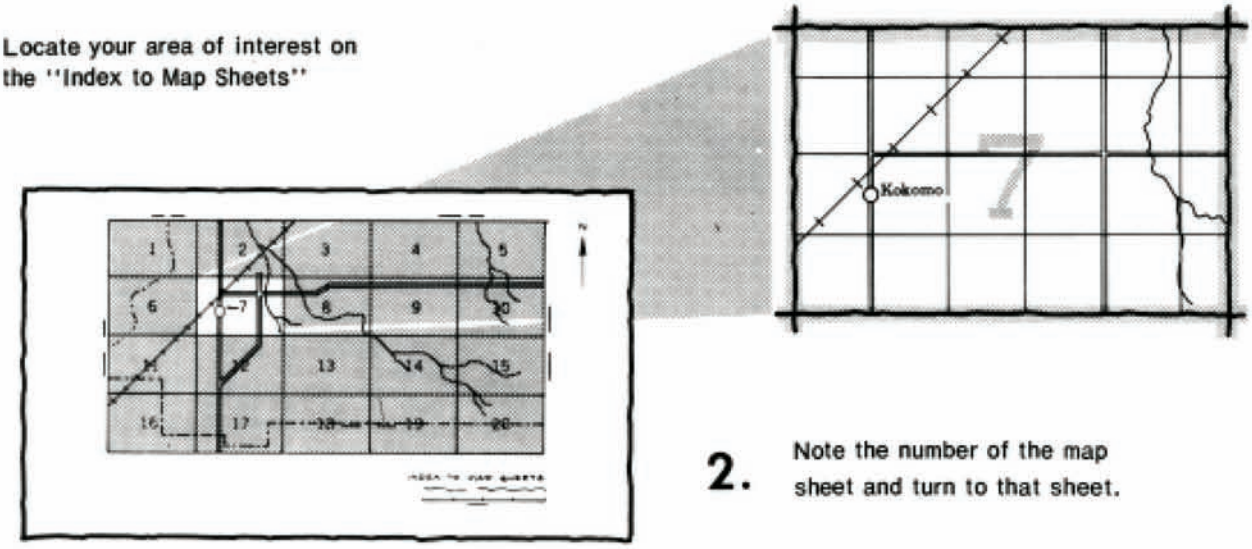
Soil Survey of

SAUK COUNTY, WISCONSIN

United States Department of Agriculture
Soil Conservation Service
in cooperation with
Research Division of the
College of Agricultural and Life Sciences
University of Wisconsin

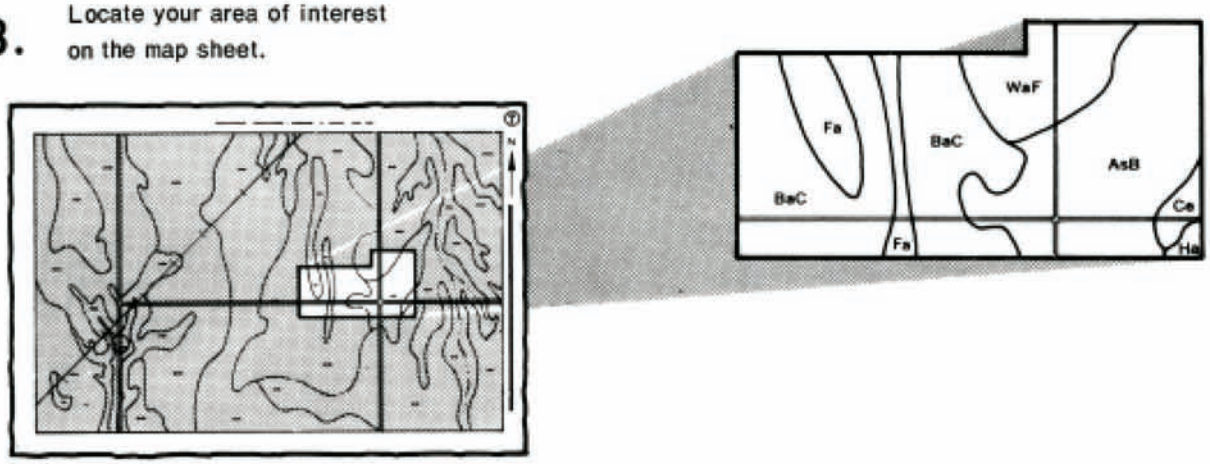
HOW TO USE

1. Locate your area of interest on the "Index to Map Sheets"

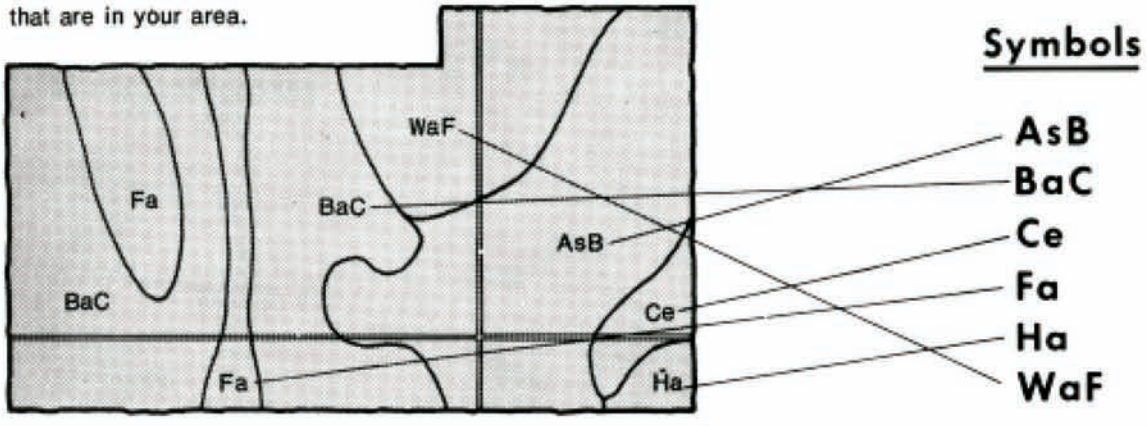


2. Note the number of the map sheet and turn to that sheet.

3. Locate your area of interest on the map sheet.

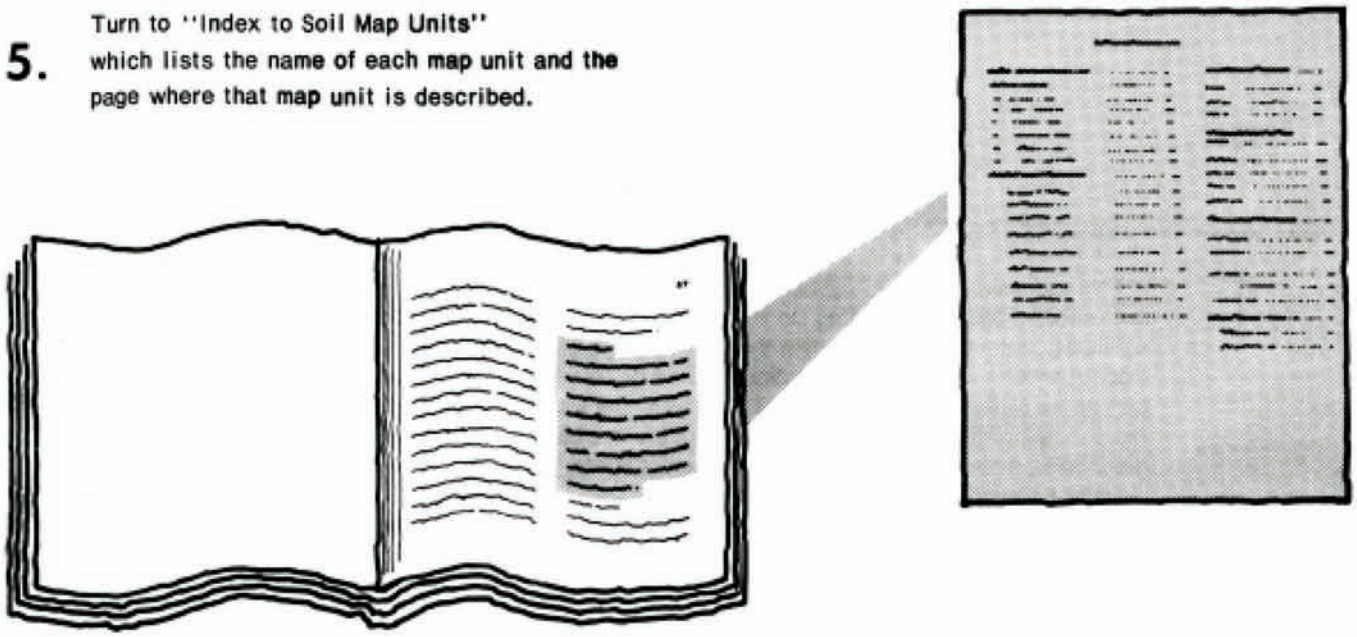


4. List the map unit symbols that are in your area.

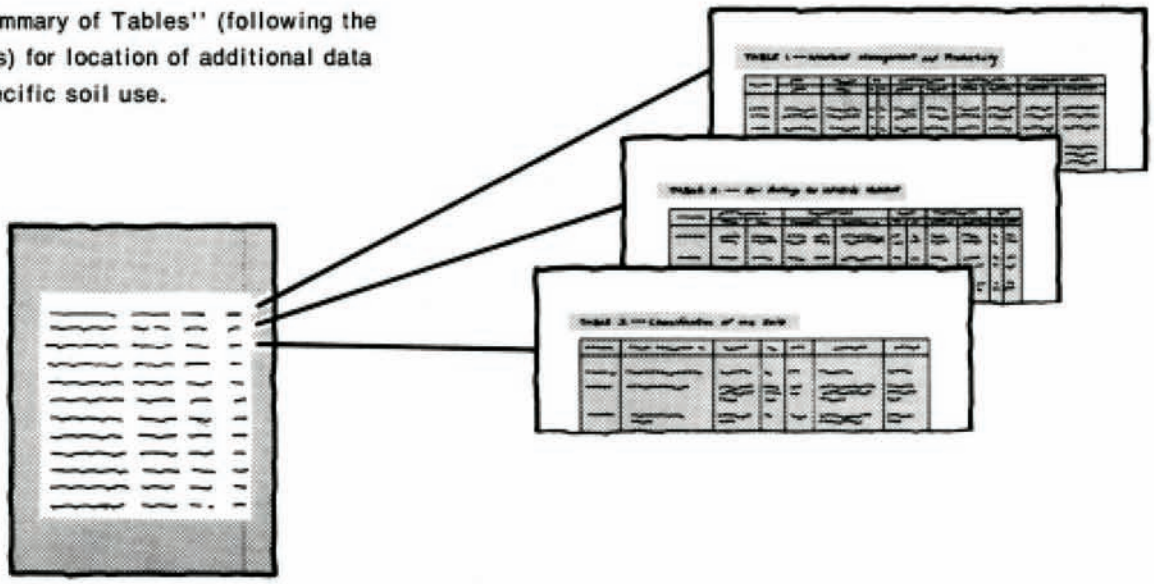


THIS SOIL SURVEY

5. Turn to "Index to Soil Map Units" which lists the name of each map unit and the page where that map unit is described.



6. See "Summary of Tables" (following the Contents) for location of additional data on a specific soil use.



7. Consult "Contents" for parts of the publication that will meet your specific needs. This survey contains useful information for farmers or ranchers, foresters or agronomists; for planners, community decision makers, engineers, developers, builders, or homebuyers; for conservationists, recreationists, teachers, or students; to specialists in wildlife management, waste disposal, or pollution control.

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 Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, or age.

Major fieldwork for this soil survey was performed in the period 1962-76. Soil names and descriptions were approved in 1977. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1977. This survey was made cooperatively by the Soil Conservation Service and the Research Division of the College of Agricultural and Life Sciences, University of Wisconsin. It is part of the technical assistance furnished to the Sauk County Soil and Water Conservation District. The fieldwork was partly financed by the Sauk County Soil and Water Conservation District.

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

Cover: Contour strips of oats and alfalfa on sloping Valton soils. Contour stripcropping is part of the upland erosion-control program in the Plain-Honey Creek Watershed.

Contents

	Page
Index to map units	v
Summary of tables	vii
Foreword	ix
General nature of the county	1
Climate	1
Geology and underlying material	2
Physiography, relief, and drainage	2
Water supply	3
History and development	4
Transportation and industry	5
How this survey was made	5
General soil map for broad land use planning	5
Map unit descriptions	7
1. Valton	7
2. La Farge-Norden-Gale	8
3. Eleva-Boone-Plainfield	9
4. Baraboo-Rock outcrop	9
5. McHenry-St. Charles	10
6. Wyocena-Gotham-Plainfield	10
7. Dickinson-Gotham-Dakota	11
8. Sparta-Plainfield-Sparta variant	12
9. Ettrick-Fluvaquents, wet-Curran	13
10. Briggsville-Mosel-Colwood	13
11. Fluvaquents, wet-Fluvaquents	14
Soil maps for detailed planning	14
Soil descriptions	15
Use and management of the soils	106
Crops and pasture	107
Yields per acre	109
Land capability classification	109
Woodland management and productivity	110
Windbreaks and environmental plantings	111
Engineering	112
Building site development	112
Sanitary facilities	113
Construction materials	114
Water management	115
Recreation	116
Wildlife habitat	117
Wildlife area 1	117
Wildlife area 2	117
Wildlife area 3	117
Wildlife area 4	118
Soil properties	119
Engineering properties and classifications	119
Physical and chemical properties	120
Soil and water features	121
Engineering test data	122
Classification of the soils	122
Soil series and morphology	122
Adrian series	123
Arenzville series	123
Atterberry series	124
Baraboo series	124
Baraboo variant	125
Bertrand series	126
Billett series	126
Boone series	127
Brems series	127
Briggsville series	128
Chaseburg series	128
Colwood series	129
Curran series	129
Dakota series	130
Dells series	130
Dickinson series	131
Eleva series	132
Eleva variant	132
Elkmound series	132
Ettrick series	133
Fayette series	133
Fox series	134
Gale series	135
Gotham series	135
Granby series	135
Granby variant	136
Houghton series	136
Jackson series	137
Kendall series	138
La Farge series	138
Marshan series	139
McHenry series	139
Mosel series	140
Norden series	141
Orion series	141
Ossian series	142
Palms series	142
Pillot series	143
Plainfield series	144
Reedsburg series	144
Richwood series	145
Rimer series	145
Ringwood series	146
Rowley series	147
St. Charles series	147
Shiffer series	148
Shiffer variant	149
Sisson series	149
Sparta series	150
Sparta variant	150
Tama series	151
Tell series	151
Toddville series	152
Tustin series	153
Urne series	153
Valton series	154

Contents—Continued

	Page
Watseka series	154
Wildale series	155
Wyocena series	156
Formation of the soils	156
Parent material	156
Climate	157
Plant and animal life	157
Relief	158
Time	158
References	158
Glossary	159
Tables	165

Issued March 1980

Index to map units

	Page
Ad—Adrian muck	15
ArA—Arenzville silt loam, 0 to 3 percent slopes	15
AtA—Atterberry silt loam, 0 to 2 percent slopes	16
AtB—Atterberry silt loam, 2 to 6 percent slopes	17
BaB—Baraboo silt loam, 2 to 6 percent slopes	18
BaC—Baraboo silt loam, 6 to 12 percent slopes	18
BbC—Baraboo stony silt loam, 2 to 12 percent slopes	19
BbD—Baraboo stony silt loam, 12 to 30 percent slopes	21
BcE—Baraboo-Rock outcrop complex, 12 to 60 percent slopes	22
BdB—Baraboo Variant stony silt loam, 1 to 6 percent slopes	23
BeB—Bertrand silt loam, 2 to 6 percent slopes	24
BeC2—Bertrand silt loam, 6 to 12 percent slopes, eroded	24
BlB—Billett sandy loam, 1 to 6 percent slopes	25
BlC2—Billett sandy loam, 6 to 12 percent slopes, eroded	26
BlD2—Billett sandy loam, 12 to 20 percent slopes, eroded	26
BmA—Billett fine sandy loam, moderately well drained, 0 to 3 percent slopes	27
BoB—Boone sand, 2 to 6 percent slopes	28
BoC—Boone sand, 6 to 12 percent slopes	28
BoD—Boone sand, 12 to 30 percent slopes	29
BrA—Brems loamy sand, 0 to 3 percent slopes	30
BtB—Briggsville silt loam, 2 to 6 percent slopes	30
ChA—Chaseburg silt loam, 0 to 3 percent slopes	31
Co—Colwood loam	32
CuA—Curran silt loam, 0 to 3 percent slopes	32
DaA—Dakota loam, 0 to 2 percent slopes	33
DaB—Dakota loam, 2 to 6 percent slopes	34
DeA—Dells silt loam, 0 to 3 percent slopes	34
DkB—Dickinson sandy loam, 1 to 6 percent slopes	35
DkC—Dickinson sandy loam, 6 to 12 percent slopes	36
ElB—Eleva sandy loam, 2 to 6 percent slopes	36
ElC2—Eleva sandy loam, 6 to 12 percent slopes, eroded	37
ElD2—Eleva sandy loam, 12 to 20 percent slopes, eroded	38
ElE—Eleva sandy loam, 20 to 30 percent slopes	39
EmA—Eleva Variant sandy loam, 0 to 3 percent slopes	39
EnB—Elkmound sandy loam, 2 to 6 percent slopes	40
EnC—Elkmound sandy loam, 6 to 12 percent slopes	41
EnD—Elkmound sandy loam, 12 to 20 percent slopes	42
Et—Ettrick silt loam	42
FaB—Fayette silt loam, 2 to 6 percent slopes	43
FaC2—Fayette silt loam, 6 to 12 percent slopes, eroded	44
FaD2—Fayette silt loam, 12 to 20 percent slopes, eroded	45
Fu—Fluvaquents	45
Fw—Fluvaquents, wet	46
FxB—Fox loam, 2 to 6 percent slopes	47
FxC2—Fox loam, 6 to 15 percent slopes, eroded	47
GaB—Gale silt loam, 2 to 6 percent slopes	48
GaC2—Gale silt loam, 6 to 12 percent slopes, eroded	49
GaD2—Gale silt loam, 12 to 20 percent slopes, eroded	50
GaE—Gale silt loam, 20 to 30 percent slopes	51
GoB—Gotham loamy sand, 1 to 6 percent slopes	51
GoC—Gotham loamy sand, 6 to 12 percent slopes	52
GoD—Gotham loamy sand, 12 to 25 percent slopes	53
Gr—Granby loamy sand	53
Gv—Granby Variant loamy sand	54
Ho—Houghton muck	55
JaA—Jackson silt loam, 0 to 2 percent slopes	55
JaB—Jackson silt loam, 2 to 6 percent slopes	57
KlA—Kendall silt loam, 0 to 3 percent slopes	57
LfB—La Farge silt loam, 2 to 6 percent slopes	58
LfC2—La Farge silt loam, 6 to 12 percent slopes, eroded	59
LfD2—La Farge silt loam, 12 to 20 percent slopes, eroded	60
LfE—La Farge silt loam, 20 to 30 percent slopes	60
Mc—Marshan loam	61
MdB—McHenry silt loam, 2 to 6 percent slopes	62
MdC2—McHenry silt loam, 6 to 12 percent slopes, eroded	63
MdD2—McHenry silt loam, 12 to 20 percent slopes, eroded	63
MdE—McHenry silt loam, 20 to 30 percent slopes	64
MsA—Mosel loam, 0 to 3 percent slopes	65
NlB—Norden loam, 2 to 6 percent slopes	66
NlC2—Norden loam, 6 to 12 percent slopes, eroded	66
NlD2—Norden loam, 12 to 20 percent slopes, eroded	67
NlE—Norden loam, 20 to 30 percent slopes	68
NrE—Norden and Eleva soils and Rock outcrop, 12 to 60 percent slopes	69
Or—Orion silt loam	70
Os—Ossian silt loam	70
Pa—Palms muck	71
PcA—Pillot silt loam, 0 to 2 percent slopes	72
PcB—Pillot silt loam, 2 to 6 percent slopes	72
Pd—Pits, gravel	73
Pe—Pits, quarries	73
PfB—Plainfield loamy sand, 1 to 6 percent slopes	73
PfC—Plainfield loamy sand, 6 to 12 percent slopes	74
PfD—Plainfield loamy sand, 12 to 30 percent slopes	75
RbB—Reedsburg silt loam, 2 to 6 percent slopes	75

Index to map units—Continued

	Page
RhA—Richwood silt loam, 0 to 2 percent slopes	76
RhB—Richwood silt loam, 2 to 6 percent slopes	77
RmA—Rimer loamy sand, 0 to 3 percent slopes	78
RnB—Ringwood silt loam, 2 to 6 percent slopes	78
RnC2—Ringwood silt loam, 6 to 12 percent slopes, eroded	79
Rt—Rock outcrop, quartzite	80
Ry—Rowley silt loam	80
ScB—St. Charles silt loam, 2 to 6 percent slopes	81
ScC2—St. Charles silt loam, 6 to 12 percent slopes, eroded	81
ScD2—St. Charles silt loam, 12 to 20 percent slopes, eroded	82
Se—Saprists and Aquents	83
SfA—Shiffer loam, 0 to 3 percent slopes	83
ShA—Shiffer Variant sandy loam, 0 to 3 percent slopes	84
SnB—Sisson loam, 2 to 6 percent slopes	85
SpB—Sparta loamy sand, 1 to 6 percent slopes	86
SpC—Sparta loamy sand, 6 to 12 percent slopes	86
St—Sparta Variant loamy sand	87
TaA—Tama silt loam, 0 to 2 percent slopes	88
TaB—Tama silt loam, 2 to 6 percent slopes	88
TaC2—Tama silt loam, 6 to 12 percent slopes, eroded	89
TeA—Tell silt loam, 0 to 2 percent slopes	90
TeB—Tell silt loam, 2 to 6 percent slopes	90
TeC2—Tell silt loam, 6 to 12 percent slopes, eroded	91
TeD2—Tell silt loam, 12 to 20 percent slopes, eroded	92
TvA—Toddville silt loam, 0 to 2 percent slopes	92
TvB—Toddville silt loam, 2 to 6 percent slopes	93
TwB—Tustin loamy sand, 1 to 6 percent slopes	94
UfB—Urne fine sandy loam, 2 to 6 percent slopes	95
UfC2—Urne fine sandy loam, 6 to 12 percent slopes, eroded	95
UfD2—Urne fine sandy loam, 12 to 20 percent slopes, eroded	96
UfE—Urne fine sandy loam, 20 to 30 percent slopes	97
VaB—Valton silt loam, 2 to 6 percent slopes	97
VaC2—Valton silt loam, 6 to 12 percent slopes, eroded	98
VaD2—Valton silt loam, 12 to 20 percent slopes, eroded	99
VaE—Valton silt loam, 20 to 30 percent slopes	100
Wt—Watseka loamy sand	101
WwB—Wildale silt loam, 2 to 6 percent slopes	102
WwC2—Wildale silt loam, 6 to 12 percent slopes, eroded	102
WwD2—Wildale silt loam, 12 to 20 percent slopes, eroded	103
WxB—Wyocena sandy loam, 2 to 6 percent slopes	103
WxC2—Wyocena sandy loam, 6 to 12 percent slopes, eroded	104
WxD2—Wyocena sandy loam, 12 to 20 percent slopes, eroded	105
WxE—Wyocena sandy loam, 20 to 30 percent slopes	106

Summary of tables

	Page
Temperature and precipitation (table 1)	166
Freeze dates in spring and fall (table 2) *Probability. Temperature.*	166
Acreage and proportionate extent of the soils (table 3) *Acres. Percent.*	167
Yields per acre of crops and pasture (table 4) *Corn. Corn silage. Oats. Grass-legume hay. Kentucky bluegrass. Soybeans.*	169
Capability classes and subclasses (table 5) *Total acreage. Major management concerns.*	174
Woodland management and productivity (table 6) *Ordination symbol. Management concerns. Potential productivity. Trees to plant.*	175
Windbreaks and environmental plantings (table 7) *Trees having predicted 20-year average heights.*	181
Building site development (table 8) *Shallow excavations. Dwellings without basements. Dwellings with basements. Small commercial buildings. Local roads and streets. Lawns and landscaping.*	187
Sanitary facilities (table 9) *Septic tank absorption fields. Sewage lagoon areas. Trench sanitary landfill. Area sanitary landfill. Daily cover for landfill.*	194
Construction materials (table 10) *Roadfill. Sand. Gravel. Topsoil.*	202
Water management (table 11) *Pond reservoir areas. Embankments, dikes, and levees. Drainage. Irrigation. Terraces and diversions. Grassed waterways.*	209
Recreational development (table 12) *Camp areas. Picnic areas. Playgrounds. Paths and trails. Golf fairways.*	215
Wildlife habitat potentials (table 13) *Potential for habitat elements. Potential as habitat for—Openland wildlife, Woodland wildlife, Wetland wildlife.*	222
Engineering properties and classifications (table 14) *Depth. USDA texture. Classification—Unified, AASHTO. Fragments greater than 3 inches. Percentage passing sieve—4, 10, 40, 200. Liquid limit. Plasticity index.*	227

Summary of tables—Continued

	Page
Physical and chemical properties of soils (table 15) ..... *Depth. Permeability. Available water capacity. Soil reaction. Shrink-swell potential. Erosion factors. Wind erodibility group.*	236
Soil and water features (table 16) ..... *Hydrologic group. Flooding. High water table. Bedrock. Potential frost action. Risk of corrosion.*	241
Engineering test data (table 17) ..... *Moisture density. Grain-size distribution. Liquid limit. Plasticity index. Classification.*	246
Classification of the soils (table 18) ..... *Family or higher taxonomic class.*	248

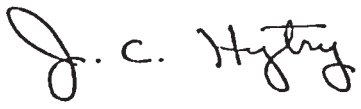
Foreword

This soil survey contains information that can be used in land-planning programs in Sauk County, Wisconsin. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

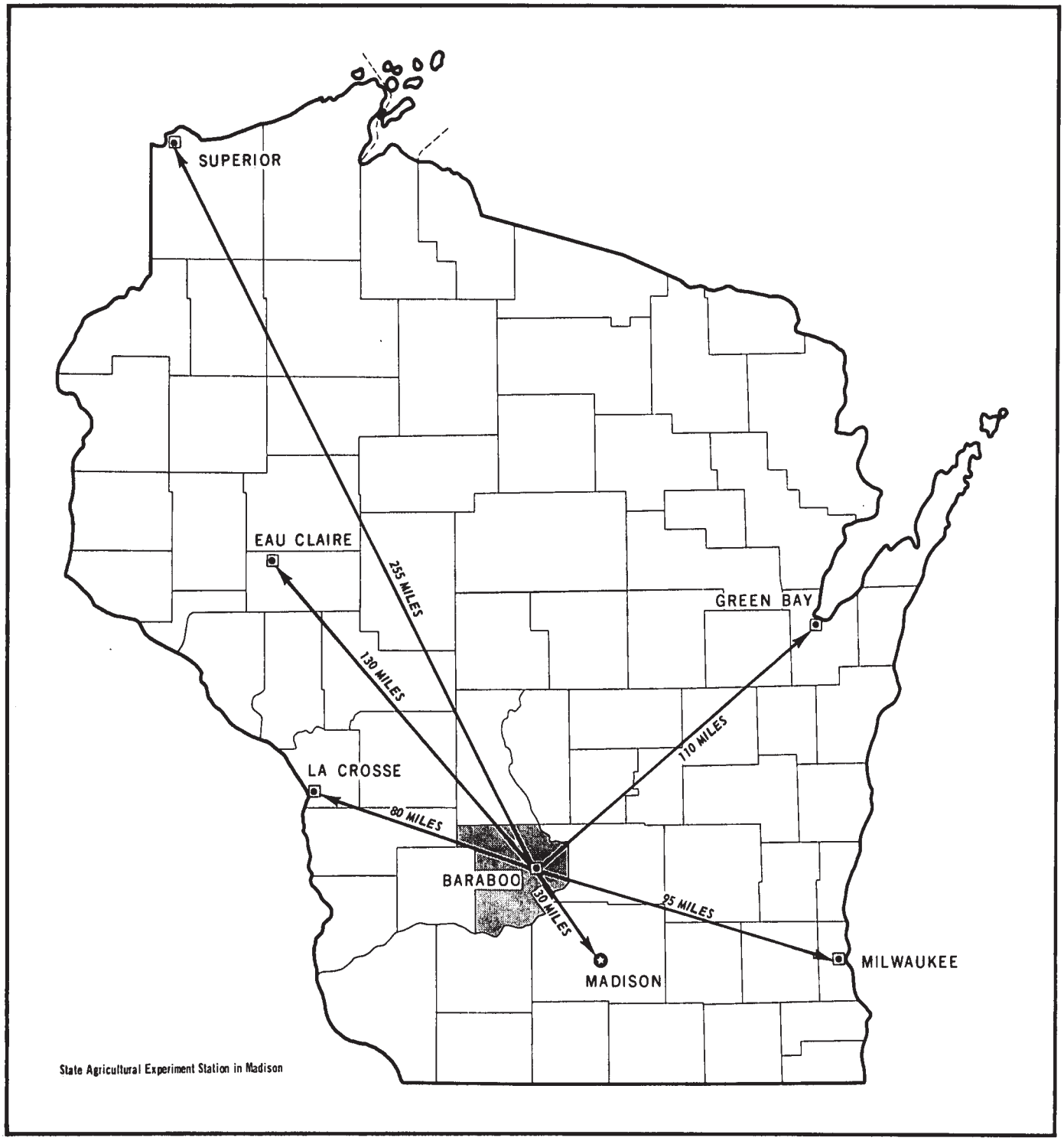
This soil survey is designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey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

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

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



J.C. Hytry
State Conservationist
Soil Conservation Service



Location of Sauk County in Wisconsin.

SOIL SURVEY OF SAUK COUNTY, WISCONSIN

By Howard F. Gundlach, Soil Conservation Service

Fieldwork by Howard F. Gundlach, David C. Roberts, Robert W. Slota, and Keith H. Widdel, Soil Conservation Service

United States Department of Agriculture, Soil Conservation Service, in cooperation with the Research Division of the College of Agricultural and Life Sciences, University of Wisconsin

SAUK COUNTY, in the southwestern part of Wisconsin, has a total area of 544,640 acres. Of this total, 537,915 acres is land and 6,725 acres is water. The county is an area of farms, small cities, and villages. In 1977, the population was about 41,316. Baraboo, the county seat and largest city, had a population of 7,931. The Wisconsin River forms the southern and extreme northeastern boundaries of the county. Manufacturing activities are diversified. Dairying is the major agricultural enterprise. Hogs and beef cattle are also significant. Recreation and tourism are important to the economy, especially in the Baraboo-Wisconsin Dells area in the eastern part of the county.

General nature of the county

The climate of Sauk County, the geology and underlying material, and the physiography, relief, and drainage are described in the paragraphs that follow. Also in this part of the survey is information on water supply, history and development, and transportation and industry.

Climate

The climate of Sauk County is continental, characterized by marked changes in weather common to the latitude and interiors of large land masses. There is a tendency toward extremes in all of the climatic elements. Seasons vary widely from year to year and vary considerably in temperature and precipitation. Frequent weather systems move across the county from west to east. Spring, a mixture of warm and cold periods, is often late. With advancing spring, the frequency of precipitation is less and the intensity greater. Summers are warm. Hot and humid spells are frequent but last for only a few days. Cool periods generally occur during any summer month. Dew is typical and is often heavy. Fall arrives suddenly in mid-September and often lingers on into November. In nearly every year there are periods after the killing freeze when days are abnormally warm with clear skies or are sunny but hazy and nights are cool. The change from fall to winter is often abrupt.

The average date of the last 32 degree freeze in spring is May 10, and the first in fall is September 28. The growing season, defined as the number of days between the last 32 degree freeze in spring and the first in fall, averages 142 days. There is some variation within the county, depending on the nearness to water and the location—a valley, a hillside, or a hilltop. Generally, freezes in the valleys are later in spring and earlier in fall than on the hillsides. Extreme temperatures, especially winter minimums, vary considerably with the changing terrain. The valleys usually have the colder temperatures.

Precipitation is usually adequate for agricultural purposes, but soil moisture is usually deficient in July and August. Severe drought affecting all crops is rare. Most precipitation in summer is in showers that vary in length and intensity. Hail falls on an average of 3 days a year.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Richland Center in the period 1930 to 1959. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring.

In winter the average temperature is 22.1 degrees F in December, January, and February, and the average daily minimum temperature is 12.4 degrees. The lowest temperature on record, which occurred at Richland Center on January, 1951, is -46 degrees. In summer the average temperature is 70.9 degrees, and the average daily maximum temperature is 83.6 degrees. The highest recorded temperature, which occurred on July, 1936, is 110 degrees.

The total annual precipitation is 32.37 inches. Of this, 19.64 inches, or 60 percent, usually falls in April through September, which includes the growing season for most crops. In 2 years out of 10, the rainfall in May through September is less than 16 inches. The heaviest 1-day rainfall during the period of record was 5.9 inches at Richland Center on October 1943. Thunderstorms occur

on about 43 days each year, and most occur in June and July.

Average seasonal snowfall is 36.2 inches. The greatest snow depth at any one winter during the period of record was 80 inches.

Relative humidity is about 50 percent about 80 percent of the time and is above 80 percent about 30 percent of the time. The sun shines 70 percent of the time possible in summer and 40 percent in winter. The prevailing wind is from the west in winter and south in summer. Average windspeed is highest, 12 miles per hour, in March, April, and November and lowest, 9 miles per hour, in July and August. The highest wind speeds are usually from a westerly direction.

Geology and underlying material

Approximately 80 percent of Sauk County lies in the part of southwestern Wisconsin that is commonly described as unglaciated. This area of the county was not covered by the most recent advances of the glaciers. It is, for the most part, a well dissected bedrock upland. The highest ridges are capped with a thin layer of the Oneota Dolomite Formation, which is part of the Prairie du Chien Group (*5*). In a few places this dolomite is underlain by remnants of the St. Peter Sandstone Formation, but these areas are small. Below the dolomite is the Trempealeau Group—the Jorden Sandstone Formation and the St. Lawrence Siltstone and Dolomite Formation. Below the Trempealeau Group is the Tunnel City Group, formerly designated as the Franconia Sandstone Formation. This group, which includes the Mazomanie and Lone Rock Formation, consists of dominantly very fine grained sandstone, sandy dolomite, and silty and shaly sandstones that contain layers rich in glauconite. Most of the valley slopes in the unglaciated area of the county are the Mazomanie and Lone Rock Formations. Underlying the Tunnel City Group is the Elk Mound Group, formerly designated as the Dresbach Group. The upper part of this group, the Wonewoc Formation, consists of the Ironton and Galesville Sandstones. It occurs on foot slopes along the valley floors.

In the east-central part of the county is the Baraboo Quartzite. It occurs in a conspicuous upland commonly called the Baraboo Bluffs or the Baraboo Range. In contrast to the rock formations previously mentioned—all sedimentary rocks of late Cambrian age or younger—the Baraboo Quartzite is a metamorphic rock of Pre-Cambrian age (fig. 1). This formation is an eroded monadnock that was buried beneath the sedimentary rock and is now being exhumed.

Approximately the eastern fifth of Sauk County was covered by the Green Bay Lobe of the Cary Substage of the Wisconsin Stage of Glaciation. The glacier came into the county from the east, moving slowly westward. The terminal moraine, marking the farthest advance of the Green Bay Lobe, is easily discernible (fig. 2). In general, the ice lowered the preglacial relief by eroding the hills and filling the valleys. The glacier blocked the Wisconsin River from its original path through the Baraboo Bluffs by plugging both ends of the gap in the south bluff with glacial drift, resulting in the formation of Devils Lake in the gap.

Physiography, relief, and drainage

Most of Sauk County lies in that part of southwestern Wisconsin that was not covered by the last glaciation. Only about the eastern fifth of the county was glaciated. The unglaciated part is a deeply dissected bedrock plateau with narrow ridges and steep sided valleys. In most areas the bedrock is mantled with 2 to several feet of loess or bedrock residuum, or both. The valleys, incised 300 to 400 feet below the ridgetops, are up to 2 miles wide. The eastern part of the county, an area of terminal and ground moraines, was greatly modified by glaciation. The terrain is gently undulating to hilly. Slopes are complex.

The most conspicuous and probably the most famous topographic feature in Sauk County is the Baraboo Range. It consists of a large mass of metamorphic quartzite rock that has been folded into a trough of syncline. This syncline has an east-west longitudinal axis about 25 miles long. Twenty miles of this axis is in Sauk County. The Range has been partly exhumed from the softer surrounding sedimentary rocks. At the eastern end it rises 400 to 800 feet above the nearby plain. Actually the Baraboo Range consists of two distinct ranges, joined at both the east and west ends but separated in the middle by a canoe-shaped upland of lower elevation. The east ends of both the North and South Ranges were covered by the glacier. Here the quartzite rock, except for some of the steeper slopes, is covered with a thick blanket of glacial drift. The resulting landscape is one of sloping to very steep complex slopes. The unglaciated part of the Range has broad gently sloping to sloping ridgetops that drop off to very steep side slopes or bluffs of bare quartzite. Here the quartzite, except on some of the steeper slopes, is blanketed with 2 to several feet of loess.

Another important topographic feature of the county is the outwash terraces. The terrace in the Spring Green area was formed by the Wisconsin River. It is dominantly nearly level and gently sloping. The low rolling dune areas formed through deposition of windblown sands. The outwash terrace near Merrimac, a combination of outwash and lacustrine deposits, has several levels. It was formed by deposition in an extinct glacial lake and by the melt waters from the retreating glacier. It is well dissected with gently sloping to steep complex slopes and is pitted with small depressions, some of which are small ponds or bogs. The outwash terrace in the Sauk City-Prairie du Sac area and the outwash terrace between Baraboo and Wisconsin Dells were both formed from outwash deposited by melt waters of the glacier. The terminal moraine fronts on both of these terraces.

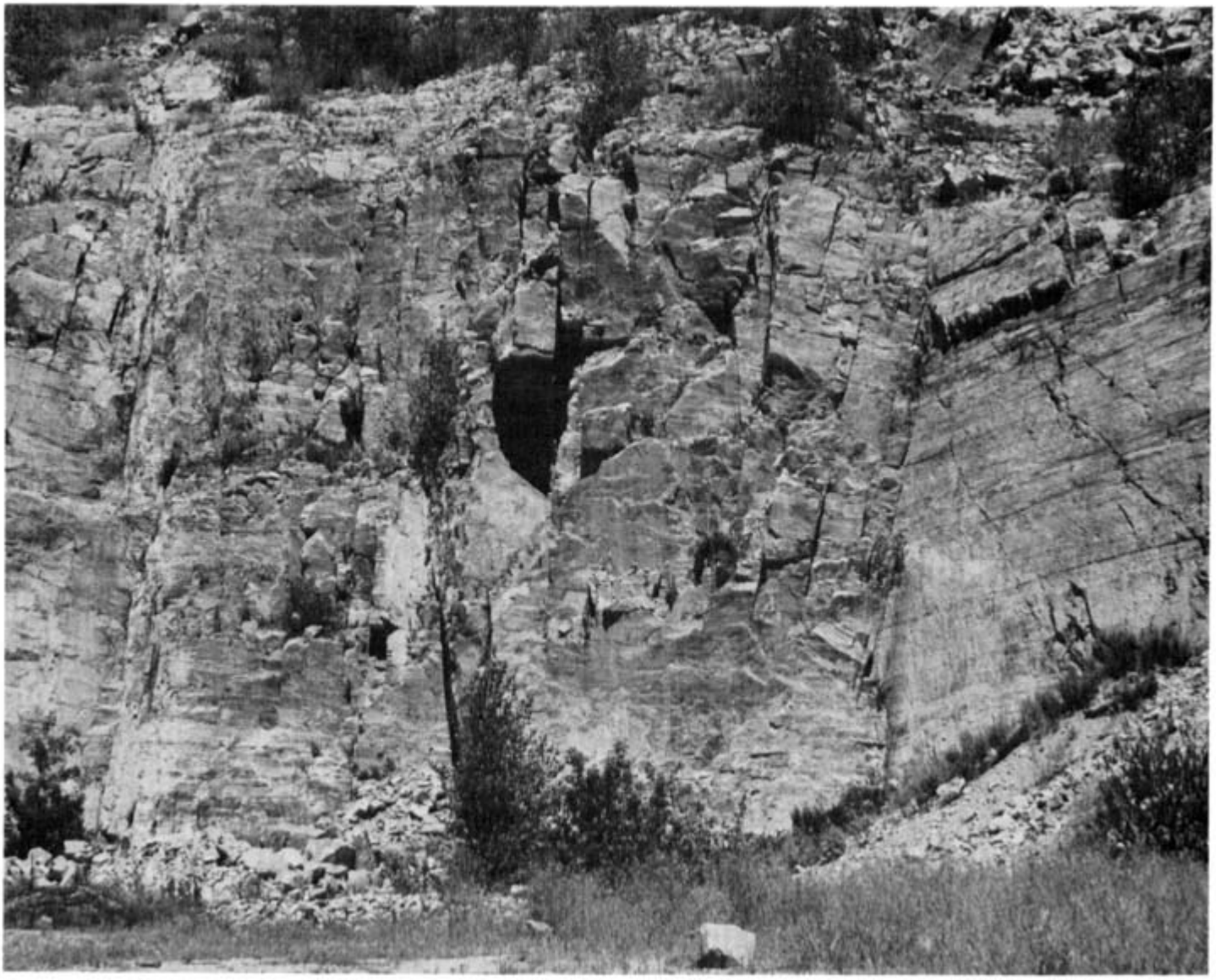


Figure 1.—Exposure of quartzite bedrock in abandoned quarry. The quartzite is crushed and used as ballast for roadbeds.

Both areas are dominantly nearly level and gently sloping and have been only slightly dissected.

The highest point in the county, an elevation of about 1,600 feet, is on the glaciated part of the Baraboo Range. The lowest elevation in the county, about 700 feet, is along the Wisconsin River near Spring Green. The general elevation of the county ranges from 775 to 1,000 feet.

All of Sauk County lies within the drainage basin of the Wisconsin River. Except for some small isolated depressions in the glaciated area, all parts of the county are reached by streams that provide outlets for drainage waters. The Baraboo River drains most of the northern part of the county. Smaller creeks, such as Honey Creek, drain the southern part of the county. Many streams are fed by permanent springs. Most of the county is well drained. Only about 10 percent is poorly drained or very poorly drained. About 6 percent is somewhat poorly drained. Most of these wet areas are on bottom land along the streams and rivers.

Water supply

The many springs, streams, and rivers in Sauk County in addition to a number of lakes furnish an abundant

Figure 2.—Cut 25 feet deep exposing gravelly glacial till in gravel pit in terminal moraine.

supply of surface water. For most uses, however, ground water is the major source of supply. In Sauk County, ground water is readily available in quantities adequate to meet the present and anticipated domestic, agricultural, municipal, and industrial needs.

Ground water is found at various depths, depending on the general topography, the distance above the permanent stream level, and the character of the underlying rock formation. It is stored in porous strata called aquifers. At a certain depth below the surface, all pores and fissures in the bedrock or in unconsolidated material, such as sand and gravel, are filled with ground water. It is into these water-filled layers that wells must be drilled in order to obtain an adequate supply. The level of ground water may rise and fall from season to season and year to year, depending on rainfall.

Most ground water in Sauk County is obtained from the Cambrian sandstone aquifer, which underlies most of the county. This aquifer provides reliable supplies of water suitable for virtually all uses. It produces high yields, as much as 1,850 gallons per minute. The average yield in high capacity wells is 400 to 500 gallons per minute (*4*).

Another important source of ground water in some parts of Sauk County is the surficial sand and gravel deposits along the Wisconsin River and the lower reaches of the Baraboo River. These deposits yield large quantities of water to wells having high capacity yields that average more than 700 gallons per minute.

One area in east-central Sauk County is underlain by Precambrian quartzite bedrock. In this area the sand and gravel and sandstone aquifers are thin or absent. The nonporous quartzite, which holds water only in fractures in the rock, is generally not considered an aquifer. Drilling wells is expensive in this hard rock, and yields are generally low—often barely sufficient for domestic purposes. The highest well yield reported from this quartzite is 20 gallons per minute.

Ground water in Sauk County is generally of very good quality and is usable for most purposes. Local differences in the quality of ground water are the result of differences in the composition, the solubility, and the surface area of particles of soil and rock through which the water moves and in the length of time the water is in contact with these materials. The main chemical constituents in the water are calcium, magnesium, and bicarbonate irons that are derived primarily from dolomite and from glacial drift containing fragments of dolomite. Minor problems are caused by hardness, and locally, by high concentrations of iron or nitrate.

History and development

The area now known as Sauk County was controlled by the Winnebago Indians until 1837 when, through a treaty, they ceded it to the United States. The Indians directly and historically associated with Sauk County are the Sacs (Sauks), the Foxes, and the Winnebagos.

In 1673, Louis Joliet and Father James Marquette traveled down the Wisconsin River from what is now Portage on their journey to find the Mississippi River.

In the spring of 1838, three men staked out claims at the present site of Sauk City. By 1840, there were settlements at what are now Prairie du Sac and Baraboo. The county was formed in 1839-40 and was surveyed between 1840 and 1845.

The first railroad in the county was the Chicago, Milwaukee, St. Paul, and Pacific Railroad. It was built through the extreme southern part of the county in 1856, and Spring Green was established. The Chicago and North Western Railway was built through Baraboo and Reedsburg in the northern part of the county in 1871-72.

The first agricultural community, Sauk City, was founded in 1854. Wheat, corn, and potatoes were the most important crops of the early settlers. Farming still prevails as the predominant land use in the county and is likely to continue as such for many years.

According to the 1970 census, the population of Sauk County was 39,057, which reflected an increase of about 6 percent over the 1960 census. This population increase can be attributed to the increase in manufacturing employment, the development of several artificial lakes in the county, and the general trend toward rural nonfarm residential development.

Transportation and Industry

Rail service in Sauk County is provided by the Chicago and North Western and by the Milwaukee Road. Good hard-surfaced or gravel roads extend to all parts of the county. Interstate Highways 90 and 94 cut across the northeast corner of the county. State Highway 33 in northern Sauk County and State Highways 60 and 14 in southern Sauk County are the main east-west roads. State Highway 23 in the western part of the county and State Highway 12 in the eastern part are the main north-south roads.

Agriculture is the major enterprise, with hogs and beef cattle well represented. Cash cropping is increasing, and vegetable production is significant. The number of farms in the county is decreasing, but the average size of farms is increasing, as is the value of land and buildings per farm.

About 30 percent of Sauk County is forested. The harvest of timber for sawlogs and pulp is common.

Mineral production in the county presently includes crushed quartzite for ballast and abrasives, crushed and ground limestone, and sand and gravel (fig. 3). Iron ore was taken from four iron mines in the county in earlier years. The last of these mines closed in 1925, but the potential exists for future iron mining in the county. In 1909, it was estimated that three of these mines, in the Baraboo and La Rue area, had reserves of 910 billion tons of ore that is 35 percent or more iron (*3*).

Manufacturing activity in the county is diversified. Current industries include food products, textiles, wood products, furniture, plastic products, and electrical equipment.

The tourist and recreation industry has long been an important part of the economy in Sauk County. The contrasting geologic features of the county provide educational and recreational appeal. Among the more important recreational attractions in the county are Devil's Lake State Park, the Wisconsin Dells, the Mid Continent Railroad Museum, and the Circus World Museum. Devil's Lake State Park alone attracts more than a million and a half visitors annually.

How this survey was made

Soil scientists made this survey to learn what soils are in the survey area, where they are, and how they can be used. They observed the steepness, length, and shape of slopes; the size of streams and the general pattern of drainage; the kinds of native plants or crops; and the kinds of rock. They dug many holes to study soil profiles. A profile is the sequence of natural layers, or horizons, in a soil. It extends from the surface down into the parent material, which has been changed very little by leaching or by plant roots.

The soil scientists recorded the characteristics of the profiles they studied and compared those profiles with others in nearby counties and in more distant places. They classified and named the soils according to nationwide uniform procedures. They drew the boundaries of the soils on aerial photographs. These photographs show trees, buildings, fields, roads, and other details that help in drawing boundaries accurately. The soil maps at the back of this publication were prepared from aerial photographs.

The areas shown on a soil map are called map units. Most map units are made up of one kind of soil. Some are made up of two or more kinds. The map units in this survey area are described under "General soil map for broad land use planning" and "Soil maps for detailed planning."

While a soil survey is in progress, samples of some soils are taken for laboratory measurements and for engineering tests. All soils are field tested to determine their characteristics. Interpretations of those characteristics may be modified during the survey. Data are assembled from other sources, such as test results, records, field experience, and state and local specialists. For example, data on crop yields under defined management are assembled from farm records and from field or plot experiments on the same kinds of soil.

But only part of a soil survey is done when the soils have been named, described, interpreted, and delineated on aerial photographs and when the laboratory data and other data have been assembled. The mass of detailed information then needs to be organized so that it can be used by farmers, woodland managers, engineers, planners, developers and builders, home buyers, and others.

General soil map for broad land use planning

The general soil map at the back of this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, a map unit

Figure 3.—Exposure of dolomite bedrock in a quarry. Dolomite is crushed for road gravel and ground for agricultural lime.

consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one unit can occur in other units but in a different pattern.

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

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

Each map unit is rated for *cultivated crops, specialty crops, woodland, urban uses,* and *recreation areas.* Cultivated crops are those grown extensively in the survey area. Specialty crops are the vegetables and fruits that generally require intensive management. Woodland refers to areas of native or introduced trees. Urban uses include residential, commercial, and industrial developments. Intensive recreation areas are campsites, picnic areas, ballfields, and other areas that are subject to heavy foot

traffic. Extensive recreation areas are those used for nature study and as wilderness.

Map unit descriptions

Areas dominated by moderately well drained to excessively drained soils that have a loamy or sandy surface layer and a loamy, sandy, or clayey subsoil; underlain by bedrock

These are gently sloping to very steep soils on unglaciated uplands. They make up 63 percent of the county. Suitability is good or fair for cultivated crops and pasture. On the steeper soils it is good for trees.

1. Valton

Gently sloping to steep, well drained, medium textured soils; dolomite below a depth of 60 inches

This map unit is on ridgetops and upper side slopes on unglaciated uplands (fig. 4). It occupies about 13 percent of the county. It is about 60 percent Valton soils and 40 percent soils of minor extent.

Valton soils are well drained. They are moderately permeable in the silty upper part and slowly permeable in the cherty clay residuum. The available water capacity is moderate. Typically the surface layer is very dark grayish brown silt loam about 8 inches thick. In most cultivated areas it contains some dark yellowish brown subsoil material that has been mixed in by plowing. The subsoil to a depth of about 60 inches is dark yellowish brown, friable silt loam in the upper part; brown, firm silty clay loam in the middle part; and reddish brown and yellowish red, very firm cherty clay in the lower part.

Minor in this unit are the well drained Wildale and Fayette soils and the somewhat poorly drained Reedsburg soils. Wildale and Fayette soils are intermingled with Valton soils on plane and convex ridges and slopes. Reedsburg soils are in plane to slightly convex areas of the broader ridgetops and in drainageways.

The Valton soils in this map unit are used mainly for cultivated crops. Some areas are woodland, and some are pastureland. Erosion is the main hazard in cultivated areas.

The gently sloping Valton soils have good potential for cultivated crops, the sloping and moderately steep soils fair potential, and the steep soils poor potential. All have good potential for trees.

The potential for residential development is only medium. Slow permeability is a severe limitation for septic tank absorption fields. In addition, the soils lack sufficient strength and stability to support foundations and vehicular traffic.

Figure 4.—Broad ridgetop of Valton soils. The bedrock is dolomite.

2. La Farge-Norden-Gale

Gently sloping to very steep, well drained, medium textured soils; sandstone bedrock at a depth of 20 to 40 inches

This map unit is on ridgetops, side slopes, and valley floors in the unglaciated sandstone uplands (fig. 5). It occupies about 37 percent of the county. It is about 25 percent La Farge soils, 20 percent Norden soils, 9 percent Gale soils, and 46 percent soils of minor extent.

La Farge soils are well drained. They are moderately permeable. The available water capacity is moderate. Typically, the surface layer is dark grayish brown silt loam about 8 inches thick. The subsoil is about 25 inches thick. It is brown, friable silt loam in the upper part; dark yellowish brown, firm silt loam in the middle part; and light olive brown, firm clay loam in the lower part. Glauconitic sandstone and siltstone bedrock is at a depth of about 33 inches. It is light olive brown, soft, interbedded sandstone and siltstone to a depth of about 60 inches.

Norden soils are well drained. They are moderately permeable. The available water capacity is moderate. Typically, the surface layer is very dark gray loam about 3 inches thick. The subsurface layer is brown loam about 4 inches thick. The subsoil is about 21 inches thick. It is dark yellowish brown, friable loam in the upper part; olive brown, firm loam in the middle part; and light olive brown, firm gravelly loam in the lower part. Glauconitic sandstone bedrock is at a depth of about 28 inches. It is light olive brown, soft, platy glauconitic sandstone with thin lenses of siltstone to a depth of about 60 inches.

Gale soils are well drained. They are moderately permeable in the subsoil and rapidly permeable in the sand substratum. The available water capacity is moderate.

Figure 5.—Typical landscape of La Farge-Norden-Gale map unit.

Typically, the surface layer is dark grayish brown silt loam about 7 inches thick. The subsoil is about 24 inches thick. It is brown and dark yellowish brown, friable and firm silt loam in the upper part and brown, firm loam in the lower part. The substratum to a depth of about 60 inches is yellowish brown, loose sand over brown, yellowish brown, and brownish yellow soft sandstone. The soft sandstone bedrock begins at a depth of about 35 inches.

Minor soils in this unit are the excessively drained Boone soils, the somewhat excessively drained Eleva and Urne soils, the well drained Fayette soils, and areas where sandstone rock crops out. Boone, Eleva, Urne, and Fayette soils occupy landscape positions similar to those of La Farge, Norden, and Gale soils. The sandstone outcrops are on escarpments or very steep side slopes.

Most areas are used for cultivated crops and pasture. A large acreage of mainly steeper soils is woodland. Erosion is the main hazard in cultivated areas.

The gently sloping soils have good potential for cultivated crops, the sloping and moderately steep soils fair potential, and the steep and very steep areas poor potential. All have good potential for trees.

The potential for residential development is fair. Depth to rock is a severe limitation for septic tank absorption fields.

3. Eleva-Boone-Plainfield

Gently sloping to very steep, somewhat excessively drained and excessively drained, moderately coarse textured and coarse textured soils underlain by sandstone bedrock or outwash sand

This unit is on ridgetops, side slopes, and valley floors in the unglaciated sandstone uplands. It occupies about 7 percent of the county. It is about 20 percent Eleva soils, 15 percent Boone soils, 15 percent Plainfield soils, and 50 percent soils of minor extent. Eleva and Boone soils are on ridgetops, side slopes, and valley floors. Plainfield soils are on foot slopes and valley floors.

Eleva soils are somewhat excessively drained. They are moderately rapidly permeable. The available water capacity is low. Typically, the surface layer is dark grayish brown sandy loam about 9 inches thick. The subsoil is about 22 inches thick. It is brown and dark yellowish brown, friable sandy loam in the upper part and yellowish brown, very friable loamy sand in the lower part. The substratum to a depth of about 60 inches is yellowish brown, loose sand over light yellowish brown, soft sandstone. The soft sandstone begins at a depth of about 36 inches.

Boone soils are excessively drained. They are rapidly permeable. The available water capacity is very low. Typically, the surface layer is very dark grayish brown sand about 7 inches thick. The sand substratum is about 21 inches thick. It is dark yellowish brown and yellowish brown, loose sand. Soft sandstone begins at a depth of about 28 inches and extends to 60 inches or more. It is yellowish brown in the upper part and strong brown and very pale brown in the lower part.

Plainfield soils are excessively drained. They are rapidly permeable. The available water capacity is low. Typically, the surface layer is dark grayish brown loamy sand about 7 inches thick. The subsoil is sand about 23 inches thick. It is yellowish brown and very friable in the upper part and dark yellowish brown and loose in the lower part. The substratum to a depth of about 60 inches is yellowish brown, loose fine sand over light yellowish brown, loose sand.

Minor in this unit are the well drained Elkmound, Gale, La Farge, and Norden soils; the somewhat excessively drained Urne soils; and the somewhat poorly drained Eleva variant. Elkmound, Gale, La Farge, Norden, and Urne soils are on ridgetops, side slopes, and valley floors. The Eleva variant is in upland drainageways, depressions, and seep areas.

Most areas are used for cultivated crops or pasture, but some areas, especially of the steeper soils, are woodland. Erosion, soil blowing, and droughtiness are the main hazards in cultivated areas.

If irrigated and adequately protected from erosion and soil blowing, the gently sloping and sloping soils have fair potential for cultivated crops. The moderately steep and steep soils have poor potential. All have good potential for trees.

The potential for residential development is fair. Depth to rock is a severe limitation for septic tank absorption fields in most areas.

4. Baraboo-Rock outcrop

Gently sloping to very steep, moderately well drained, medium textured soils and quartzite Rock outcrop; quartzite bedrock at a depth of 20 to 40 inches

This map unit is on convex ridgetops and side slopes on quartzite uplands. It occupies about 6 percent of the county. It is about 69 percent Baraboo soils; 3 percent Rock outcrop, quartzite; and 28 percent soils of minor extent.

Baraboo soils are moderately well drained. They are moderately permeable. The available water capacity is moderate. Typically, the surface layer is very dark gray stony silt loam about 3 inches thick. The subsurface layer is dark grayish brown silt loam about 3 inches thick. The subsoil is brown, firm, silty clay loam about 28 inches thick. It is mottled with yellowish brown in the lower part. Pale red and weak red quartzite bedrock is at a depth of about 34 inches.

The areas of Rock outcrop, quartzite, are bare exposures of quartzite bedrock.

Minor in this unit are the well drained Fayette soils and the somewhat poorly drained Atterberry and Baraboo variant soils. Fayette soils are on broad ridgetops. Atterberry soils and the Baraboo variant are in upland drainageways, depressions, and seep areas.

Baraboo soils are used mainly for pasture and woodland. Stoniness and erosion are the main hazards in cultivated areas.

This unit is generally too stony to be cultivated. If cleared of stones and protected from erosion, however, the gently sloping soils have good potential for cultivated crops and the sloping and moderately steep soils have fair potential. All have good potential for trees.

The potential for residential development is fair. Depth to rock is a severe limitation for septic tank absorption fields.

Areas dominated by well drained soils that have a loamy surface layer and subsoil; underlain by glacial till

These are gently sloping to steep soils on glaciated uplands. They make up 7 percent of the county. Suitability is good for cultivated crops and pasture. On steeper soils it is good for trees.

5. McHenry-St. Charles

Gently sloping to steep, well drained, medium textured soils underlain by glacial till

This map unit is on ridgetops, side slopes, and valley floors of loess-covered till plains and moraines (fig. 6). It occupies about 7 percent of the county. It is about 47 percent McHenry soils, 19 percent St. Charles soils, and 34 percent soils of minor extent.

McHenry soils are well drained. They are moderately permeable. The available water capacity is high. Typically, the surface layer is dark grayish brown silt loam about 6 inches thick. The subsurface layer is brown silt loam about 2 inches thick. The subsoil is about 51 inches thick. It is dark yellowish brown, firm silty clay loam in the upper part; dark yellowish brown, firm clay loam and sandy clay loam in the middle part; and dark yellowish brown, friable sandy loam in the lower part. The substratum to a depth of about 60 inches is yellowish brown, very friable gravelly sandy loam.

St. Charles soils are well drained. They are moderately permeable. The available water capacity is high. Typically, the surface layer is dark grayish brown silt loam about 8 inches thick. The subsoil is about 52 inches thick. It is dark yellowish brown and brown, firm silty clay loam in the upper part; yellowish brown, firm silt loam in the middle part; and dark yellowish brown, friable gravelly sandy loam in the lower part.

Minor in this unit are the well drained Richwood, Ringwood, and Wyocena soils; the moderately well drained Baraboo soils; the somewhat poorly drained Kendall soils; and the poorly drained Ossian soils. Richwood and Ringwood soils are on outwash plains and till plains. Wyocena soils occur as scattered areas throughout the unit. Baraboo soils are on ridgetops and side slopes of the glaciated quartzite uplands. Kendall and Ossian soils are in drainageways and depressions.

Most areas are used for cultivated crops and pasture, but a considerable acreage is woodland. Erosion is the main hazard in cultivated areas.

The gently sloping soils have good potential for cultivated crops if adequately protected from erosion. The sloping soils have fair potential for cultivated crops, and the moderately steep and steep soils poor potential. All have good potential for trees.

The potential for residential development is good, but slope is a moderate or severe limitation for septic tank absorption fields in some areas.

Areas dominated by moderately well drained to excessively drained soils that have a loamy or sandy surface layer and subsoil; underlain by outwash or sandy glacial till

These are nearly level to steep soils on glaciated uplands. They make up 12 percent of the county. Suitability is mainly fair for cultivated crops and pasture. On steeper soils it is fair or poor for trees.

6. Wyocena-Gotham-Plainfield

Gently sloping to steep, well drained to excessively drained, moderately coarse textured and coarse textured soils underlain by sandy glacial till or outwash sand

This map unit is on moraines with short uneven slopes and on broad outwash plains and till plains. It occupies about 4 percent of the county. It is about 46 percent Wyocena soils, 14 percent Gotham soils, 11 percent Plainfield soils, and 29 percent soils of minor extent.

Wyocena soils are well drained. They are moderately rapidly permeable. The available water capacity is moderate. Typically, the surface layer is dark grayish brown sandy loam about 8 inches thick. In most cultivated areas it contains some brown subsoil material that has been mixed in by plowing. The subsoil is about 27 inches thick. It is brown, friable and firm sandy loam in the upper part and brown, very friable loamy sand in the lower part. The substratum to a depth of about 60 inches is dark yellowish brown, very friable loamy sand over yellowish brown, loose sand.

Gotham soils are somewhat excessively drained. They are rapidly permeable. The available water capacity is low. Typically, the surface layer is very dark grayish brown loamy sand about 9 inches thick. The subsoil is dark yellowish brown and yellowish brown, very friable loamy sand about 25 inches thick. The substratum to a depth of about 60 inches is yellowish brown, loose sand.

Plainfield soils are excessively drained. They are rapidly permeable. The available water capacity is low. Typically, the surface layer is dark grayish brown loamy sand about 7 inches thick. The subsoil is about 23 inches thick. It is yellowish brown, very friable sand in the upper part and dark yellowish brown, loose sand in the lower part. The substratum to a depth of about 60 inches is yellowish brown, loose fine sand over light yellowish brown, loose sand.

Figure 6.—Typical glaciated landscape of McHenry and St. Charles soils. The prominent knoll in the background is a sandstone monadnock that withstood the leveling action of the glacier.

Minor in this unit are the well drained Billett, Fox, McHenry, and Sisson soils, all of which occur as scattered areas throughout the unit.

Most areas are used for cultivated crops and pasture, but some areas are used for woodland. Erosion, soil blowing, and droughtiness are the main limitations for cultivated crops.

If irrigated and adequately protected from erosion and soil blowing, the gently sloping and sloping soils have fair potential for cultivated crops. The moderately steep and steep soils have poor potential for cultivated crops. All have good or fair potential for trees.

The potential for residential development is good, but ground water pollution from septic tank absorption fields is a hazard.

7. Dickinson-Gotham-Dakota

Nearly level to steep, somewhat excessively drained and well drained, medium textured to coarse textured soils underlain by outwash sand

This map unit is on broad outwash plains and stream terraces. It occupies about 5 percent of the county. It is about 29 percent Dickinson soils, 15 percent Gotham soils, 14 percent Dakota soils, and 42 percent soils of minor extent.

Dickinson soils are somewhat excessively drained. They are moderately rapidly permeable. The available water capacity is low. Typically, the surface layer is very dark brown sandy loam about 12 inches thick. The subsoil is about 19 inches thick. It is dark brown and dark yellowish brown, friable sandy loam in the upper part and dark yellowish brown, very friable loamy sand in the lower part. The substratum to a depth of about 60 inches is yellowish brown, loose sand.

Gotham soils are somewhat excessively drained. They are rapidly permeable. The available water capacity is low. Typically, the surface layer is very dark grayish brown loamy sand about 9 inches thick. The subsoil is dark yellowish brown and yellowish brown, very friable loamy sand about 25 inches thick. The substratum to a depth of about 60 inches is yellowish brown, loose sand.

Dakota soils are well drained. They are moderately permeable in the subsoil and rapidly permeable in the substratum. The available water capacity is moderate. Typically, the surface layer is very dark brown loam about 12 inches thick. The subsoil is about 22 inches thick. It is dark brown, firm loam in the upper part; dark yellowish brown and dark brown, firm clay loam and sandy clay loam in the middle part; and dark yellowish brown, very friable loamy sand in the lower part. The substratum to a depth of 60 inches is dark yellowish brown, loose sand.

Minor in this unit are the excessively drained Plainfield soils, the well drained Billett and Pillot soils, and the somewhat poorly drained Shiffer soils. Plainfield, Billett, and Pillot soils occur as scattered areas throughout the unit. Shiffer soils are in drainageways and depressions.

Most areas are used for cultivated crops or pasture, but some areas have been planted to pines. Droughtiness and soil blowing are the main hazards in cultivated areas.

Dakota soils have good potential for cultivated crops. If irrigated and protected from erosion and soil blowing, Dickinson soils have good potential for cultivated crops. The nearly level to sloping Gotham soils have fair potential for cultivated crops. Dickinson and Gotham soils have fair potential for trees, and the Dakota soils have poor potential.

The potential for residential development is good, but ground water pollution from septic tank absorption fields is a hazard.

8. Sparta-Plainfield-Sparta variant

Nearly level to steep, excessively drained and moderately well drained, coarse textured soils underlain by outwash sand

This map unit is on broad, smooth flats and short, uneven side slopes on outwash plains. The plains have been reworked by wind, and the topography is dunelike in places. The map unit occupies about 3 percent of the county. It is about 37 percent Sparta soils, 15 percent Plainfield soils, 10 percent Sparta variant soils, and 38 percent soils of minor extent.

Sparta soils are excessively drained. They are rapidly permeable. The available water capacity is low. Typically, the surface layer is very dark brown loamy sand about 9 inches thick. The subsurface layer is very dark brown and very dark grayish brown loamy sand about 7 inches thick. The subsoil is dark yellowish brown, very friable loamy sand about 14 inches thick. The substratum to a depth of about 60 inches is yellowish brown, loose sand over light yellowish brown, loose sand.

Plainfield soils are excessively drained. They are rapidly permeable. The available water capacity is low. Typically, the surface layer is dark grayish brown loamy sand about 7 inches thick. The subsoil is about 23 inches thick. It is yellowish brown, very friable sand in the upper part and dark yellowish brown, loose sand in the lower part. The substratum to a depth of about 60 inches is yellowish brown, loose, fine sand over light yellowish brown, loose sand.

Sparta variant soils are moderately well drained. They are rapidly permeable. The available water capacity is low. Typically, the surface layer is very dark brown loamy sand about 8 inches thick. The subsurface layer is very dark brown loamy sand about 6 inches thick. The subsoil is dark yellowish brown and yellowish brown, very friable loamy sand about 18 inches thick. It is mottled with yellowish red. The substratum to a depth of about 60 inches is brownish yellow and strong brown, loose sand over light yellowish brown, loose sand. It is mottled with yellowish red in the upper part and strong brown in the lower part.

Minor in this unit are the somewhat excessively drianed Dickinson and Gotham soils, the well drained Billett and Dakota soils, and the somewhat poorly drained Watseka soils. Billett, Dakota, Dickinson, and Gotham soils occupy landscape positions similar to those of Sparta, Plainfield, and Sparta variant soils. Watseka soils occupy slightly lower landscape positions.

Most areas are used for cultivated crops, hay, and pasture. Some small areas are native woodland, and some have been planted to pines. Droughtiness and soil blowing are the main hazards in cultivated areas.

If irrigated and adequately protected from soil blowing, the nearly level to sloping soils have fair potential for cultivated crops. The moderately steep and steep areas have poor potential for cultivated crops. All have fair potential for trees.

The potential for residential development is good in most areas, but ground water pollution from septic tank absorption fields is a hazard. Slope or excess wetness is a moderate or severe limitation for septic tank absorption fields in some areas.

Areas dominated by well drained to very poorly drained soils that have a loamy or sandy surface layer and subsoil; underlain by loamy or sandy deposits

These nearly level to sloping soils occupy glaciated lake basins and flood plains. They make up 18 percent

of the county. Suitability is mainly good for cultivated crops and pasture.

9. Ettrick-Fluvaquents, wet-Curran

Nearly level and gently sloping, somewhat poorly drained to very poorly drained, mostly medium textured soils underlain by outwash sand or stratified loamy and sandy deposits

This map unit is on outwash plains, flood plains, and terraces. It occupies about 14 percent of the county. It is about 17 percent Ettrick soils, 11 percent Fluvaquents, wet, 11 percent Curran soils, and 61 percent soils of minor extent. Ettrick soils and Fluvaquents, wet, are in low wet areas along drainageways and in depressions of flood plains. Curran soils are in slightly elevated positions.

Ettrick soils are poorly drained and very poorly drained. They are moderately slowly permeable. The available water capacity is high. Typically, the surface layer is black silt loam about 11 inches thick. The subsoil is about 35 inches thick and is mottled with yellowish brown throughout. It is olive gray, firm silty clay loam in the upper part; olive gray and light olive gray, firm silt loam in the middle part; and light olive gray, friable stratified silt loam, loam, and fine sandy loam in the lower part. The substratum to a depth of about 60 inches is light brownish gray and yellowish brown, friable stratified silt loam, loam, fine sandy loam, loamy fine sand, and fine sand.

Fluvaquents, wet, are poorly drained and very poorly drained. Typically, soil characteristics range widely. Permeability and the available water capacity range from high to low. Texture of the surface layer ranges from silt loam to sand, and in some areas the surface layer is organic. Below the surface layer is stratified sandy, silty, and loamy material, and in some areas organic material.

Curran soils are somewhat poorly drained. They are moderately slowly permeable in the subsoil and rapidly permeable in the substratum. The available water capacity is high. Typically, the surface layer is very dark grayish brown silt loam about 8 inches thick. The subsoil is about 51 inches thick and is mottled. It is brown, firm silt loam in the upper part; brown and grayish brown, firm silty clay loam and silt loam in the middle part; and yellowish brown, friable stratified loamy and sandy material in the lower part. The substratum to a depth of about 60 inches is dark yellowish brown loamy fine sand.

Minor in this unit are the well drained Bertrand, Billett, Dakota, Pillot, Richwood, and Tell soils; the moderately well drained Jackson and Toddville soils; the somewhat poorly drained Dells, Fluvaquents, Orion, and Rowley soils; the poorly drained and very poorly drained Marshan soils; and the very poorly drained Adrian, Houghton, and Palms soils. Bertrand, Billett, Dakota, Jackson, Pillot, Richwood, Tell, and Toddville soils occur as scattered areas throughout the map unit on high better drained terraces. Dells and Rowley soils occur as scattered areas throughout the unit on plane to concave intermediate terraces. Orion soils are on flood plains along drainageways. Adrian, Houghton, Marshan, and Palms soils are in low wet areas along drainageways and in depressions of flood plains.

Ettrick and Curran soils in this map unit are used mainly for cultivated crops and pasture. Some small areas are wooded. Fluvaquents, wet, are used mainly for pasture and woodland. Some small areas are used for cultivated crops. In this map unit, flooding and excess wetness are the main limitations for cultivated crops.

If adequately drained and protected from overflow, the Ettrick and Curran soils in this map unit have good potential for cultivated crops. The Curran soils have fair potential for trees, but the Ettrick soils and Fluvaquents, wet, have poor potential.

The potential for residential development is poor. Flooding and wetness are severe limitations for septic tank absorption fields.

10. Briggsville-Mosel-Colwood

Nearly level and gently sloping, well drained and somewhat poorly drained to very poorly drained, medium textured soils underlain by stratified lacustrine deposits

This map unit is in lake basins formed by extinct glacial lakes. It occupies about 2 percent of the county. It is about 24 percent Briggsville soils, 11 percent Mosel soils, 8 percent Colwood soils, and 57 percent soils of minor extent. Briggsville soils are on uplands in old lake basins and Mosel and Colwood soils are in adjacent drainageways and depressions.

Briggsville soils are well drained. They are moderately slowly permeable. The available water capacity is high. Typically, the surface layer is dark grayish brown silt loam about 7 inches thick. The subsoil is about 32 inches thick. It is reddish brown, firm silty clay loam in the upper part; reddish brown, firm and very firm silty clay in the middle part; and reddish brown and brown, firm silty clay loam in the lower part. The substratum to a depth of about 60 inches, is light brown, friable silty clay loam.

Mosel soils are somewhat poorly drained. They are moderately slowly permeable. The available water capacity is high. Typically, the surface layer is black loam about 9 inches thick. The subsoil is about 27 inches thick. It is dark brown, firm loam in the upper part; brown, firm clay loam in the middle part; and brown, firm silty clay loam in the lower part. It is mottled with yellowish brown, grayish brown, light brownish gray, and strong brown. The substratum to a depth of 60 inches is brown, firm silty clay loam with thin lenses of silt loam. It is mottled with light brownish gray.

Colwood soils are poorly drained and very poorly drained. They are moderately permeable. The available water capacity is high. Typically, the surface layer is black loam about 8 inches thick. The subsoil is about 18 inches thick. It is grayish brown, friable sandy loam in the

upper part; grayish brown and yellowish brown, firm loam in the middle part; and grayish brown and yellowish brown, firm silty clay loam in the lower part. It is mottled with yellowish brown and gray. The substratum to a depth of about 60 inches is brown, yellowish brown, and light yellowish brown, friable and very friable silt loam with thin lenses of very fine sand. It is mottled with grayish brown, light brownish gray, gray, and pinkish gray.

Minor in this unit are the excessively drained Plainfield soils; the somewhat excessively drained Gotham soils; the well drained Billet, Sisson, and Tustin soils; the somewhat poorly drained Rimer soils; and the poorly drained and very poorly drained Marshan soils. Plainfield, Gotham, Billett, Sisson, and Tustin soils are intermingled with Briggsville soils throughout the unit. Rimer and Marshan soils are intermingled with Mosel and Colwood soils in drainageways and depressions.

These soils are used mainly for cultivated crops, but some areas are woodland. Erosion is the main hazard in cultivated areas of Briggsville soils. Excess wetness is the main hazard in cultivated areas of Mosel and Colwood soils.

If adequately protected from erosion, Briggsville soils have good potential for cultivated crops. If adequately drained, the Mosel and Colwood soils have good potential for cultivated crops. All have good potential for trees.

The potential for residential development is fair or poor. Wetness and moderately slow permeability are severe limitations for septic tank absorption fields.

11. Fluvaquents, wet-Fluvaquents

Nearly level, moderately well drained to very poorly drained, medium textured to coarse textured soils underlain by stratified alluvium

This map unit is on broad flood plains along the Wisconsin River. It occupies about 2 percent of the county. It is about 58 percent Fluvaquents, wet, 23 percent Fluvaquents, and 19 percent soils of minor extent.

Fluvaquents, wet, are poorly drained and very poorly drained. Typically, soil characteristics range widely. Permeability and the available water capacity range from high to low. The texture of the surface layer ranges from silt loam to sand, and in some areas the surface layer is organic. Below the surface layer is stratified sandy, loamy, and silty material and, in some areas, organic material.

Fluvaquents are moderately well drained and somewhat poorly drained. Typically, soil characteristics range widely. Permeability and the available water capacity range from high to low. The texture of the surface layer ranges from silt loam to sand. Below the surface layer is stratified silty, loamy, and sandy material.

Minor in this map unit are the poorly drained and very poorly drained Adrian, Houghton, Marshan, Palms soils, Saprists and Aquents. All are intermingled with Fluvaquents, wet, and Fluvaquents.

These soils are used mainly for unimproved pasture, woodland, and wildlife habitat. Frequent flooding and excess wetness are the main hazards in cultivated areas.

The Fluvaquents, wet, in this map unit have poor potential for cultivated crops. If adequately protected from flooding, some areas of Fluvaquents have good potential for cultivated crops. These soils are too variable to rate for trees.

The potential for residential development is poor. Wetness and flooding are severe limitations for septic tank absorption fields.

Soil maps for detailed planning

The map units on the detailed soil maps at the back of this survey represent the soils in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability and potential of a soil for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit, or soil, is given under "Use and management of the soils."

Each map unit on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named.

A symbol identifying the soil precedes the map unit name in the soil descriptions. Each description includes general facts about the soil, a brief description of the soil profile, and a listing of the principal hazards and limitations to be considered in planning management.

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

Soils of one series can differ in texture of the surface layer or of the substratum. They also can differ in slope, stoniness, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Valton silt loam, 2 to 6 percent slopes, is one of several phases in the Valton series.

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

A *soil complex* consists of two or more soils in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Baraboo-Rock outcrop complex, 12 to 60 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils that could be mapped individually but are mapped as one unit because similar interpretations can be made

for use and management. The pattern and proportion of the soils in a mapped area are not uniform. An area can be made up of only one of the major soils, or it can be made up of all of them. Norden and Eleva soils and Rock outcrop, 12 to 60 percent slopes, is an undifferentiated group in this survey area.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description. Some small areas of strongly contrasting soils are identified by a special symbol on the soil maps.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop, quartzite is an example. Miscellaneous areas are shown on the soil maps. Some that are too small to be shown are identified by a special symbol on the soil maps.

Table 3 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of 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.

Soil descriptions

Ad—Adrian muck. This nearly level, very poorly drained soil is on flood plains and in glacial lake basins, drainageways, and depressions. In most areas it is subject to flooding or ponding during wet periods and after heavy rains. Slopes are plane or concave. Most areas are irregular in shape and range from 3 to 70 acres.

Typically, the organic layer is black muck about 30 inches thick. The substratum to a depth of about 60 inches is light brownish gray, loose fine sand. It has yellowish brown mottles in the upper part. In some small areas the organic layer is less than 16 inches thick. Some areas have up to 16 inches of sandy or loamy overwash. In some areas there are sandy or loamy layers in the organic layer. In some there are loamy layers in the underlying sand.

Included with this soil in mapping are small areas of Houghton and Palms soils. The Houghton soil occupies landscape positions similar to those of the Adrian soil where the organic layer is more than 51 inches thick. The Palms soils occupies landscape positions similar to those of the Adrian soil where the substratum is loamy rather than sandy. These included soils make up 5 to 10 percent of the unit.

Permeability is moderately rapid in the organic layer of this Adrian soil and rapid in the sand substratum. The available water capacity is high. Surface runoff is very slow or ponded. Unless drained, this soil has a water table at the surface or within 1 foot of the surface throughout the year. Natural fertility is low. Root penetration is limited by the water table. In drained areas it is limited by the underlying sand. If this soil is drained, the organic layer decomposes and subsides.

In most drained areas this soil is used for corn. In some it is used for vegetable crops, such as potatoes, carrots, and onions, and for specialty crops, such as mint. Undrained areas provide wildlife habitat. Some are used for unimproved pasture. The potential is fair for cultivated crops, pasture, and trees. It is poor for openland wildlife habitat and woodland habitat but good for wetland habitat. The potential is poor for recreational development and for most engineering uses.

If drained, this Adrian muck is suited to crops and pasture. In undrained areas it is not suited to cultivated crops. Deep ditches and tiles are used for internal drainage. Draining this soil is difficult. Some areas lack suitable outlets. If tile is placed in the underlying sand, loose sand will enter the tile lines unless the tile is blinded. Ditchbanks are easily eroded by flowing water, and vertical banks will cave and plug the ditch. Drained areas are subject to burning. Cultivated areas are subject to soil blowing. Excessive lowering of the water table increases subsidence. Because trafficability is poor, special equipment is needed in farming.

Because of the high water table, the periodic ponding, and the low fertility, this soil is not suited to most forage species unless it is drained. It is suited only to reed canarygrass. In drained areas red clover can be grown, but the low soil strength restricts livestock grazing and the use of machinery.

This soil is suited to trees. Soil wetness during tree planting season limits reforestation to natural regeneration or to planting by hand or machine on prepared ridges. The heavy equipment needed in harvesting can be used only when the soil is frozen because of the wetness and low strength. The hazard of windthrow of the trees left after harvest can be reduced by clear-cut or group-selection harvesting. Competing vegetation, which hinders natural regeneration, can be removed mechanically or controlled through the use of suitable herbicides.

Adrian muck is poorly suited to septic tank absorption fields because of the high water table and frequent flooding. The soil is also poorly suited to building site development because it has a high water table and is frequently flooded and because it lacks sufficient strength to support building foundations and vehicular traffic.

The capability unit is IVw-7. The woodland suitability subclass is 3w.

ArA—Arenzville silt loam, 0 to 3 percent slopes. This nearly level to gently sloping, moderately well drained soil is on flood plains and in drainageways. It is subject to frequent flooding of short duration. Slopes are plane or concave. Most areas are long and narrow and range from 3 to 80 acres. A few are as large as 200 acres.

Typically, the surface layer is dark grayish brown silt loam about 7 inches thick. The upper 28 inches of the substratum is dark grayish brown, friable silt loam mottled with yellowish red in the lower part. The next 11 inches, the surface horizon of a buried soil, is very dark gray, friable silt loam. The lower part of the substratum to a depth of about 60 inches is dark gray, friable silt loam over a mottled grayish brown, friable silt loam. In some small areas slopes are as much as 6 percent. In some areas this soil does not have a buried dark colored surface layer. In some places the surface layer is loam or fine sandy loam. In some this soil is gravelly.

Included with this soil in mapping are small areas of Ettrick and Orion soils and small areas of Fluvaquents. Also included are small areas where the soil is sandy loam or fine sandy loam throughout. The poorly drained and very poorly drained Ettrick soil is in lower and wetter areas of the larger flood plains. The somewhat poorly drained Orion soil is in lower and wetter areas of the smaller flood plains and drainageways. Included soils make up 10 to 15 percent of the unit.

Permeability is moderate in this Arenzville soil. The available water capacity is very high. Surface runoff is slow. The water table is at a depth of 3 to 6 feet during wet periods. Natural fertility is high. The surface layer is moderately low or moderate in organic-matter content. It is friable and can be easily tilled throughout a wide range in moisture content.

Most areas of this soil are used for pasture. Some are used for cultivated crops. Some are native woodland. The potential is good for cultivated crops, pasture, and trees. It is good for openland wildlife habitat and woodland habitat but poor for wetland habitat. The potential is fair or poor for recreational development and poor for most engineering uses.

If protected from overflow, this soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture. Dikes and diversions can be used to prevent flooding. Regular additions of organic matter help to maintain fertility and good tilth.

This soil is suited to hay and pasture. Protection from overflow is needed because flooding can damage the forage. Overgrazing leads to a loss of plant cover and encourages undesirable plants. Loss of plant cover can also result in erosion during periods of overflow. Grazing when the soil is wet compacts the surface, which results in poor tilth and reduced water infiltration. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is suited to trees. Competing vegetation, however, interferes with natural regeneration or the establishment of seedlings. It can be removed mechanically or controlled through the use of suitable herbicides.

This Arenzville soil is poorly suited to septic tank absorption fields because it is frequently flooded and has a seasonal high water table. Where dikes and levees protect the site from flooding, the suitability can be improved by draining the soil to lower the water table or by building a filtering mound of suitable material. Frequent flooding also makes this soil poorly suited to dwellings with and without basements and to small commercial buildings. Dikes and levees are needed. The soil is poorly suited to local roads and streets because of frequent flooding and the high potential frost action. The flood hazard can be overcome in some areas by constructing dikes and levees. The frost hazard can be overcome by replacing this soil with suitable base material.

The capability unit is IIw-11. The woodland suitability subclass is 2o.

AtA—Atterberry silt loam, 0 to 2 percent slopes. This nearly level, somewhat poorly drained soil is in depressions and drainageways of unglaciated uplands and on outwash plains and terraces. In some areas it is subject to flooding or ponding during wet periods or after heavy rains. Slopes are plane or concave. Most areas are irregular in shape and range from 3 to 40 acres. One area is 80 acres.

Typically, the surface layer is very dark grayish brown silt loam about 9 inches thick. The subsurface layer is grayish brown silt loam about 3 inches thick. The subsoil is about 43 inches thick. It is brown, friable silt loam in the upper part; grayish brown and light brownish gray, firm silty clay loam in the middle part; and mixed light brownish gray and yellowish brown, friable silt loam in the lower part. It is mottled with grayish brown and yellowish brown. The substratum to a depth of about 60 inches is mixed light brownish gray and yellowish brown, friable silt loam. It is mottled with yellowish brown. In some small areas this soil is gently sloping. In places the surface layer is light colored. In some small areas the silty mantle is less than 60 inches thick.

Included with this soil in mapping are small areas of Ettrick and Jackson soils. The moderately well drained Jackson soil is in slightly higher, better drained positions on the landscape where the silty mantle is 40 to 60 inches thick over sand. The poorly drained and very poorly drained Ettrick soil is in lower, wetter areas of drainageways and depressions. Included soils make up about 5 percent of the unit.

Permeability is moderately slow in this Atterberry soil. The available water capacity is very high. Surface runoff is slow. This soil has a water table at a depth of 1 to 3 feet during wet periods. Unless this soil is drained, root penetration is limited by the water table during wet periods of the growing season. Natural fertility is high. The surface layer is moderate to high in organic-matter content. It is friable and can be easily worked throughout a wide range in moisture content.

Drained areas of this soil are used for cultivated crops, hay, and pasture. Undrained areas provide wildlife habitat, and many are used for unimproved pasture. Some areas are native woodland. The potential for cultivated crops, hay, pasture, and trees is good. It is good for openland and woodland habitat and fair for wetland habi-

tat. The potential is fair or poor for recreational development and poor for most engineering uses.

If drained, this soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture. Surface drainage is needed to remove excess surface water rapidly. Deep ditches and tiles are used for internal drainage. Ditchbanks are easily eroded by flowing water, and vertical banks will cave and plug the ditch. Regular additions of organic matter help to maintain fertility and good tilth.

If drained, this soil is suited to legumes and grasses for hay and pasture. Overgrazing, however, destroys the plant cover and encourages undesirable plants. Grazing when the soil is wet compacts the surface and results in poor tilth and reduced water infiltration. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is suited to trees. Competing vegetation, however, interferes with natural regeneration and the establishment of plantings. It can be removed mechanically or controlled through the use of suitable herbicides.

This Atterberry soil is poorly suited to septic tank absorption fields because of the occasional flooding, the seasonal high water table, and the moderately slow permeability. Where dikes and levees can be used to protect the site from flooding, the suitability can be improved by building a filtering mound or by lowering the seasonal water table and increasing the size of the field. The soil is poorly suited to dwellings with or without basements and to small commercial buildings because of the occasional flooding, the seasonal high water table, and the lack of sufficient strength to support building foundations. These limitations can be overcome by draining the soil to lower the seasonal water table, by constructing dikes and levees to protect the soil from flooding, and by replacing the soil with suitable base material. The soil is poorly suited to local roads and streets because of the occasional flooding, the high potential frost action, and the lack of sufficient strength to support vehicular traffic. Dikes and levees are needed. The frost action hazard can be overcome by draining the soil and by replacing this soil with suitable base material. Suitable base material will also overcome the low strength limitation.

The capability unit is IIw-2. The woodland suitability subclass is 2o.

AtB—Atterberry silt loam, 2 to 6 percent slopes. This gently sloping, somewhat poorly drained soil is on foot slopes, in seep areas, in drainageways of unglaciated uplands, and on outwash plains and terraces. In some areas it is subject to flooding during wet periods and after heavy rains. Slopes are convex and concave. Most areas are irregular in shape and range from 3 to 75 acres.

Typically, the surface layer is very dark grayish brown silt loam about 9 inches thick. The subsurface layer is grayish brown silt loam about 3 inches thick. The subsoil is about 43 inches thick. It is brown, friable silt loam in the upper part; grayish brown and light brownish gray, firm silty clay loam in the middle part; and mixed light brownish gray and yellowish brown, friable silt loam in the lower part. It is mottled with grayish brown and yellowish brown. The substratum to a depth of about 60 inches is mixed light brownish gray and yellowish brown, friable silt loam. It is mottled with yellowish brown. In some small areas this soil is nearly level. In some, it is eroded. In places the surface layer is light colored. In some small areas the silty mantle is less than 60 inches thick.

Included with this soil in mapping are small areas of Jackson soil. The moderately well drained Jackson soil is in slightly higher, better drained positions where the silty mantle is 40 to 60 inches deep over sand. It makes up less than 5 percent of the unit.

Permeability is moderately slow in this Atterberry soil. The available water capacity is very high. Surface runoff is medium. Depth to the seasonal water table is 1 to 3 feet. Unless the soil is drained, root penetration is limited by the water table during wet periods of the growing season. Natural fertility is high. The surface layer is moderate to high in organic-matter content. It is friable and can be easily worked throughout a wide range in moisture content.

Most drained areas of this soil are used for cultivated crops, hay, and pasture. Undrained areas provide wildlife habitat, and many are used for unimproved pasture. Some are native woodland. The potential is good for cultivated crops, hay, pasture, and trees. It is good for openland and woodland wildlife habitat but is poor for wetland habitat. The potential is fair or poor for recreational development and poor for most engineering uses.

If drained, this soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture. Surface drainage is needed to remove excess surface water rapidly. Deep ditches and tiles are used for internal drainage. Ditchbanks are easily eroded, and vertical banks will cave and plug the ditch. The hazard of erosion is slight in cultivated areas. Crop residue management, minimum tillage, contour stripcropping, grassed waterways, and winter cover crops help to control erosion. Regular additions of organic matter help to maintain fertility and good tilth.

If drained, this soil is suited to legumes and grasses for hay and pasture. Erosion is generally not a problem in areas where these crops are grown. Overgrazing, however, destroys the plant cover and results in erosion. Grazing when the soil is wet compacts the surface, which results in poor tilth and increases runoff and the hazard of erosion. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is suited to trees. Competing vegetation, however, interferes with natural regeneration and the establishment of plantings. It can be removed mechanically or controlled through the use of suitable herbicides.

This Atterberry soil is poorly suited to septic tank absorption fields because of the occasional flooding, the seasonal high water table, and the moderately slow permeability. Where dikes and levees can be used to protect the site from flooding, the suitability can be improved by building a filtering mound or by lowering the seasonal water table and increasing the size of the field. The soil is poorly suited to dwellings with or without basements and to small commercial buildings because of the occasional flooding, the seasonal high water table, and the lack of sufficient strength to support building foundations. These limitations can be overcome by draining the soil to lower the water table, by constructing dikes and levees to protect the soil from flooding, and by replacing the soil with suitable base material. This soil is poorly suited to local roads and streets because of the occasional flooding, the high potential for frost action, and the lack of sufficient strength to support vehicular traffic. Dikes and levees are needed. The frost action hazard can be overcome by draining the soil and by replacing the soil with suitable base material. Suitable base material will also overcome the low strength.

The capability unit is IIe-8. The woodland suitability subclass is 2o.

BaB—Baraboo silt loam, 2 to 6 percent slopes. This gently sloping, moderately well drained soil is on broad, convex ridgetops on loess-covered quartzite uplands. Most areas are irregular in shape and range from 3 to 80 acres. A few are as much as 870 acres.

Typically, the surface layer is dark grayish brown silt loam about 5 inches thick. The subsoil is about 29 inches thick. It is brown, friable silt loam in the upper part; dark yellowish brown, firm silty clay loam in the middle part; and brown, firm silty clay loam in the lower part. The lower part is mottled with yellowish brown. Pale red and weak red quartzite is at a depth of about 34 inches. In some small areas this soil is eroded. In some, slopes are less than 2 percent. In some small areas the lower part of the subsoil is loam, clay loam, or sandy clay loam. In some, the underlying bedrock is quartzite conglomerate or hard sandstone. In places this soil is more than 40 inches deep over quartzite.

Included with this soil in mapping are small areas of Baraboo variant soils. Also included are small areas of sloping Baraboo silt loam and small areas of this soil where stones and boulders are on the surface and throughout the soil. The somewhat poorly drained Baraboo variant is in depressions, drainageways, and seep areas. Included soils make up 5 to 10 percent of the unit.

Permeability is moderate in this Baraboo soil. The available water capacity is moderate. Surface runoff is medium. This soil has a water table perched above the quartzite during wet periods. This soil is somewhat slow to dry in spring as a result of the underlying impervious quartzite. Natural fertility is moderate. Root penetration is limited by the underlying quartzite. The surface layer is moderately low or moderate in organic-matter content. It is friable and can be easily worked throughout a wide range in moisture content.

Some areas of this soil are used for crops, and some are wooded. Many areas that were farmed in the past are no longer farmed. The potential is good for cultivated crops, pasture, and trees. It is good for openland wildlife habitat and woodland habitat but very poor for wetland habitat. The potential is good or fair for recreational development and fair or poor for most engineering uses.

This soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture. The hazard of erosion is slight in cultivated areas. Crop residue management, minimum tillage, contour stripcropping, grassed waterways, and winter cover crops help to control erosion. Regular additions of organic matter help to maintain fertility and good tilth and increase water infiltration.

Erosion is generally not a problem in areas where this soil is used for pasture or hay. Overgrazing, however, destroys the plant cover and results in erosion. Grazing when the soil is wet compacts the surface, which results in poor tilth and increases runoff and the hazard of erosion. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is suited to trees. Competing vegetation, however, interferes with natural regeneration and the establishment of seedlings. It can be removed mechanically or controlled through the use of suitable herbicides.

This Baraboo soil is poorly suited to septic tank absorption fields because of the depth to bedrock and the seasonal perched water table. The suitability can be improved by building a filtering mound. The soil is only moderately suited to dwellings without basements and to small commercial buildings because of the seasonal perched water table and because it lacks sufficient strength and stability to adequately support building foundations. Low strength and poor stability can be overcome by replacing the soil with suitable base material. The water table limitation can be overcome by draining the soil or by adding fill. The soil is poorly suited to dwellings with basements because of the seasonal perched water table and the depth to bedrock. Draining the soil and adding fill overcome these limitations. Another limitation to be considered for building sites is that the underlying bedrock is very hard and is a poor aquifer. Wells are difficult and expensive to drill, and they generally are of low capacity. This soil is poorly suited to local roads and streets because of the high frost action potential and the lack of sufficient strength to support vehicular traffic. These limitations can be overcome by replacing the soil with suitable base material.

The capability unit is IIe-2. The woodland suitability subclass is 2o.

BaC—Baraboo silt loam, 6 to 12 percent slopes. This sloping, moderately well drained soil is on convex

ridgetops and foot slopes on loess-covered quartzite uplands. Most areas are oblong and range from 3 to 90 acres.

Typically, the surface layer is dark grayish brown silt loam about 5 inches thick. The subsoil is about 29 inches thick. It is brown, friable silt loam in the upper part; dark yellowish brown, firm silty clay loam in the middle; and dark yellowish brown and brown, firm silty clay loam in the lower part. The lower part is mottled with yellowish brown. Dusky red and weak red quartzite is at a depth of about 34 inches. In some small areas this soil is eroded. In some, the lower part of the subsoil is loam, clay loam, or sandy clay loam. In some, the underlying bedrock is quartzite conglomerate or hard sandstone. In places, this soil is more than 40 inches deep over quartzite.

Included with this soil in mapping are small areas of gently sloping Baraboo silt loam and some small areas where slopes are more than 12 percent. Also included are small areas where cobbles, stones, and boulders are on the surface and throughout the soil and small areas of somewhat poorly drained soils in depressions, drainageways, and seep areas. Included soils make up 5 to 10 percent of the unit.

Permeability is moderate in this Baraboo soil. The available water capacity is moderate. Surface runoff is medium. This soil has a water table perched just above the quartzite during wet periods. It is somewhat slow to dry in spring as a result of the underlying impervious quartzite. Natural fertility is moderate. Root penetration is limited by the underlying quartzite. The surface layer is moderately low or moderate in organic-matter content. It is friable and can be easily worked throughout a wide range in moisture content.

Some areas of this soil are used for crops, and some are in woodland. Many areas that were farmed in the past are no longer farmed. The potential is fair for cultivated crops. It is good for hay, pasture, and trees. It is good for openland and woodland wildlife habitat but very poor for wetland habitat. The potential is fair or poor for most recreational development and for most engineering uses.

This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. The hazard of erosion is moderate in cultivated areas. Crop residue management, minimum tillage, contour stripcropping, grassed waterways, and winter cover crops help to control erosion. Regular additions of organic matter help to maintain fertility and good tilth and increase water infiltration.

Erosion is generally not a problem in areas where this soil is used for pasture or hayland. Overgrazing, however, destroys the plant cover and results in erosion. Grazing when the soil is wet compacts the surface, which results in poor tilth and increases runoff and the hazard of erosion. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is suited to trees. Competing vegetation, however, interferes with natural regeneration or the establishment of seedlings. It can be removed mechanically or controlled through the use of suitable herbicides.

This Baraboo soil is poorly suited to septic tank absorption fields because of the depth to bedrock and the seasonal perched water table. The suitability can be improved by building a filtering mound. The soil is only moderately suited to dwellings without basements because of the seasonal perched water table and the lack of sufficient strength and stability to support building foundations. The perched water table limitation can be overcome by draining the soil or by adding fill. Low strength and poor stability can be overcome by replacing the soil with suitable base material. The soil is poorly suited to small commercial buildings because of the slope. This limitation can be overcome by reshaping the site. The soil is poorly suited to dwellings with basements because of the depth to bedrock and the seasonal perched water table. These limitations can be overcome by draining the soil and adding fill to the site. Another limitation to be considered for building sites is that the underlying bedrock is very hard and is a poor aquifer. Wells are difficult and expensive to drill and generally are of low capacity. This soil is poorly suited to local roads and streets because of the high frost action potential and the lack of sufficient strength to support vehicular traffic. These limitations can be overcome by replacing this soil with suitable material.

The capability unit is IIIe-2. The woodland suitability subclass is 2o.

BbC—Baraboo stony silt loam, 2 to 12 percent slopes. This gently sloping to sloping, moderately well drained soil is on broad, convex ridgetops on loess-covered quartzite uplands. Most areas are oblong or irregular in shape and range from 3 to 500 acres.

Typically, stones more than 10 inches in diameter cover 3 to 15 percent of the surface. The surface layer is very dark gray stony silt loam about 3 inches thick. The subsurface layer is dark grayish brown silt loam about 3 inches thick. The subsoil is brown firm silty clay loam about 28 inches thick. It is mottled with yellowish brown in the lower part. Pale red and weak red quartzite bedrock is at a depth of about 34 inches. In some small areas this soil is eroded. In some, it is moderately steep, and in others slopes are less than 2 percent. In places the lower part of the subsoil is loam, clay loam, or sandy clay loam. In some, the underlying bedrock is quartzite conglomerate or hard sandstone. In some areas this soil is more than 40 inches deep over quartzite bedrock, and in others it is less than 20 inches deep.

Included with this soil in mapping are small areas of Baraboo variant, Fayette, McHenry, and St. Charles soils and small areas of this soil which are not stony. The somewhat poorly drained Baraboo variant is in depressions, drainageways, and seep areas. The well drained

Fayette soil is in landscape positions similar to those of this Baraboo soil where the loess mantle is more than 60 inches thick. The well drained McHenry and St. Charles soils are in landscape positions similar to those of this Baraboo soil where the glacier covered the quartzite upland. Included soils make up 5 to 10 percent of the unit.

Permeability is moderate in this Baraboo soil. The available water capacity is moderate. Surface runoff is medium. This soil has a perched water table just above the quartzite during wet periods. This soil is somewhat slow to dry in spring as a result of the underlying impervious quartzite. Natural fertility is moderate. Root penetration is limited by the underlying quartzite. Organic-matter content of the surface layer is moderately low or moderate.

Most areas are native woodland (fig. 7). Some areas are used for hay, and some are used for pasture. The

Figure 7.—Undisturbed oak-hickory forest on sloping Baraboo soils.

potential is poor for cultivated crops as a result of stoniness. It is fair for hay and pasture, but it is good for these uses if the soil is cleared of stones. The potential is good for trees. It is good for woodland wildlife habitat, fair for openland habitat, and very poor for wetland habitat. The potential is fair or good for most recreational development and fair or poor for most engineering uses.

This soil is generally not suitable for cultivated crops because it is stony. If cleared of stones, it is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture. Because most areas are native woodland, the soil would also have to be cleared of trees. The expense of clearing stones and trees in addition to the expense of obtaining an adequate water supply for farmsteads generally precludes the use of this soil for intensive agriculture. In cleared and cultivated areas, the erosion hazard is slight or moderate. Crop residue management, minimum tillage, contour stripcropping, grassed waterways, and winter cover crops help to control erosion. Regular additions of organic matter help to maintain fertility and good tilth and increase water infiltration.

This soil is suited to hay and pasture, and if cleared of stones, it is best suited to these uses. Erosion is generally not a problem. Overgrazing, however, destroys the plant cover and results in erosion. Grazing when the soil is wet compacts the surface, which results in poor tilth and increases runoff and the hazard of erosion. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is suited to trees. Competing vegetation, however, interferes with natural regeneration and the establishment of plantings. It can be removed mechanically or controlled through the use of suitable herbicides.

This soil is poorly suited to septic tank absorption fields because of the depth to bedrock and the seasonal perched water table. The suitability can be improved by building a filtering mound. The soil is moderately suited to dwellings without basements and to small commercial buildings because of the seasonal perched water table and the lack of sufficient strength and stability to support building foundations. Slope is also a limitation for small commercial buildings. The water table limitation can be overcome by draining the soil or by adding fill. Low strength and poor stability can be overcome by replacing the soil with suitable material. The slope limitation can be overcome by reshaping the site. The soil is poorly suited to dwellings with basements because of the seasonal perched water table and the depth to bedrock. These limitations can be overcome by draining the soil and adding fill. Another limitation to be considered for building sites is that the underlying bedrock is very hard and is a poor aquifer. Wells are difficult and expensive to drill, and they generally are of low capacity. This soil is poorly suited to local roads and streets because of the high potential frost action. This limitation can be overcome by replacing the soil with suitable base material.

The capability unit is VIs-5. The woodland suitability subclass is 2o.

BbD—Baraboo stony silt loam, 12 to 30 percent slopes. This moderately steep and steep, moderately well drained soil is on side slopes of loess-covered quartzite uplands. Slopes are convex. Most areas are oblong and range from 3 to 300 acres.

Typically, stones more than 10 inches in diameter cover 3 to 15 percent of the surface. The surface layer is very dark gray stony silt loam about 3 inches thick. The subsurface layer is dark grayish brown silt loam about 3 inches thick. The subsoil is brown, firm silty clay loam about 24 inches thick. It is mottled with yellowish brown in the lower part. Pale red and weak red quartzite bedrock is at a depth of about 30 inches. In some small areas this soil is eroded. In some, it is only sloping, and in others slopes are more than 30 percent. In places the subsoil is loam, clay loam, or sandy clay loam. In some, the underlying bedrock is quartzite conglomerate or hard sandstone. In some areas this soil is more than 40 inches deep over quartzite, and in others it is less than 20 inches deep.

Included with this soil in mapping are small areas of Fayette, McHenry, and St. Charles soils and small areas of Rock outcrop, quartzite. Also included are small areas of this soil that are not stony and small areas of somewhat poorly drained soils in drainageways and seep areas. The well drained Fayette soil is on landscape positions similar to those of this Baraboo soil where the loess mantle is more than 60 inches thick. The well drained McHenry and St. Charles soils are in landscape positions similar to those of this Baraboo soil where the glacier covered the quartzite upland. Rock outcrop, quartzite, is in areas where the quartzite bedrock is exposed. Included soils make up 5 to 10 percent of the unit.

Permeability is moderate in this Baraboo soil. The available water capacity is moderate. Surface runoff is rapid. This soil has a perched water table above the quartzite during wet periods. It is somewhat slow to dry in spring as a result of the underlying impervious quartzite. Natural fertility is moderate. Root penetration is limited by the underlying quartzite. Organic-matter content of the surface layer is moderately low or moderate.

Most areas of this soil are native woodland. Some areas are used for hay and some for pasture. The potential is poor for cultivated crops because of stoniness and moderately steep slopes. The potential is fair for hay and pasture, and it is good if the soil is cleared of stones. The potential is good for trees. It is good for woodland wildlife habitat, fair for openland habitat, and very poor for wetland habitat. It is poor for most recreational development and for most engineering uses.

This soil is generally not suitable for cultivated crops because it is stony. If cleared of stones, it is well suited to grasses and legumes for hay and pasture. Because most areas are native woodland, they would also have to

be cleared of trees. The expense of clearing stones and trees in addition to the expense of obtaining an adequate water supply for farmsteads generally precludes the use of this soil for intensive agriculture. If the moderately steep soil is cleared and cultivated, the erosion hazard is severe. Crop residue management, minimum tillage, contour stripcropping, grassed waterways, and winter cover crops help to control erosion. Regular additions of organic matter help to maintain fertility and good tilth and increase water infiltration.

This soil is suited to hay and pasture, and if it is cleared of stones it is well suited to these uses. Erosion is generally not a problem. Overgrazing, however, destroys the plant cover and results in erosion. Grazing when the soil is wet compacts the surface, which results in poor tilth and increases runoff and the hazard of erosion. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is suited to trees. Soil related problems in forest management are associated with steepness of slope; mortality of seedlings on hot, dry sites; and brush encroachment following harvest. Planting trees on the contour and selecting the best location for skid roads during harvest minimize erosion and improve trafficability. Seedling mortality on south and west-facing slopes can be reduced by careful planting of vigorous nursery stock. Vegetation that competes with planted seedlings and natural reproduction following harvest can be removed mechanically or controlled through use of suitable herbicides.

This soil is poorly suited to septic tank absorption fields because of the depth to bedrock, the seasonal perched water table, and the slope. In places the suitability can be improved by building a filtering mound of suitable material and shaping it. The soil is poorly suited to dwellings without basements and to small commercial buildings because of the slope. In places this limitation can be overcome by filling and shaping the site to a suitable slope. The soil is poorly suited to dwellings with basements because of the seasonal perched water table, the depth to bedrock, and the slope. These limitations can be overcome by draining the soil and by adding fill to the site and reshaping it. Another limitation to be considered for building sites is that the underlying bedrock is very hard and is a poor aquifer. Wells are difficult and expensive to drill and generally are of low capacity. The soil is poorly suited to local roads and streets because of the slope and the high potential frost action. The slope limitation can be overcome by reshaping the site or by constructing roads on the contour. The frost action hazard can be overcome by replacing this soil with suitable base material. Generally, a more suitable site should be selected for community development.

The capability unit is VIs-5. The woodland suitability subclass is 2r.

BcE—Baraboo-Rock outcrop complex, 12 to 60 percent slopes. This unit consists of moderately steep to very steep, moderately well drained soils and areas of Rock outcrop on convex slopes of the quartzite uplands. Mapped areas are 50 to 90 percent Baraboo soil and 10 to 45 percent Rock outcrop. Most are oblong and range from 3 to 175 acres. The Baraboo soil and Rock outcrop are so intricately mixed, or so small in size, that it is not practical to map them separately.

Typically, stones more than 10 inches in diameter cover 3 to 15 percent of the surface of the Baraboo soil. The surface layer is very dark gray stony silt loam about 3 inches thick. The subsurface layer is dark grayish brown silt loam about 3 inches thick. The subsoil is brown, firm silty clay loam about 20 inches thick. Pale red and weak red quartzite is at a depth of about 26 inches. In some small areas this soil is less than 20 inches deep over quartzite, and in others it is more than 40 inches deep.

The Rock outcrop part of this unit is bare quartzite bedrock. Some areas are vertical or near vertical bedrock escarpments. At the foot of most escarpments is an accumulation of quartzite stones and boulders.

The Baraboo soil has moderate permeability and available water capacity. Surface runoff is rapid or very rapid. It has a perched water table just above the quartzite during wet seasons. Root penetration is limited by the quartzite. Natural fertility is moderate. Organic-matter content of the surface layer is moderately low or moderate.

Most areas of the Baraboo soil are native woodland. Some are unimproved pasture. If this soil is cleared of stones and trees, the potential is good for pasture. It is also good for trees. The potential is fair for openland wildlife habitat, good for woodland habitat, and very poor for wetland habitat. It is poor for recreational development and for most engineering uses.

This unit is not suitable for cultivated crops. Areas of the Baraboo soil that are cleared of stones and trees are suited to pasture, and some less sloping areas are suited to hay. Overgrazing destroys plant cover and results in erosion. Grazing when the surface layer is wet compacts the surface, which increases runoff and the hazard of erosion. Fertilization, renovation, and controlled grazing help to keep the soil and the plant cover in good condition.

The Baraboo soil in this unit is suited to trees. Soil related problems in forest management are associated with steepness of slope; mortality of seedlings on hot, dry sites; and brush encroachment following harvest. Planting trees on the contour and selecting the best location for skid roads during harvest minimize erosion and improve equipment trafficability. Seedling mortality on south- and west-facing slopes can be reduced by careful planting and by planting vigorous nursery stock. Vegetation that competes with planted seedlings or natural reproduction following harvest can be removed mechanically or controlled through use of suitable herbicides.

Rock outcrop is not suitable for cultivated crops, hay, pasture, trees, or wildlife plantings, nor is it suitable for recreational development and engineering uses.

The Baraboo soil in this unit is poorly suited to septic tank absorption fields and to dwellings with basements because of the seasonal perched water table, the depth to bedrock, and the slope. It is poorly suited to dwellings without basements and to small commercial buildings because of the slope. It is poorly suited to local roads and streets because of the slope and the high potential frost action. Generally, the best alternative is to select a more suitable site. In places the limitations can be overcome or reduced. The suitability for septic tank absorption fields can be improved in some less sloping areas by building a filtering mound of suitable material and shaping it to a suitable slope. Filling and shaping the site also help to overcome the limitations for buildings with and without basements and for small commercial buildings. The frost action hazard for local roads and streets can be overcome by replacing the soil with suitable base material. The slope limitation can be overcome by reshaping or by constructing roads on the contour.

The capability unit is VIs-5. The woodland suitability subclass is 2r.

BdB—Baraboo Variant stony silt loam, 1 to 6 percent slopes. This nearly level to gently sloping, somewhat poorly drained soil is in drainageways, depressions, and seep areas in broad, convex ridgetops on loess-covered quartzite uplands. Some areas are subject to flooding or ponding during wet periods or after heavy rains. Most areas are oblong and range from 3 to 55 acres.

Typically, the surface layer is very dark grayish brown stony silt loam about 6 inches thick. The subsoil is about 20 inches thick. It is brown, friable silt loam in the upper part and brown and grayish brown, firm silty clay loam in the lower part. The lower part is mottled with grayish brown and yellowish brown. Weak red quartzite bedrock is at a depth of about 26 inches. In some small areas this soil is eroded. In some, slopes are more than 6 percent. In some areas this soil is more than 40 inches deep over quartzite bedrock.

Included with this soil in mapping are small areas of Baraboo soils. Also included are some small areas where the soil is not stony and some where it is poorly drained. The moderately well drained Baraboo soil occupies slightly higher, better drained positions on the landscape than the Baraboo variant. Included soils make up 5 to 10 percent of this unit.

Permeability is moderate in this soil. The available water capacity is low. Surface runoff is slow or medium. A perched water table is at a depth of 1 to 3 feet during wet seasons. Depth of the root zone is limited by the perched water table during wet periods of the growing season or by the underlying quartzite. Natural fertility is moderate. The organic-matter content is moderate to high in the surface layer.

Most areas of this Baraboo variant are native woodland. Some areas have been cleared of trees and stones and are used for cultivated crops, hay, and pasture. If this soil is cleared of trees and stones and adequately drained, the potential is good for cultivated crops, hay, and pasture. It is fair for trees. The potential is fair for openland wildlife habitat, good for woodland habitat, and very poor for wetland habitat. It is fair or poor for most recreational development and poor for most engineering uses.

This soil is generally not suitable for cultivated crops because it is stony. If cleared of stones and adequately drained, it is suited to corn, soybeans, and small grain, and to legumes and grasses for hay and pasture. Because most areas are native woodland, the soil would also have to be cleared of trees. The underlying quartzite is very hard. Wells are difficult and expensive to drill and are generally of low capacity. The expense of clearing stones and trees in addition to the expense of obtaining adequate drainage and an adequate water supply for farmsteads generally precludes the use of this soil for intensive agriculture. In cleared and cultivated areas, the erosion hazard is slight. Crop residue management, minimum tillage, contour stripcropping, grassed waterways, and winter cover crops help to control erosion. Regular additions of organic matter help to maintain fertility and good tilth and increase water infiltration.

If cleared of stones and trees and adequately drained, this soil is suited to hay and pasture. There is little or no erosion unless the plant cover is overgrazed. Grazing when the surface layer is wet compacts the surface, which results in poor tilth and increases runoff and the hazard of erosion. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is suited to trees. Competing vegetation, however, interferes with natural regeneration and the establishment of plantings. It can be removed mechanically or controlled through the use of suitable herbicides.

This Baraboo variant is poorly suited to septic tank absorption fields because of occasional ponding, the depth to rock, and the seasonal high water table. The suitability can be improved by building a filtering mound of suitable material and protecting the site from ponding. The soil is poorly suited to dwellings without basements and small commercial buildings because of occasional ponding and the seasonal high water table. It is poorly suited to dwellings with basements because of occasional ponding, the seasonal high water table, and the depth to rock. These hazards can be overcome by protecting the site from ponding, by providing drainage to lower the water table, and by filling to increase the thickness of soil over the bedrock. This soil is poorly suited to local roads and streets because of occasional ponding and high potential frost action. These limitations can be overcome by protecting the site from ponding and by replacing the soil with suitable base material.

The capability unit is VIs-5. The woodland suitability subclass is 3o.

BeB—Bertrand silt loam, 2 to 6 percent slopes. This gently sloping, well drained soil is on broad outwash plains and on stream terraces along drainageways. Slopes are plane or convex. Most areas are oblong and range from 3 to 65 acres. A few areas are up to 160 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 8 inches thick. The subsoil is more than 52 inches thick. It is brown, firm silt loam in the upper part; dark yellowish brown and brown, firm silty clay loam and silt loam in the middle part; and dark yellowish brown, friable and very friable stratified silt loam, loam, sandy loam and loamy sand in the lower part. In some small areas the surface layer is thicker and darker than is typical. In some, this soil is eroded. In some areas it is underlain by soft sandstone rather than sand. In places the silty mantle of soil is less than 40 inches thick, and in others it is more than 60 inches thick.

Included with this soil in mapping are small areas of Curran soil, small areas of sloping Bertrand silt loam, some small areas where slopes are less than 2 percent, and some areas of moderately well drained soils. The somewhat poorly drained Curran soil is in drainageways and depressions and on foot slopes adjacent to wet bottoms. Included soils make up 5 to 10 percent of this unit.

Permeability is moderate in this Bertrand soil. The available water capacity is very high. Surface runoff is medium. Natural fertility is high. The surface layer is moderately low or moderate in organic-matter content. It is friable and can be easily worked throughout a wide range in moisture content. It tends to crust, however, after hard rains.

Most areas of this soil are used for cultivated crops, hay, and pasture. Some small areas are in woodland. The potential is good for cultivated crops, hay, pasture, and trees. It is good for openland and woodland wildlife habitat but is very poor for wetland wildlife habitat. The potential is good for recreational development and fair for most engineering uses.

This soil is well suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture. There is a slight hazard of erosion in cultivated areas. Crop residue management, minimum tillage, contour stripcropping, grassed waterways, and winter cover crops help to control erosion. Regular additions of organic matter help to maintain fertility and good tilth and increase water infiltration.

Erosion is generally not a problem in areas where this soil is used for pasture and hay. Overgrazing, however, destroys the plant cover and results in erosion. Grazing when the soil is wet compacts the surface, which results in poor tilth and increases runoff and the hazard of erosion. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is suited to trees. Competing vegetation, however, interferes with natural regeneration and the establishment of plantings. It can be removed mechanically or controlled through the use of suitable herbicides.

This soil is only moderately suited to septic tank filter fields because of the moderate permeability in the subsoil. This limitation can be overcome by increasing the size of the absorption area. The soil is only moderately suited to dwellings with or without basements and to small commercial buildings because it lacks sufficient strength and stability to support building foundations. These limitations can be overcome by replacing the soil with suitable base material. The soil is poorly suited to local roads and streets because of the high potential frost action and the lack of sufficient strength to support vehicular traffic. These limitations can be overcome by replacing this soil with suitable material.

The capability unit is IIe-1. The woodland suitability subclass is 1o.

BeC2—Bertrand silt loam, 6 to 12 percent slopes, eroded. This sloping, well drained soil is on short, uneven convex side slopes on outwash plains and stream terraces. Most areas are oblong and range from 3 to 36 acres.

Typically, the surface layer is dark grayish brown silt loam about 7 inches thick. In most cultivated areas it contains some brown subsoil material that has been mixed in by plowing. The subsoil is about 45 inches thick. It is brown, friable silt loam in the upper part; dark yellowish brown and brown, firm silty clay loam in the middle part; and dark yellowish brown, friable and very friable stratified silt loam, loam, sandy loam, and loamy sand in the lower part. The substratum to a depth of about 60 inches is dark yellowish brown, very friable loamy fine sand. In some small areas this soil is not eroded. In some areas it is underlain by soft sandstone. In some small areas the silty mantle is less than 40 inches thick, and in others it is more than 60 inches thick.

Included with this soil in mapping are small areas of Billett soil, small gently sloping areas and small areas of severely eroded Bertrand silt loam. Also included are small areas of this soil where slopes are more than 12 percent. The well drained Billett soils are in landscape positions similar to those of the Bertrand soils where there is more sand and less silt and clay in the soil. Included soils make up 5 to 10 percent of the unit.

Permeability is moderate in this Bertrand soil. The available water capacity is very high. Surface runoff is medium. Natural fertility is high. The surface layer is moderately low or moderate in organic-matter content. It is friable and can be easily tilled throughout a wide range in moisture content. It tends to crust, however, after hard rains, especially in areas where the plowed layer contains subsoil material.

Most areas of this soil are used for cultivated crops, hay, and pasture. Some areas are native woodland. The potential is fair for cultivated crops. It is good for pasture and trees. It is good for openland and woodland habitat

but is very poor for wetland habitat. The potential is fair for most recreation development and most engineering uses.

This Bertrand soil is suited to corn and small grain and is well suited to grasses and legumes for hay and pasture. The hazard of further erosion is moderate in cultivated areas. Crop residue management, minimum tillage, contour stripcropping, grassed waterways, and winter cover crops help to control erosion. Regular additions of organic matter help to maintain fertility and good tilth and increase water infiltration.

Erosion is generally not a problem in areas where this soil is used for pasture or hay. Overgrazing, however, destroys the plant cover and results in erosion. Grazing when the soil is wet compacts the surface, which results in poor tilth and increases runoff and the hazard of further erosion. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is suited to trees. Competing vegetation, however, interferes with natural regeneration and the establishment of plantings. It can be removed mechanically or controlled through the use of suitable herbicides.

This soil is moderately suited to septic tank absorption fields because of the moderate permeability and the slope. These limitations can be overcome by increasing the size of the absorption area and by shaping the site to a more suitable slope or installing the field on the contour. The soil is moderately suited to dwellings with or without basements because of the slope and the lack of sufficient strength and stability to support building foundations. The slope limitation can be overcome by reshaping the site. Low strength and poor stability can be overcome by replacing the soil with suitable base material. The soil is poorly suited to small commercial buildings because of the slope. This limitation can be overcome by reshaping the site. The soil is poorly suited to local roads and streets because of the high frost action potential and the lack of sufficient strength to support vehicular traffic. These limitations can be overcome by replacing the soil with suitable base material.

The capability unit is IIIe-1. The woodland suitability subclass is 1o.

BIB—Billett sandy loam, 1 to 6 percent slopes. This nearly level to gently sloping, well drained soil is on broad outwash plains and on stream terraces along drainageways. Most areas are oblong and range from 3 to 170 acres.

Typically, the surface layer is dark brown sandy loam about 9 inches thick. The subsoil is about 28 inches thick. It is brown, friable and very friable sandy loam in the upper part and strong brown, very friable loamy sand in the lower part. The substratum to a depth of about 60 inches is yellowish brown, loose sand. In some small areas this soil is eroded. In some, it is sloping. In places the surface layer is loamy sand. In some small areas this soil is less than 30 inches deep over sand.

Included with this soil in mapping are small areas of Fox and Gotham soils. Also included are small areas of moderately well drained soils. The somewhat excessively drained Gotham soil is in landscape positions similar to those of this Billett soil where there is more sand and less clay in the soil. The well drained Fox soil is in landscape positions similar to those of this soil where there is more clay and less sand in the subsoil. Included soils make up 10 to 15 percent of the unit.

Permeability is moderately rapid in this Billett soil. The available water capacity is low. Surface runoff is medium. Natural fertility is low. In some areas, root penetration is limited by the underlying sand. The surface layer is moderate in organic-matter content. It is very friable and can be easily tilled throughout a wide range in moisture content.

Most areas of this soil are used for cultivated crops, hay, and pasture. Some areas are in woodland, and some are planted to pines. The potential is fair for cultivated crops, hay, and pasture, and is good if the soil is irrigated. The potential is fair for trees. It is good for openland and woodland wildlife habitat but is very poor for wetland habitat. The potential is good for recreational development and good or fair for most engineering uses.

This soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture, but crop yields are limited during most seasons by the low available water capacity. With irrigation and intensive management, better and more consistent yields can be produced. In cultivated areas, the erosion hazard is slight but the soil is subject to blowing. Crop residue management, minimum tillage, contour stripcropping, windbreaks, and winter cover crops help to control erosion and soil blowing. Fertilization, supplemental irrigation, and protection from soil blowing are needed for dependable crop production.

This soil is suited to hay and pasture, but forage yields are generally somewhat limited unless the soil is fertilized and irrigated. Erosion and soil blowing are generally not hazards. Overgrazing, however, destroys the plant cover and results in erosion and soil blowing. Fertilization, renovation, and controlled grazing help to maintain the plant cover.

This soil is suited to trees. Competing vegetation can slow natural regeneration and establishment of plantings. It can be removed mechanically or controlled through the use of suitable herbicides.

This soil is suited to septic tank absorption fields. There is a danger of pollution of the ground water, however, as a result of the rapidly permeable substratum. The soil is suited to building site development. It is moderately suited to local roads and streets because of the potential frost action. This hazard can be overcome by replacing the soil with suitable base material. This soil is a fair source of sand and a good source of topsoil.

The capability unit is IIIe-4. The woodland suitability subclass is 3o.

BIC2—Billett sandy loam, 6 to 12 percent slopes, eroded. This sloping, well drained soil is on short convex side slopes on outwash plains and on stream terraces. Most areas are oblong and range from 3 to 70 acres.

Typically, the surface layer is dark brown sandy loam about 7 inches thick. In most cultivated areas it contains some brown subsoil material that has been mixed in by plowing. The subsoil is about 27 inches thick. It is brown, friable sandy loam in the upper part and strong brown, very friable loamy sand in the lower part. The substratum to a depth of about 60 inches is yellowish brown, loose sand. In some small areas this soil is not eroded. In some, it is only gently sloping. In places the surface layer is loamy sand. In some small areas this soil is less than 30 inches deep over sand.

Included with this soil in mapping are small areas of Fox and Gotham soil. Also included are small areas of severely eroded Billett sandy loam and some small areas where there is more clay and less sand in the subsoil. The somewhat excessively drained Gotham soil is in landscape positions similar to those of this Billett soil where there is more sand and less clay in the subsoil. The well drained Fox soil is in similar landscape positions where there is more clay and less sand in the subsoil. Included soils make up 5 to 10 percent of the unit.

Permeability is moderately rapid in this Billett soil. The available water capacity is low. Surface runoff is medium. In some areas, root penetration is limited by the underlying sand. Natural fertility is low. The surface layer is moderate in organic-matter content. It is very friable and can be easily tilled throughout a wide range in moisture content.

Most areas of this soil are used for cultivated crops, hay, and pasture. Some areas are wooded, and some are planted to pines. The potential is fair for cultivated crops, hay, pasture, and trees. It is good for openland and woodland wildlife habitat but is very poor for wetland habitat. The potential is fair for most recreational development and for most engineering uses.

This soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture, but crop yields are limited during most seasons by the low available water capacity. With irrigation and intensive management, better and more consistent yields can be produced. In cultivated areas, the hazard of further erosion is moderate and the soil is subject to blowing. Crop residue management, minimum tillage, contour stripcropping, windbreaks, and winter cover crops help to control erosion and soil blowing. Fertilization, supplemental irrigation, and protection from soil blowing are needed for dependable crop production.

This soil is suited to hay and pasture, but forage yields are generally somewhat limited unless the soil is fertilized and irrigated. Erosion and soil blowing are generally not hazards. Overgrazing, however, destroys the plant cover and results in erosion and soil blowing. Fertilization, renovation, and controlled grazing help to maintain the plant cover.

This soil is suited to trees. Competing vegetation can slow natural regeneration and establishment of plantings. It can be removed mechanically or controlled through the use of suitable herbicides.

This soil is moderately suited to septic tank absorption fields because of the slope. This limitation can be overcome by reshaping the site or by installing the field on the contour. There is a hazard of pollution of the ground water, however, as a result of the rapid permeability in the substratum. The soil is moderately suited to dwellings with or without basements and is poorly suited to small commercial buildings because of the slope. This limitation can be overcome by reshaping the site or by selecting a less sloping site. This soil is moderately suited to local roads and streets because of the slope and the potential frost action. The slope limitation can be minimized by land shaping or by constructing roads on the contour. The frost action hazard can be overcome by replacing the soil with suitable base material. This soil is a fair source for sand and topsoil.

The capability unit is IVe-4. The woodland suitability group is 3o.

BID2—Billett sandy loam, 12 to 20 percent slopes, eroded. This moderately steep, well drained soil is on short convex side slopes on outwash plains and stream terraces. Most areas are long and narrow and range from 3 to 25 acres.

Typically, the surface layer is dark brown sandy loam about 6 inches thick. In most cultivated areas it contains some brown subsoil material that has been mixed in by plowing. The subsoil is about 25 inches thick. It is brown, friable sandy loam in the upper part; brown, very friable loamy sand in the middle part; and strong brown, very friable sand in the lower part. The substratum to a depth of about 60 inches is yellowish brown, loose sand. In some small areas this soil is not eroded. In places the surface layer is loamy sand. In some small areas this soil is less than 30 inches deep over sand.

Included with this soil in mapping are small areas of Gotham and Plainfield soils. Also included are small sloping areas and severely eroded areas of Billett sandy loam, some small areas where slopes are more than 20 percent, and some small areas where there is more clay and less sand in the subsoil than is typical. The somewhat excessively drained Gotham and excessively drained Plainfield soils are in landscape positions similar to those of this Billett soil where there is more sand and less clay in the subsoil. Included soils make up about 5 to 10 percent of the unit.

Permeability is moderately rapid in this Billett soil. The available water capacity is low. Surface runoff is rapid. In some areas, root penetration is limited by the underlying sand. Natural fertility is low. The surface layer is moderate in organic-matter content. It is very friable and can be easily tilled throughout a wide range in moisture content.

Some areas of this soil are used for cultivated crops, hay, and pasture. Some areas are native woodland, and some are planted to pines. The potential is poor for cultivated crops and fair for pasture and trees. It is fair for openland wildlife habitat, good for woodland habitat, but very poor for wetland habitat. The potential is poor for most recreational development and for most engineering uses.

This soil generally is not suited to cultivated crops but is suited to legumes and grasses for hay and pasture. Crop yields are limited during most seasons by the low available water capacity. In cultivated areas, the hazard of further erosion is severe, and the soil is subject to blowing. Crop residue management, minimum tillage, contour stripcropping, grassed waterways, and winter cover crops are needed to minimize erosion and soil blowing.

The use of this soil as pastureland or hayland is effective in controlling erosion and soil blowing, but forage yields are generally limited by the low available water capacity. Overgrazing destroys the plant cover and results in further erosion and soil blowing. Fertilization, renovation, and controlled grazing help to maintain the plant cover.

This soil is suited to trees. Soil related problems in forest management are associated with steepness of slope; mortality of seedlings on hot, dry sites; and brush encroachment following harvest. Planting trees on the contour and selecting the best location for skid roads during harvest minimize erosion and improve equipment trafficability. Seedling mortality on south- and west-facing slopes can be reduced by careful planting and by planting vigorous nursery stock. Vegetation that competes with planted seedlings or natural reproduction following harvest can be removed mechanically or controlled through use of suitable herbicides.

This soil is poorly suited to septic tank absorption fields because of the slope. This limitation can be overcome by shaping the site or by selecting a less sloping site. There is a hazard of ground water pollution, however, as a result of the rapid permeability in the substratum. This soil is poorly suited to building site development because of the slope. This limitation can be overcome by shaping the site or by selecting a less sloping site.

The capability unit is VIe-4. The woodland suitability subclass is 3r.

BmA—Billett fine sandy loam, moderately well drained, 0 to 3 percent slopes. This nearly level to gently sloping, moderately well drained soil is on smooth outwash plains and stream terraces. Most areas are oblong and range from 3 to 70 acres.

Typically, the surface layer is dark brown fine sandy loam about 8 inches thick. The subsoil is about 28 inches thick. It is brown, friable and very friable fine sandy loam in the upper part and brown, very friable loamy sand in the lower part. The substratum to a depth of about 60 inches is light yellowish brown and pale brown, loose sand. It is mottled with brownish yellow. In some small areas slopes are more than 3 percent. In some areas the surface layer is loamy sand, and in some, the dark surface layer is 10 inches or more thick. In places the soil is less than 30 inches deep over sand.

Included with this soil in mapping are small areas of Shiffer variant. Also included are some small areas of well drained Billett soils, and small areas where there is less sand and more silt and clay in the soil. The somewhat poorly drained Shiffer variant is in drainageways and depressions. Included soils make up 5 to 10 percent of the unit.

Permeability is moderately rapid in this Billett soil. The available water capacity is moderate. Surface runoff is slow. Depth to the water table is 3 to 6 feet in wet periods. Natural fertility is low. In some areas, root penetration is limited by the underlying sand. The surface layer is moderate in organic-matter content. It is very friable and can be easily worked throughout a wide range in moisture content.

Most areas of this soil are used for cultivated crops, hay, and pasture. Some areas are woodland, and some are planted to pines. The potential is fair for cultivated crops, hay, and pasture and is good if the soil is irrigated. The potential is fair for trees. It is good for openland and woodland wildlife habitat but poor for wetland habitat. It is good for recreational development and fair or poor for most engineering uses.

This soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture, but crop yields are limited during most seasons by the moderate available water capacity. In irrigated areas, better and more consistent yields can be produced. In cultivated areas, the erosion hazard is slight, and the soil is subject to blowing. Crop residue management, minimum tillage, contour stripcropping, windbreaks, and winter cover crops help to control erosion and soil blowing. Fertilization, supplemental irrigation, and protection from soil blowing are needed for dependable crop production.

This soil is suited to hay and pasture, but forage yields generally are somewhat limited unless this soil is fertilized and irrigated. Erosion is generally not a problem. Overgrazing, however, destroys the plant cover and results in erosion and soil blowing. Fertilization, renovation, and controlled grazing help to maintain the plant cover.

This soil is suited to trees. Competing vegetation, however, can slow natural regeneration or the establishment of plantings. It can be removed mechanically or controlled through the use of suitable herbicides.

This soil is poorly suited to septic tank absorption fields because of the seasonal high water table. The suitability can be improved by draining the soil to lower the water table or by building a filtering mound. There is a hazard of ground water pollution, however, because the substratum is rapidly permeable. The soil is suited to dwellings without basements and to small commercial buildings. It is only moderately suited to dwellings with basements because of the seasonal high water table. This limitation can be overcome by draining the soil to

lower the water table. This soil is moderately suited to local roads and streets because of the potential frost action. This hazard can be overcome by replacing the soil with suitable material.

The capability unit is IIIe-4. The woodland suitability subclass is 3o.

BoB—Boone sand, 2 to 6 percent slopes. This gently sloping, excessively drained soil is on convex ridgetops and foot slopes on sandstone uplands and benches. Most areas are oblong or irregular in shape and range from 3 to 110 acres.

Typically, the surface layer is very dark grayish brown sand about 7 inches thick. The substratum is dark yellowish brown and yellowish brown, loose sand about 21 inches thick. Soft sandstone begins at a depth of about 28 inches and extends to 60 inches or more. The upper part is yellowish brown, and the lower part is strong brown and very pale brown. In some areas this soil is underlain by hard sandstone. In some small areas it is eroded mainly as a result of soil blowing. In places the surface layer is loamy sand. In some areas this soil is less than 20 inches deep over sandstone, and in others it is more than 40 inches deep.

Included with this soil in mapping are some small areas of Eleva and Elkmound soils. Also included are small areas of sloping Boone sand and areas of soils that are severely eroded, mainly as a result of soil blowing. The somewhat excessively drained Eleva soil and the well drained Elkmound soil are in landscape positions similar to those of this Boone soil where there is more silt and clay and less sand in the soil. The Elkmound soil is less than 20 inches deep over sandstone. Included soils make up 5 to 10 percent of the unit.

Permeability is rapid in this Boone soil. The available water capacity is very low. Surface runoff is medium. Natural fertility is low. Root penetration is limited by the underlying sandstone. The surface layer is low in organic-matter content. It is very friable and can be easily worked throughout a wide range in moisture content.

Some areas of this soil are used for cultivated crops, hay, and pasture. Some areas are native woodland, and some are planted to pines. Many areas that were cultivated in the past are no longer farmed. The potential is poor for cultivated crops, hay, and pasture. Under intensive management and irrigation, the potential is fair for these uses. It is poor for trees. It is poor for openland and woodland wildlife habitat and very poor for wetland habitat. The potential is poor for recreational development but good or fair for most engineering uses.

This soil generally is not suitable for cultivated crops, hay, and pasture because of the very low available water capacity. If irrigated and fertilized, it is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture. Water erosion is generally not a problem, but the soil is subject to blowing. Crop residue management, minimum tillage, windbreaks, and winter cover crops help to control soil blowing. Fertilization, irrigation, and protection from soil blowing are needed for dependable crop production. Because of the rapid permeability of this soil, irrigation rates should be limited to prevent washing plant nutrients out of the root zone.

Soil blowing is generally not a problem in areas where this soil is used for hay or pasture. Forage yields, however, are generally low unless this soil is fertilized and irrigated. Early spring planting, before the soil has a chance to dry, is best. Later plantings are likely to have poor survival. Overgrazing destroys the plant cover and results in soil blowing. Fertilization, renovation, irrigation, and controlled grazing help to maintain the plant cover.

This soil is poorly suited to trees. Tree growth and form are poor. Poor seedling survival in dry years can be offset by careful planting and by planting vigorous nursery stock. Although production of merchantable trees may be economically marginal, the use of trees to control active blowouts and sand dune movement may be advisable.

This soil is poorly suited to septic tank absorption fields because of the depth to bedrock. The suitability can be improved by building a filtering mound of suitable material. The soil is suited to dwellings without basements, to small commercial buildings, and to local roads and streets. It is moderately suited to dwellings with basements because of the depth to bedrock. This limitation can be overcome by adding fill to the site to increase the thickness of this soil.

The capability unit is VIs-8. The woodland suitability subclass is 4s.

BoC—Boone sand, 6 to 12 percent slopes. This sloping, excessively drained soil is on convex ridgetops and side slopes on sandstone uplands and benches. Most areas are oblong and range from 3 to 85 acres.

Typically, the surface layer is very dark grayish brown sand about 7 inches thick. The substratum is dark yellowish brown and yellowish brown, loose sand about 21 inches thick. Soft sandstone begins at a depth of about 28 inches and extends to about 60 inches or more. The upper part is yellowish brown, and the lower part is strong brown and very pale brown. In some small areas this soil is underlain by hard sandstone. In some, it is eroded, mainly as a result of soil blowing. In some, it is only gently sloping. In places the surface layer is loamy sand. In places this soil is less than 20 inches deep over sandstone, and in others it is more than 40 inches deep.

Included with this soil in mapping are small areas of Eleva and Elkmound soils. Also included are small areas of moderately steep Boone sand and some small areas of soils that are severely eroded, mainly as a result of soil blowing. The somewhat excessively drained Eleva soil and the well drained Elkmound soil are in landscape positions similar to those of this Boone soil where there is more silt and clay and less sand in the soil. The Elkmound soil is less than 20 inches deep over sandstone. Included soils make up 5 to 10 percent of the unit.

Permeability is rapid in this Boone soil. The available water capacity is very low. Surface runoff is medium. Natural fertility is low. Root penetration is limited by the underlying sandstone. The surface layer is low in organic-matter content. It is very friable and can be easily worked throughout a wide range in moisture content.

Some areas of this soil are used for cultivated crops, hay, and pasture. Some areas are native woodland, and some have been planted to pines. Many areas that were cultivated in the past are no longer farmed. The potential is poor for cultivated crops, hay, and pasture. Under intensive management and irrigation, it is fair for these uses. The potential is poor for trees. It is poor for openland and woodland habitat and very poor for wetland habitat. It is poor for recreation development and fair or poor for most engineering uses.

This soil generally is not suitable for cultivated crops, hay, and pasture because of the very low available water capacity, the low natural fertility, and the hazard of soil blowing. If irrigated and fertilized, it is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture. The hazard of erosion is slight in cultivated areas, but soil blowing is a hazard. Crop residue management, minimum tillage, windbreaks, and winter cover crops help to control erosion and soil blowing. Fertilization, irrigation, and protection from soil blowing are needed for dependable crop production. Because of the rapid permeability of this soil, irrigation rates should be limited to prevent washing plant nutrients out of the root zone.

Soil blowing is generally not a problem in areas where this soil is used for hay or pasture. Forage yields are generally low unless the soil is fertilized and irrigated. Early spring planting, before the soil has a chance to dry, is best. Later plantings are likely to have poor survival. Overgrazing destroys the plant cover and results in soil blowing. Fertilization, renovation, irrigation, and controlled grazing help to maintain the plant cover.

This soil is poorly suited to trees. Tree growth and form are poor. Poor seedling survival in dry years can be offset by careful planting and by planting vigorous nursery stock. Although production of merchantable trees may be economically marginal, the use of trees to control active blowouts and sand dune movement may be advisable.

This soil is poorly suited to septic tank absorption fields because of the depth to bedrock. The suitability can be improved by building a filtering mound of suitable material. The soil is moderately suited to dwellings without basements and local roads and streets because of the slope. It is poorly suited to small commercial buildings because of the slope. This limitation can be overcome by reshaping the site or by constructing roads on the contour. This soil is moderately suited to dwellings with basements because of the slope and the depth to rock. These limitations can be overcome by adding fill to the site to increase the thickness of the soil and by reshaping the site.

The capability unit is VIs-8. The woodland suitability subclass is 4s.

BoD—Boone sand, 12 to 30 percent slopes. This moderately steep and steep, excessively drained soil is on convex side slopes on sandstone uplands and benches. Most areas are oblong and range from 3 to 70 acres. A few are larger than 70 acres.

Typically, the surface layer is very dark gray sand about 3 inches thick. The subsurface layer is dark grayish brown sand about 3 inches thick. The substratum is about 20 inches thick. It is dark yellowish brown and yellowish brown loose sand. Soft sandstone begins at a depth of about 26 inches and extends to 60 inches or more. The upper part is yellowish brown, and the lower part is strong brown and very pale brown. In some areas this soil is underlain by hard sandstone. In some small areas it is eroded. In some, slopes are more than 30 percent. In places the surface layer is loamy sand. In some places this soil is less than 20 inches deep over sandstone, and in others it is more than 40 inches deep.

Included with this soil in mapping are small areas of Eleva and Elkmound soils. Also included are small sloping areas and small severely eroded areas of Boone sand. The somewhat excessively drained Eleva soil and the well drained Elkmound soil are in landscape positions similar to those of the Boone soil. The Elkmound soil is less than 20 inches deep over sandstone. Included soils make up 5 to 10 percent of the unit.

Permeability is rapid in this Boone soil. The available water capacity is very low. Surface runoff is rapid or very rapid. Natural fertility is low. The depth of the root zone is limited by the underlying sandstone. The organic-matter content is low in the surface layer.

Most areas of this soil are native woodland. Some have been planted to pines. A few small areas that occur in larger, less sloping fields of other soils are used for crops. The potential is poor for cultivated crops, hay, and pasture. It is poor for trees. The potential is poor for openland wildlife habitat and woodland habitat and very poor for wetland habitat. It is poor for recreational development and for most engineering uses.

Because of the very low available water capacity and the severe and very severe hazards of erosion and soil blowing, this Boone soil is not suitable for cultivated crops. The use of this soil as pasture land or hayland is effective in controlling erosion and soil blowing, but forage yields are generally low. Early spring planting is best. Later plantings are likely to have poor survival. Overgrazing destroys the plant cover and results in erosion and soil blowing. Fertilization, renovation, and controlled grazing help to maintain the plant cover.

This soil is poorly suited to trees. Growth is slow, and trees tend to have poor form. Erosion can be reduced by planting trees on the contour and by selecting the best location of skid roads during harvest. These practices also reduce equipment limitations. Poor seedling survival in dry years can be offset by careful planting and by

planting vigorous nursery stock. Although production of merchantable wood is economically marginal, trees help to control erosion and soil blowing.

This Boone soil is poorly suited to septic tank absorption fields because of the depth to bedrock and the slope. In some places the suitability can be improved by building a filtering mound of suitable material and shaping it to a suitable slope. If this alternative is not feasible, a more suitable site should be selected. The soil is poorly suited to building site development and local roads and streets because of the slope. In places this limitation can be overcome by filling and reshaping the site and by constructing roads on the contour. If these alternatives are not feasible, a more suitable site should be selected.

The capability unit is VIIs-8. The woodland suitability subclass is 4s.

BrA—Brems loamy sand, 0 to 3 percent slopes. This nearly level to gently sloping, moderately well drained soil is on smooth outwash plains, on stream terraces, and in lake basins. Most areas are oblong and range from 3 to 130 acres.

Typically, the surface layer is very dark grayish brown loamy sand about 10 inches thick. The subsoil is about 28 inches thick. It is brown and dark yellowish brown, very friable sand in the upper part and yellowish brown, very friable and loose sand in the lower part. The lower part is mottled with yellowish brown and yellowish red. The substratum to a depth of about 60 inches is brown, loose sand. It is mottled with grayish brown and yellowish red. In some small areas this soil is eroded, mainly as a result of soil blowing. In places the surface layer is sand. In some small areas slopes are more than 3 percent.

Included with this soil in mapping are small areas of Gotham and Plainfield soils. Also included are some small areas of soils that are severely eroded, mainly as a result of soil blowing, and some small areas of soils in drainageways and depressions where the water table is no more than 1 foot below the surface during wet periods. The somewhat excessively drained Gotham soil and the excessively drained Plainfield soil are on high landscape positions where depth to the water table is more than 60 inches. Included soils make up 5 to 10 percent of the unit.

Permeability is rapid in this Brems soil. The available water capacity is low. Surface runoff is slow. The water table is 2 1/2 to 5 feet below the surface during wet periods. Natural fertility is low. The surface layer is low in organic-matter content. It is very friable and can be easily worked throughout a wide range in moisture content.

Many areas of this soil are used for cultivated crops, hay, and pasture. Some areas are native woodland, and some have been planted to pines. Many areas that were cultivated in the past are no longer farmed. The potential is fair for cultivated crops, hay, and pasture. Under intensive management and irrigation, it is good for these uses. The potential is fair for trees. It is fair for openland wildlife habitat, good for woodland habitat, and very poor for wetland habitat. The potential is fair for most recreational development and good or fair for most engineering uses.

This soil is suited to cultivated crops, hay, and pasture, but crop yields are generally limited by the low available water capacity. If fertilized and irrigated, the soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture. Erosion is generally not a hazard, but the soil is subject to blowing. Crop residue management, minimum tillage, windbreaks, and winter cover crops help to control erosion and soil blowing. Fertilization, irrigation, and protection from soil blowing are needed for dependable crop production. Because of the very rapid permeability of this soil, irrigation should be limited to prevent washing plant nutrients out of the root zone.

Soil blowing is generally not a problem in areas where this soil is used for hay or pasture. Forage yields, however, are generally low unless the soil is fertilized and irrigated. Early spring planting, before the soil has a chance to dry, is best. Later plantings are likely to have poor survival. Overgrazing destroys the plant cover and results in soil blowing. Fertilization, renovation, irrigation, and controlled grazing help to maintain the plant cover.

This soil is suited to trees. Poor seedling survival in dry years can be offset by careful planting and by planting vigorous nursery stock. Competing vegetation that interferes with natural regeneration can be removed mechanically or controlled through the use of suitable herbicides.

This soil is poorly suited to septic tank absorption fields because of the seasonal water table. The suitability can be improved by draining the soil to lower the seasonal water table or by building a filtering mound of suitable material. The soil is suited to dwellings without basements, to small commercial buildings, and to local roads and streets. It is only moderately suited to dwellings with basements because of the seasonal high water table. This limitation can be overcome by draining the soil to lower the seasonal water table.

The capability unit is IVs-4. THe woodland suitability subclass is 3s.

BtB—Briggsville silt loam, 2 to 6 percent slopes. This gently sloping, well drained soil is in glacial lake basins. Slopes are convex. Most areas are irregular in shape and range from 3 to 100 acres.

Typically, the surface layer is dark grayish brown silt loam about 7 inches thick. The subsoil is about 32 inches thick. It is reddish brown, firm silty clay loam in the upper part; reddish brown, firm and very firm silty clay in the middle part; and reddish brown and brown, firm silty clay loam in the lower part. The substratum to a depth of about 60 inches is light brown, friable silty clay loam. In some areas this soil is eroded. In some, slopes

are less than 2 percent. In places the surface layer is loam, sandy loam, loamy sand, or sand and the upper part of the subsoil is sandy loam, loam, or clay loam to a depth of as much as 30 inches. In some small areas this soil is more than 40 inches deep over stratified lacustrine deposits.

Included with this soil in mapping are small areas of Mosel, Rimer, and Tustin soils. Also included are small areas where slopes are more than 6 percent and small areas of severely eroded Briggsville silt loam. In most severely eroded areas the surface layer is mainly silty clay loam. The somewhat poorly drained Mosel soil is in drainageways, depressions, and seep areas and on foot slopes. The somewhat poorly drained Rimer soil is in landscape positions similar to those of the Mosel soil where there is a sandy mantle 20 to 40 inches thick. The well drained Tustin soil is in landscape positions similar to those of the Briggsville soil where there is a sandy mantle 20 to 40 inches thick. Included soils make up 5 to 10 percent of the unit.

Permeability is moderately slow in this Briggsville soil. The available water capacity is high. Surface runoff is medium. Natural fertility is high. The surface layer is moderately low or moderate in organic-matter content. It is friable and can be easily worked throughout a wide range in moisture content. It tends to crust, however, after hard rains.

Most areas of this soil are used for cultivated crops, hay, and pasture. Some areas are native woodland. The potential is good for cultivated crops, pasture, and trees. It is good for openland wildlife habitat and woodland habitat but poor for wetland habitat. It is good or fair for recreational development and poor for most engineering uses.

This soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture. The hazard of erosion is slight in cultivated areas. Crop residue management, minimum tillage, contour stripcropping, grassed waterways, and winter cover crops help to control erosion. Regular additions of organic matter help to maintain fertility and good tilth and increase water infiltration.

Erosion is generally not a problem in areas where this soil is used for pasture or hay. Overgrazing, however, destroys the plant cover and results in erosion. Grazing when the soil is wet compacts the surface, which results in poor tilth and increases runoff and the hazard of erosion. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is suited to trees. Seedling survival can be improved by careful planting and by planting vigorous nursery stock. Competing vegetation can interfere with natural regeneration following harvest. It can be removed mechanically or controlled through the use of suitable herbicides.

This soil is poorly suited to septic tank absorption fields because of the moderately slow permeability. The suitability can be improved by building a filtering mound of suitable material or, in places, by increasing the size of the field. The soil is poorly suited to dwellings with or without basements, to small commercial buildings, and to local roads and streets because it lacks sufficient strength to adequately support building foundations or vehicular traffic. This limitation can be overcome by replacing this soil with suitable material.

The capability unit is IIe-6. The woodland suitability subclass is 2c.

ChA—Chaseburg silt loam, 0 to 3 percent slopes. This nearly level to gently sloping, moderately well drained soil is in drainageways and depressions and on flood plains. It is subject to frequent flooding of brief duration. Slopes are concave. Most areas are long and narrow and range from 3 to 120 acres.

Typically, the surface layer is dark grayish brown silt loam about 7 inches thick. The substratum to a depth of about 60 inches is brown, friable silt loam. It is mottled with yellowish brown in the lower part. In some small areas slopes are more than 3 percent. In some, this soil is gravelly. In places the surface layer is thicker and darker colored than is typical.

Included with this soil in mapping are small areas of Orion soils and Fluvaquents. The moderately well drained and somewhat poorly drianed Fluvaquents are in landscape positions similar to those of this Chaseburg soil where the soil is stratified silty, loamy, and sandy sediments. The somewhat poorly drained Orion soil is in somewhat lower and wetter areas of drainageways. Included soils make up 10 to 15 percent of the unit.

Permeability is moderate in this Chaseburg soil. The available water capacity is very high. Surface runoff is slow. A water table is at a depth of 3 to 5 feet during wet periods. Natural fertility is high. The surface layer is moderately low or moderate in organic-matter content. It is very friable and can be easily tilled throughout a wide range in moisture content.

Most areas of this soil are used for cultivated crops, hay, and pasture. Some areas are native woodland. The potential is good for cultivated crops, pasture, and trees. It is good for openland wildlife habitat and woodland habitat but poor for wetland habitat. It is fair or poor for recreational development and poor for most engineering uses.

Most areas of this soil are suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture. Areas subject to frequent, damaging overflow require dikes or diversions to prevent flooding. Regular additions of organic matter help to maintain fertility and good tilth.

This soil is suited to hay and pasture. If the soil is not protected from overflow, flooding can damage the forage. Overgrazing destroys the plant cover and encourages undesirable plants. Loss of plant cover can also result in erosion during periods of overflow. Grazing when the soil is wet compacts the surface and results in

poor tilth and reduces water infiltration. Fertilization, renovation, controlled grazing, protection from flooding, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is suited to trees. Competing vegetation, however, interferes with natural regeneration and the establishment of seedlings. It can be removed mechanically or controlled through the use of suitable herbicides.

This soil is poorly suited to septic tank absorption fields as a result of frequent flooding and the seasonal high water table. Where dikes and levees protect the site from flooding, the suitability can be improved by draining the soil to lower the seasonal water table or by building a filtering mound of suitable material. The soil is poorly suited to local roads and streets because it is frequently flooded and the potential frost action is high. The flood hazard can be overcome by constructing dikes and levees. The frost action hazard can be overcome by replacing this soil with suitable base material.

The capability unit is IIe-5. The woodland suitability subclass is 2o.

Co—Colwood loam. This nearly level, poorly drained and very poorly drained soil is in drainageways and depressions of glacial lake basins. It is subject to flooding or ponding during wet periods and after heavy rains. Most areas are oblong and range from 3 to 80 acres.

Typically, the surface layer is black loam about 8 inches thick. The subsurface layer is black loam about 4 inches thick. The subsoil is about 18 inches thick. It is grayish brown, friable sandy loam in the upper part; grayish brown and yellowish brown, firm loam in the middle part; and grayish brown and yellowish brown, firm silty clay loam in the lower part. It is mottled with yellowish brown and gray. The substratum to a depth of about 60 inches is brown, yellowish brown, and light yellowish brown, friable and very friable silt loam with thin lenses of very fine sand. It is mottled with grayish brown, light gray, gray, and pinkish gray. In some small areas slopes are up to 4 percent. In places the surface layer is silt loam, fine sandy loam, or sandy loam. In some, the substratum is stratified silt loam and silty clay loam.

Included with this soil in mapping are small areas of Mosel and Sisson soils. The somewhat poorly drained Mosel soil is in slightly raised, better drained positions. The well drained Sisson soil occupies higher convex areas. Included soils make up 5 to 10 percent of the unit.

Permeability is moderate in this Colwood soil. The available water capacity is high. Surface runoff is slow or ponded. Unless drained, this soil has a water table at the surface or within 1 foot of the surface much of the year. Natural fertility is high. Root penetration is limited by the water table. The surface layer is very high in organic-matter content. It is friable and can be easily worked throughout a wide range in moisture content.

Most drained areas of this soil are used for cultivated crops and pasture. Undrained areas provide wildlife habitat, and some are used for unimproved pasture. The potential is good for cultivated crops, pasture, and trees in drained areas. It is fair for openland wildlife habitat and woodland habitat and good for wetland habitat. The potential is poor for most recreational development and for most engineering uses.

If drained, this soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. Surface drainage is needed to remove excess surface water rapidly. Deep ditches and tiles are used for internal drainage. If tile is placed in the underlying stratified deposits, however, loose sand will enter the tile lines unless precautions are taken. Ditchbanks are easily eroded by flowing water, and vertical banks will cave and plug the ditch.

Because of the high water table and the periodic ponding, undrained areas of this soil are not suited to most forage species and are restricted to such species as reed canarygrass. Drained areas are suited to such species as alfalfa and red clover. Overgrazing destroys the plant cover and encourages undesirable plants. Grazing when the soil is wet compacts the surface and results in poor tilth and reduced water infiltration. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is suited to trees. Soil wetness limits the use of machinery and generally requires planting by hand or by machine on prepared ridges if natural regeneration is unreliable. Harvest is frequently limited to periods when the soil is frozen. Poor seedling survival can be offset by carefully planting vigorous nursery stock. The hazard of windthrow after harvest can be reduced by clear-cut or group-selection harvest. Competing vegetation, which interferes with natural regeneration or the establishment of plantings, can be removed mechanically or controlled through the use of suitable herbicides.

This soil is poorly suited to septic tank absorption fields because it has a high water table and is frequently flooded. These limitations are difficult to overcome. The soil is poorly suited to dwellings with or without basements and to small commercial buildings because of the high water table and frequent flooding. Draining the soil can lower the water table. Constructing dikes and levees can protect the site from flooding. The soil is poorly suited to local roads and streets because of the high water table, the frequent flooding, and the high potential frost action. Draining the soil can lower the water table. Constructing dikes and levees can protect the soil from flooding. The frost action hazard can be overcome by replacing this soil with suitable base material.

The capability unit is IIw-1. The woodland suitability subclass is 1w.

CuA—Curran silt loam, 0 to 3 percent slopes. This nearly level to gently sloping, somewhat poorly drained soil is in drainageways and on outwash plains and stream terraces. In some areas it is subject to flooding or

ponding during wet periods and after heavy rains. Most areas are oblong and range from 3 to 170 acres.

Typically, the surface layer is very dark grayish brown silt loam about 8 inches thick. The subsoil is about 51 inches thick. It is brown, firm silt loam in the upper part; brown and grayish brown, firm silty clay loam and silt loam in the middle part; and yellowish brown, friable stratified loamy and sandy material in the lower part. It is mottled. The substratum to a depth of about 60 inches is dark yellowish brown loamy fine sand. In some small areas slopes are more than 3 percent. In some areas the silty mantle is less than 40 inches thick, and in others it is more than 60 inches thick. In places the substratum is silt loam or is stratified silt loam, loam, sandy loam, or sand.

Included with this soil in mapping are small areas of Bertrand, Ettrick, and Jackson soils. The well drained Bertrand and moderately well drained Jackson soils occupy slightly higher convex positions on the landscape. The poorly drained and very poorly drained Ettrick soil occupies slightly lower wetter areas in drainageways and depressions. Included soils make up 5 to 10 percent of the unit.

In this Curran soil, permeability is moderately slow in the subsoil and rapid in the substratum. The available water capacity is high. Surface runoff is slow. A water table is at a depth of 1 to 3 feet during wet periods. Natural fertility is high. Root penetration is limited by the water table during wet periods of the growing season. The surface layer is moderate or high in organic-matter content. It is friable and easily worked throughout a wide range in moisture content.

Most drained areas of this soil are used for cultivated crops, hay, and pasture. Undrained areas provide wildlife habitat, and some are used for unimproved pasture. Some areas are native woodland. The potential is good for cultivated crops and pasture. It is fair for trees. It is good for openland wildlife habitat and woodland habitat and fair for wetland habitat. The potential is fair or poor for recreational development and poor for most engineering uses.

If drained, this soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture. Surface drainage is needed to remove excess surface water rapidly. Deep ditches and tiles are used for internal drainage. If tile is placed in the underlying sand, loose sand will enter the tile lines unless precautions are taken. Regular additions of organic matter help to maintain fertility and good tilth.

If drained, this soil is suited to legumes and grasses for hay and pasture. Overgrazing, however, destroys the plant cover and encourages undesirable plants. Grazing when the soil is wet compacts the surface, which results in poor tilth and reduced water infiltration. Fertilization, renovation, controlled grazing, and restricted use during wet periods help keep the soil and the plant cover in good condition.

This soil is suited to trees. Competing vegetation interferes with natural regeneration and the establishment of plantings. It can be removed mechanically or controlled through the use of suitable herbicides.

This soil is poorly suited to septic tank absorption fields because of the occasional flooding, the seasonal high water table, and the moderately slow permeability. The suitability can be improved by building a filtering mound of suitable material or by lowering the water table and increasing the size of the field. Dikes and levees can be used to protect the site from flooding. The soil is poorly suited to dwellings with or without basements and to small commercial buildings because of the occasional flooding and the seasonal high water table. These limitations can be overcome by draining the soil to lower the water table and by constructing dikes and levees to protect the site from flooding. The soil is poorly suited to local roads and streets because of the occasional flooding, the high potential frost action, and the insufficient strength to support vehicular traffic. Dikes and levees protect the site from flooding. The frost action hazard can be overcome by draining the soil and by replacing the soil with suitable base material. Suitable base material also overcomes the low strength.

The capability unit is IIw-2. The woodland suitability subclass is 3o.

DaA—Dakota loam, 0 to 2 percent slopes. This nearly level, well drained soil is on broad, smooth outwash plains and stream terraces. Most areas are irregular in shape and range from 3 to 170 acres. Two areas are about 600 acres.

Typically, the surface layer is very dark brown loam about 12 inches thick. The subsoil is about 22 inches thick. It is dark brown, firm loam in the upper part; dark yellowish brown and dark brown, firm clay loam and sandy clay loam in the middle part; and dark yellowish brown, very friable loamy sand in the lower part. The substratum to a depth of about 60 inches is dark yellowish brown, loose sand. In some small areas this soil is gently sloping. In places the dark colored surface layer is less than 10 inches thick. In some small areas the surface layer is silt loam or sandy loam. In some, this soil has a silty mantle more than 20 inches thick. In places it is less than 28 inches deep over sand. In some, the substratum is sand and gravel.

Included with this soil in mapping are small areas of Dickinson soil. The somewhat excessively drained Dickinson soil occupies landscape positions similar to those of Dakota soil where there is less silt and clay and more sand in the soil. This included soil makes up about 5 percent of the unit.

Permeability is moderate in the subsoil and rapid in the substratum in this Dakota soil. The available water capacity is moderate. Surface runoff is slow. In some areas root penetration is limited by the underlying sand. Natural fertility is moderate. The surface layer is high in organic-matter content. It is friable and can be easily worked throughout a wide range in moisture content.

Most areas of this soil are used for row crops. Some are used for hay and pasture. A few small areas have

been planted to pines. The potential is good for cultivated crops, hay, pasture, openland wildlife habitat, woodland habitat, and recreational development. It is poor for trees. The potential is very poor for wetland wildlife habitat. It is good or fair for most engineering uses.

This soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture. Erosion generally is not a problem. Regular additions of organic matter help to maintain fertility and good tilth and increase water infiltration.

This soil is suited to pasture and hay. Overgrazing, however, destroys the plant cover and encourages undesirable species. Grazing when the soil is wet compacts the surface, which results in poor tilth. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is not naturally forested and, therefore, is not generally managed for woodland.

This soil is suited to septic tank absorption fields. Ground water pollution is a hazard, however, because the substratum is rapidly permeable. The soil is suited to dwellings with or without basements and to small commercial buildings. It is only moderately suited to local roads and streets because it lacks sufficient strength to adequately support vehicular traffic. This limitation can be overcome by replacing this soil with suitable base material.

The capability unit is IIs-1. The woodland suitability subclass is not assigned.

DaB—Dakota loam, 2 to 6 percent slopes. This gently sloping, well drained soil is in undulating areas and on short, uneven convex side slopes of outwash plains and stream terraces. Most areas are oblong and range from 3 to 50 acres.

Typically, the surface layer is very dark brown loam about 9 inches thick. The subsoil is about 19 inches thick. It is dark brown, friable loam in the upper part; dark yellowish brown, firm loam in the middle part; and dark yellowish brown, friable sandy loam in the lower part. The substratum to a depth of about 60 inches is yellowish brown, loose sand. In some small areas this soil is eroded. In some, it is nearly level. In places the surface layer is silt loam or sandy loam. In some small areas this soil is less than 28 inches deep over sand. In some, the substratum is sand and gravel.

Included with this soil in mapping are small areas of Dickinson soil and small areas of Dakota loam where the slope is more than 6 percent. The somewhat excessively drained Dickinson soil is in landscape positions similar to those of the Dakota soil where there is less silt and clay and more sand in the soil. Included soils make up about 5 percent of the unit.

Permeability is moderate in the subsoil and rapid in the substratum in this Dakota soil. The available water capacity is moderate. Surface runoff is medium. In some areas root penetration is limited by the underlying sand. Natural fertility is moderate. The surface layer is high in organic-matter content. It is friable and can be easily worked throughout a wide range in moisture content.

Most areas of this soil are used for cultivated crops. Some are used for hay and pasture. A few small areas have been planted to pines. The potential is good for cultivated crops, hay, pasture, openland wildlife habitat, woodland habitat, and recreational development. It is poor for woodland. The potential is very poor for wetland wildlife habitat. It is good for most engineering uses.

This soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture. There is a slight hazard of erosion in cultivated areas. Crop residue management, minimum tillage, contour stripcropping, grassed waterways, and winter cover crops help to control erosion. Regular additions of organic matter help to maintain fertility and good tilth and increased water infiltration.

Erosion is generally not a problem in areas where this soil is used for pasture and hay. Overgrazing, however, destroys the plant cover and results in erosion. Grazing when the soil is wet compacts the surface, which results in poor tilth and increases runoff and the hazard of erosion. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is not naturally forested and, therefore, is not generally managed for woodland.

This soil is suited to septic tank absorption fields. Ground water pollution is a hazard, however, because the substratum is rapidly permeable. The soil is suited to dwellings with or without basements and to small commercial buildings. It is only moderately suited to local roads and streets because it lacks sufficient strength to adequately support vehicular traffic. This limitation can be overcome by replacing this soil with suitable base material.

The capability unit is IIe-2. The woodland suitability subclass is not assigned.

DeA—Dells silt loam, 0 to 3 percent slopes. This nearly level to gently sloping, somewhat poorly drained soil is on outwash plains and stream terraces. In some areas it is subject to flooding or ponding during wet periods. Most areas are irregular in shape and range from 3 to 40 acres. One area is 155 acres.

Typically, the surface layer is very dark grayish brown silt loam about 8 inches thick. The subsoil is about 19 inches thick. It is brown and grayish brown, firm silty clay loam in the upper part and light brownish gray, firm loam in the lower part. It is mottled with yellowish brown and grayish brown. The substratum to a depth of about 60 inches is yellowish brown, loose sand. It is mottled with light brownish gray. In some small areas slopes are more than 3 percent. In places this soil is underlain by stratified silt loam and fine sand.

Included with this soil in mapping are small areas of Ettrick and Tell soils. The poorly drained and very poorly

drained Ettrick soil is in lower, wetter areas than the Dells soil. The well drained Tell soil occupies higher convex areas in the landscape. Included soils make up 5 to 10 percent of the unit.

In this Dells soil, permeability is moderate in the subsoil and rapid in the substratum. The available water capacity is moderate. Surface runoff is slow. A water table is at a depth of 1 to 3 feet during wet periods. Natural fertility is moderate. Root penetration is limited by the water table during wet periods of the growing season. In drained areas it is limited by the underlying sand. The surface layer is moderate to high in organic-matter content. It is very friable and can be easily worked throughout a wide range in moisture content.

Drained areas of this soil are used for cultivated crops, hay, and pasture. Undrained areas provide wildlife habitat, and some are used for unimproved pasture. Some small areas are native woodland. The potential is good for cultivated crops and pasture. It is fair for trees. It is good for openland wildlife habitat and woodland habitat and fair for wetland habitat. The potential is fair or poor for recreational development and poor for most engineering uses.

If drained, this soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture. Surface drainage is needed to remove excess surface water rapidly. Deep ditches and tiles are used for internal drainage. If tile is placed in the underlying sand, loose sand will enter the tile lines unless precautions are taken. Ditchbanks are easily eroded by flowing water, and vertical banks will cave and plug the ditch. Regular additions of organic matter help to maintain fertility and good tilth.

If drained, this soil is suited to legumes and grasses for hay and pasture. Overgrazing, however, destroys the plant cover and encourages undesirable plants. Grazing when the soil is wet compacts the surface and results in poor tilth and reduced water infiltration. Fertilization, renovation, controlled grazing, and restricted use during wet periods help keep the soil and the plant cover in good condition.

This soil is suited to trees. Competing vegetation interferes with natural regeneration following harvest. It can be removed mechanically or controlled through the use of suitable herbicides.

This soil is poorly suited to septic tank absorption fields because of the seasonal high water table and because some areas are subject to infrequent flooding. The suitability can be improved by building a filtering mound of suitable material or by lowering the seasonal water table. Areas subject to flooding can be protected with dikes and levees. The soil is poorly suited to dwellings with or without basements and to small commercial buildings because of the seasonal high water table and the flooding. These limitations can be overcome by draining the soil to lower the water table and by constructing dikes and levees to protect the site from flooding. This soil is poorly suited to local roads and streets because of the high potential frost action and the insufficient strength to support vehicular traffic. The frost action hazard can be overcome by draining the soil and by replacing the soil with suitable base material. Suitable base material also overcomes the low strength.

The capability unit is IIw-5. The woodland suitability subclass is 3o.

DkB—Dickinson sandy loam, 1 to 6 percent slopes. This nearly level to gently sloping, somewhat excessively drained soil is on broad outwash plains and on stream terraces. Most areas are irregular in shape and range from 3 to 225 acres. A few areas range up to 500 acres.

Typically, the surface layer is very dark brown sandy loam about 12 inches thick. The subsoil is about 19 inches thick. It is dark brown and dark yellowish brown, friable sandy loam in the upper part and dark yellowish brown, very friable loamy sand in the lower part. The substratum to a depth of about 60 inches is yellowish brown, loose sand. In some small areas this soil is eroded. In some, it is sloping, and in others slopes are less than 1 percent. In places, the surface layer is loam or loamy sand. In some small areas this soil is less than 24 inches deep over underlying sand.

Included with this soil in mapping are small areas of Dakota and Gotham soils. Also included are a few, small areas of severely eroded Dickinson sandy loam. The well drained Dakota soils are in landscape positions similar to those of this Dickinson soil where there is more silt and clay and less sand in the soil. The somewhat excessively drained Gotham soil is in similar landscape positions where there is less silt and clay and more sand in the soil. Included soils make up 10 to 15 percent of the unit.

Permeability is moderately rapid in this Dickinson soil. The available water capacity is low. Surface runoff is medium. In some areas, root penetration is limited by the underlying sand. Natural fertility is low. The surface layer is moderate in organic-matter content. It is friable and can be easily worked throughout a wide range in moisture content.

Most areas of this soil are used for cultivated crops, hay, and pasture. Some areas are wooded and some have been planted to pines. The potential is fair for cultivated crops, hay, and pasture. If the soil is irrigated, the potential is good for these uses. It is fair for trees. It is fair for openland wildlife habitat and woodland habitat and very poor for wetland habitat. The potential is good for recreational development and good or fair for most engineering uses.

This soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture, but crop yields are limited during most seasons by the low available water capacity. Better and more consistent yields can be produced if the soil is irrigated. In cultivated areas, there is a slight erosion hazard and the soil is subject to soil blowing. Crop residue management, minimum tillage, contour stripcropping, windbreaks, and winter cover crops help to control erosion and soil blow-

ing. Fertilization, supplemental irrigation, and protection from soil blowing are needed for dependable crop production.

This soil is suited to hay and pasture, but forage yields generally are somewhat limited unless the soil is fertilized and irrigated. Erosion and soil blowing are generally not hazards. Overgrazing, however, destroys the plant cover and results in erosion and soil blowing. Fertilization, renovation, and controlled grazing help to maintain the plant cover.

This soil is suited to woodland. The only soil-related forest management problem is competing vegetation, which interferes with natural regeneration following harvest. This vegetation can be removed mechanically or controlled by suitable herbicides.

This soil is suited to septic tank absorption fields. There is a danger of pollution of ground water because the substratum is rapidly permeable. This soil is suited to dwellings with or without basements and to small commercial buildings. It is only moderately suited to local roads and streets because of the potential frost action. This limitation can be overcome by replacing this soil with suitable base material.

The capability unit is IIIe-4. The woodland suitability subclass is 3o.

DkC—Dickinson sandy loam, 6 to 12 percent slopes. This sloping, somewhat excessively drained soil is on short convex side slopes on outwash plains and stream terraces. Most areas are irregular in shape and range from 3 to 35 acres.

Typically, the surface layer is very dark grayish brown sandy loam about 8 inches thick and very dark brown sandy loam about 2 inches thick. The subsoil is about 17 inches thick. It is dark brown and dark yellowish brown, friable sandy loam in the upper part and dark yellowish brown, very friable loamy sand in the lower part. The substratum to a depth of about 60 inches is yellowish brown, loose sand. In some small areas this soil is eroded. In some, it is only gently sloping. In places the surface layer is loam or sandy loam. In some small areas this soil is less than 24 inches deep over underlying sand.

Included with this soil in mapping are some small areas of Gotham soil. Also included are some small areas of severely eroded Dickinson sandy loam and some areas where slopes are more than 12 percent. The well drained and somewhat excessively drained Gotham soil occupies landscape positions similar to those of this Dickinson soil where there is less silt and clay and more sand in the soil. Included soils make up 5 to 10 percent of the unit.

Permeability is moderately rapid in this Dickinson soil. The available water capacity is low. Surface runoff is medium. In some areas, root penetration is limited by the underlying sand. Natural fertility is low. The surface layer is moderate in organic-matter content. It is friable and can be easily worked throughout a wide range in moisture content.

Most areas of this soil are used for cultivated crops, hay, and pasture. Some areas are wooded, and some have been planted to pines. The potential is fair for cultivated crops, hay, pasture, and trees. It is good for openland wildlife habitat and woodland habitat but very poor for wetland habitat. The potential is fair for recreational development and for most engineering uses.

This soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture, but crop yields are limited during most seasons by the low available water capacity. Better and more consistent yields can be expected if the soil is irrigated. In cultivated areas, there is a moderate hazard of further erosion and the soil is subject to soil blowing. Crop residue management, minimum tillage, contour stripcropping, windbreaks, and winter cover crops help to control erosion and soil blowing. Fertilization, supplemental irrigation, and protection from soil blowing are needed for dependable crop production.

This soil is suited to hay and pasture, but forage yields generally are somewhat limited unless the soil is fertilized and irrigated. Erosion and soil blowing are generally not hazards. Overgrazing, however, destroys the plant cover and results in erosion and soil blowing. Fertilization, renovation, and controlled grazing help to maintain the plant cover.

This soil is suited to woodland. The only soil-related forest management problem is competing vegetation, which interferes with natural regeneration following harvest. This vegetation can be removed mechanically or controlled by suitable herbicides.

This soil is moderately suited to septic tank absorption fields because of the slope. This limitation can be overcome by reshaping the site or by installing the field on the contour. There is a danger of pollution of the ground water, however, as a result of the rapidly permeable substratum. The soil is moderately suited to dwellings with or without basements and to small commercial buildings because of the slope. This limitation can be overcome by reshaping the site. The soil is moderately suited to local roads and streets because of the slope and the potential frost action. The slope limitation can be overcome by reshaping the site or by constructing roads on the contour. The frost action hazard can be overcome by replacing this soil with suitable base material.

The capability unit is IVe-4. The woodland suitability subclass is 3o.

ElB—Eleva sandy loam, 2 to 6 percent slopes. This gently sloping, somewhat excessively drained soil is on broad, convex ridgetops, side slopes, and valley floors on sandstone uplands. Most areas are irregular in shape and range from 3 to 230 acres.

Typically, the surface layer is dark grayish brown sandy loam about 9 inches thick. The subsoil is about 22 inches thick. It is brown and dark yellowish brown, friable sandy loam in the upper part and yellowish brown, very friable loamy sand in the lower part. The substratum to a

depth of about 60 inches is yellowish brown, loose sand over light yellowish brown, soft sandstone. Soft sandstone is at a depth of about 36 inches. In some small areas, this soil is eroded. In places the surface layer is loamy sand. In some areas the underlying sandstone is glauconitic. In some small areas this soil is more than 40 inches deep over sandstone, and in others it is less than 20 inches deep.

Included with this soil in mapping are small areas of Boone soil and Eleva variant. Also included are small areas of sloping and severely eroded Eleva sandy loam. Boone soil is in landscape positions similar to those of this Eleva soil where there is more sand and less clay in the soil. The somewhat poorly drained Eleva variant is in shallow depressions, drainageways, and seep areas and on footslopes adjacent to wet bottoms. Included soils make up 10 to 15 percent of the unit.

Permeability is moderately rapid in this Eleva soil. The available water capacity is low. Surface runoff is medium. Root penetration is limited by the underlying sand and sandstone. Natural fertility is low. The surface layer is low in organic-matter content. It is very friable and can be easily tilled throughout a wide range in moisture content.

Most areas of this soil are used for cultivated crops, hay, and pasture. Some areas are native woodland, and some have been planted to pines. The potential is fair for cultivated crops and pasture. Under intensive management and irrigation, the potential is good for these uses. It is fair for trees. The potential is fair for openland wildlife habitat, good for woodland habitat, and very poor for wetland habitat. It is good for most recreational development and good or fair for most engineering uses.

This soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture, but crop yields are limited during most seasons by the low available water capacity. Better and more consistent yields can be produced if the soil is irrigated. In cultivated areas, there is a slight hazard of erosion, and the soil is subject to blowing. Crop residue management, minimum tillage, windbreaks, contour stripcropping, and winter cover crops help to control erosion and soil blowing. Fertilization, irrigation, and protection from soil blowing are needed for dependable crop production.

This soil is suited to pasture and hay, but forage yields generally are somewhat limited unless the soil is fertilized and irrigated. Overgrazing destroys the plant cover and results in erosion and soil blowing. Fertilization, renovation, and controlled grazing help to maintain the plant cover.

This soil is suited to trees. Competing vegetation can slow natural regeneration and the establishment of plantings. It can be removed mechanically or controlled through the use of suitable herbicides.

This soil is poorly suited to septic tank absorption fields because of the depth to bedrock. The suitability can be improved by building a filtering mound of suitable material. The soil is suited to dwellings without basements and to small commercial buildings. It is only moderately suited to dwellings with basements because of the depth to bedrock. This limitation can be overcome by adding fill to the site to increase the thickness of the soil. The soil is only moderately suited to local roads and streets because of potential frost action and because it lacks sufficient strength to adequately support vehicular traffic. These limitations can be overcome by replacing this soil with suitable base material.

The capability unit is IIIe-4. The woodland suitability subclass is 4o.

EIC2—Eleva sandy loam, 6 to 12 percent slopes, eroded. This sloping, somewhat excessively drained soil is on convex ridgetops and side slopes on sandstone uplands. Most areas are oblong and range from 3 to 65 acres.

Typically, the surface layer is dark grayish brown sandy loam about 7 inches thick. In most cultivated areas, it contains some brown subsoil material that has been mixed in by plowing. The subsoil is about 21 inches thick. It is brown and dark yellowish brown, friable sandy loam in the upper part and yellowish brown, very friable loamy sand in the lower part. The substratum to a depth of about 60 inches is yellowish brown, loose sand over light yellowish brown, soft sandstone. Soft sandstone is at a depth of about 33 inches. In some small areas this soil is only gently sloping. In some, it is not eroded. In places the surface layer is loamy sand. In some areas the underlying sandstone is glauconitic. In some small areas this soil is more than 40 inches deep over sandstone, and in some it is less than 20 inches deep.

Included with this soil in mapping are small areas of Boone and Elkmound soils. Also included are small areas of moderately steep and severely eroded Eleva sandy loam. The Boone soil occupies landscape positions similar to those of this Eleva soil where there is more sand and less clay in the soil. The Elkmound soil occupies similar landscape positions where the soil is less than 20 inches deep over sandstone. Included soils make up 5 to 10 percent of the unit.

Permeability is moderately rapid in this Eleva soil. The available water capacity is low. Surface runoff is medium. Root penetration is limited by the underlying sand and sandstone. Natural fertility is low. The surface layer is low in organic-matter content. It is very friable and can be easily tilled throughout a wide range in moisture content.

Many areas of this soil are used for cultivated crops, hay, and pasture. Some areas are native woodland, and some have been planted to pines. The potential is fair for cultivated crops, pasture, and trees. It is fair for openland wildlife habitat, good for woodland habitat, but very poor for wetland habitat. The potential is good or fair for most recreational development and fair or poor for most engineering uses.

This soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture, but

crop yields are limited during most seasons by the low available water capacity. Better and more consistent yields can be produced if the soil is irrigated. In cultivated areas, there is a moderate hazard of further erosion, and the soil is subject to blowing. Erosion has serious consequences because it reduces the thickness of the soil over the sandstone bedrock. Crop residue management, minimum tillage, contour stripcropping, grassed waterways, windbreaks, and winter cover crops help to control erosion and soil blowing. Fertilization, irrigation, and protection from erosion and soil blowing are needed for dependable crop production.

The use of this soil as pastureland or hayland is effective in controlling erosion and soil blowing, but forage yields are generally limited unless the soil is fertilized and irrigated. Overgrazing destroys the plant cover and results in erosion and soil blowing. Fertilization, renovation, and controlled grazing help to maintain the plant cover.

This soil is suited to trees. Competing vegetation can slow natural regeneration or the establishment of plantings. It can be removed mechanically or controlled through the use of suitable herbicides.

This soil is poorly suited to septic tank absorption fields because of the depth to bedrock. The suitability can be improved by building a filtering mound of suitable material. The soil is moderately suited to dwellings without basements because of the slope and to dwellings with basements because of the slope and the depth to bedrock. The slope limitation can be overcome by reshaping the site. The limitation imposed by the depth to bedrock can be overcome by adding fill to increase the thickness of the soil. The soil is poorly suited to small commercial buildings because of the slope. This limitation can be overcome by shaping the site to a more suitable slope. The soil is moderately suited to local roads and streets because of the slope, the potential frost action, and the lack of sufficient strength to adequately support vehicular traffic. These limitations can be overcome by replacing this soil with suitable base material and by reshaping the site. The slope limitation can be minimized by constructing roads on the contour.

The capability unit is IVe-4. The woodland suitability subclass is 4o.

ElD2—Eleva sandy loam, 12 to 20 percent slopes, eroded. This moderately steep, somewhat excessively drained soil is on narrow, convex ridgetops and side slopes on sandstone uplands. Most areas are oblong and range from 3 to 85 acres.

Typically, the surface layer is dark grayish brown sandy loam about 7 inches thick. In most cultivated areas, it contains some brown subsoil material that has been mixed in by plowing. The subsoil is about 18 inches thick. It is brown and dark yellowish brown, friable sandy loam in the upper part and dark yellowish brown, very friable loamy sand in the lower part. The substratum to a depth of about 60 inches is yellowish brown, loose sand over light yellowish brown, soft sandstone. Soft sandstone is at a depth of about 29 inches. In some small areas this soil is not eroded. In some areas the surface layer is loamy sand. In some, the underlying sandstone is glauconitic. In some small areas this soil is more than 40 inches deep over sandstone, and in others it is less than 20 inches deep.

Included with this soil in mapping are small areas of Boone and Elkmound soils. Also included are small sloping, steep, and severely eroded areas of Eleva sandy loam. The Boone soil occupies landscape positions similar to those of this Eleva soil where there is more sand and less clay in the soil. The Elkmound soil occupies similar landscape positions where the soil is less than 20 inches deep over sandstone. Included soils make up 5 to 10 percent of the unit.

Permeability is moderately rapid in this Eleva soil. The available water capacity is low. Surface runoff is rapid. Root penetration is limited by the underlying sand and sandstone. Natural fertility is low. The surface layer is low in organic-matter content. It is very friable and can be easily tilled throughout a wide range in moisture content.

Many areas of this soil are used for cultivated crops, hay, and pasture. Many areas are native woodland, and some have been planted to pines. The potential is poor for cultivated crops. It is fair for pasture and trees. The potential is fair for openland wildlife habitat, good for woodland habitat, but very poor for wetland habitat. It is poor for most recreational development and for most engineering uses.

This soil generally is not suitable for cultivated crops, but it is suited to legumes and grasses for hay and pasture. Crop yields are limited during most seasons by the low available water capacity. In cultivated areas, there is a severe hazard of further erosion, and the soil is subject to blowing. Erosion has serious consequences because it reduces the thickness of soil over the sandstone. Crop residue management, minimum tillage, contour stripcropping, grassed waterways, and winter cover crops help to control erosion and soil blowing.

The use of this soil as pastureland or hayland is also effective in controlling erosion and soil blowing, but forage yields are generally limited by the low available water capacity. Overgrazing destroys the plant cover and results in erosion and soil blowing. Fertilization, renovation, and controlled grazing help to maintain the plant cover.

This soil is suited to trees. Soil related problems in forest management are associated with steepness of slope; mortality of seedlings on hot, dry sites; and brush encroachment following harvest. Planting trees on the contour and selecting the best location for skid roads during harvest minimize erosion and improve equipment trafficability. Seedling mortality on south- and west-facing slopes can be reduced by careful planting and by planting vigorous nursery stock. Vegetation that competes with planted seedlings or natural regeneration following

harvest can be removed mechanically or controlled through the use of suitable herbicides.

This soil is poorly suited to septic tank absorption fields because of the slope and the depth to bedrock. In places the suitability can be improved by building a filtering mound of suitable material and reshaping the site. The soil is poorly suited to dwellings with or without basements and to small commercial buildings because of the slope. This limitation can be overcome by adding fill to the site and shaping it to a more suitable slope. This soil is poorly suited to local roads and streets because of the slope. This limitation can be overcome by reshaping the site or by constructing roads on the contour.

The capability unit is VIe-4. The woodland suitability subclass is 4r.

EIE—Eleva sandy loam, 20 to 30 percent slopes. This steep, somewhat excessively drained soil is on side slopes on sandstone uplands. Slopes are convex. Most areas are oblong and range from 3 to 110 acres. One area is 240 acres.

Typically, the surface layer is very dark gray sandy loam about 3 inches thick. The subsurface layer is dark grayish brown sandy loam about 3 inches thick. The subsoil is about 18 inches thick. It is brown and dark yellowish brown, friable sandy loam in the upper part and dark yellowish brown, very friable loamy sand in the lower part. The substratum to a depth of about 60 inches is brownish yellow, loose sand over light yellowish brown soft sandstone. Soft sandstone is at a depth of about 27 inches. In some areas this soil is eroded. In some areas there are sandstone outcrops. In some places the surface layer is loamy sand. In some the underlying sandstone is glauconitic. In some small areas the soil is more than 40 inches deep over sandstone.

Included with this soil in mapping are small areas of Boone soils, small moderately steep areas and severely eroded areas of Eleva sandy loam, and some small areas where slopes are more than 30 percent. Also included are some small areas where the soil is less than 20 inches deep over sandstone. The Boone soil occupies landscape positions similar to those of the Eleva soil where there is more sand and less clay in the surface layer and subsoil. Included soils make up 5 to 10 percent of the unit.

Permeability is moderately rapid in this Eleva soil. The available water capacity is low. Surface runoff is very rapid. Root penetration is limited by the underlying sand and sandstone. Natural fertility is low.

Many areas of this soil are native woodland. Some have been planted to pines. Some are used for cultivated crops, hay, and pasture. The potential is poor for cultivated crops and fair for pasture and trees. The potential is poor for openland wildlife habitat, good for woodland habitat, and very poor for wetland habitat. The potential is poor for recreational development and for engineering uses.

This soil is not suitable for cultivated crops because of the low available water capacity and the very severe hazards of erosion and soil blowing.

This soil is suitable for pasture and hay, which are effective in controlling erosion and soil blowing, but forage yields are generally limited by the low available water capacity. Overgrazing destroys the plant cover and results in erosion and soil blowing. Fertilization, renovation, and controlled grazing help maintain the plant cover.

This soil is suited to trees. Soil related problems in forest management are associated with steepness of slope; mortality of seedlings on hot, dry sites; and brush encroachment following harvest. Planting trees on the contour and selecting the best location for skid roads during harvest minimize erosion and improve equipment trafficability. Seedling mortality on south- and west-facing slopes can be reduced by careful planting and by planting vigorous nursery stock. Vegetation that competes with planted seedlings or natural reproduction following harvest can be removed mechanically or controlled through the use of suitable herbicides.

This soil is poorly suited to septic tank absorption fields because of the steep slope and the depth to bedrock. In places the suitability can be improved by building a filtering mound and shaping the site to a suitable slope. Generally, however, a less sloping site where the soil is deeper over bedrock should be selected. The steep slope also makes this soil poorly suited to building site development. Unless this limitation can be overcome by filling and reshaping the site, a less sloping site should be selected.

The capability unit is VIIe-4. The woodland suitability subclass is 4r.

EmA—Eleva Variant sandy loam, 0 to 3 percent slopes. This nearly level to gently sloping, somewhat poorly drained soil is in drainageways and depressions of sandstone uplands. In some areas it is subject to flooding or ponding during wet periods and after heavy rains. Most areas are irregular or oblong in shape and range from 3 to 100 acres.

Typically, the surface layer is very dark gray sandy loam about 6 inches thick and dark grayish brown sandy loam about 2 inches thick. The subsoil is about 18 inches thick. It is grayish brown, friable sandy loam in the upper part and pale brown and yellowish brown, very friable loamy fine sand in the lower part. The upper part is mottled with yellowish brown, and the lower part is mottled with light gray and yellowish brown. Light yellowish brown and brownish yellow, hard sandstone bedrock is at a depth of about 26 inches. In some small areas the surface layer is loam or loamy sand. In some, slopes are more than 3 percent. In some small areas this soil is less than 20 inches deep over sandstone, and in others it is more than 40 inches deep. In places the underlying sandstone is glauconitic.

Included with this soil in mapping are small areas of Boone and Eleva soils. Also included are some small

areas of soils that have more silt and clay and less sand. The somewhat excessively drained Eleva soil is in slightly higher, better drained landscape positions than the Eleva variant. The excessively drained Boone soil is in higher, better drained landscape positions where there is more sand and less silt and clay in the soil. Included soils make up 5 to 10 percent of the unit.

Permeability is moderately rapid in this Eleva variant. The available water capacity is low. Surface runoff is slow. Depth to the perched water table is 1 to 3 feet during wet periods. Root penetration is limited by the water table during wet periods of the growing season or by the underlying sandstone. Natural fertility is low. The surface layer is moderate in organic-matter content. It is friable and can be easily worked throughout a wide range in moisture content.

In drained areas this soil is used for cultivated crops, hay, and pasture. Undrained areas provide wildlife habitat. Many are wooded, and some are used for unimproved pasture. The potential is fair for cultivated crops, hay, pasture, and trees. It is fair for openland and wetland wildlife habitat and good for woodland habitat. The potential is fair or poor for recreational development and poor for most engineering uses.

If drained, this soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture. Ditches and tiles are needed for internal drainage. If tile is used, loose sand will enter the tile line unless precautions are taken. Ditchbanks are easily eroded by flowing water, and vertical banks will cave and plug the ditch. Drained and cultivated areas are subject to soil blowing. Minimum tillage, crop residue management, windbreaks, and winter cover crops help to prevent soil blowing. In drained and cultivated areas, crop yields are limited during most seasons by the low available water capacity. Fertilization, irrigation, and controlled drainage are needed for dependable crop production.

If drained, this soil is suited to legumes and grasses for hay and pasture, but forage yields during most seasons are limited by the low available water capacity unless the soil is irrigated. Overgrazing destroys the plant cover, which results in soil blowing and encourages undesirable plants. Fertilization, irrigation, renovation, and controlled grazing help to maintain the plant cover and improve yields.

This soil is suited to trees. Competing vegetation interferes with natural regeneration following harvest. It can be removed mechanically or controlled through the use of suitable herbicides.

This Eleva variant is poorly suited to septic tank absorption fields because of the frequent flooding, the depth to bedrock, and the seasonal high water table. The suitability can be improved by building a filtering mound and constructing dikes and levees to protect the site from flooding. The soil is poorly suited to dwellings with or without basements and to small commercial buildings because of the frequent flooding and the seasonal high water table. These limitations can be overcome by draining the soil to lower the water table and by contructing dikes and levees to protect the soil from flooding. The soil is poorly suited to local roads and streets because of the frequent flooding and the high potential frost action. Dikes and levees can be used to protect the soil from flooding. Replacing this soil with suitable base material and draining it will reduce the frost action hazard.

The capability unit is IIIw-6. The woodland suitability subclass is 3o.

EnB—Elkmound sandy loam, 2 to 6 percent slopes. This gently sloping, well drained soil is on broad convex ridgetops and side slopes on sandstone uplands. Most areas are oblong or irregular in shape and range from 3 to 100 acres.

Typically, the surface layer is dark grayish brown sandy loam about 8 inches thick. The subsoil is brown, friable sandy loam about 10 inches thick. The substratum is yellowish brown and light brown, hard sandstone bedrock. In some small areas this soil is eroded. In some, slopes are less than 2 percent. In places the surface layer is loamy sand, loam, or silt loam. In some areas the subsoil is loamy sand, loam, or sandy clay loam. In some small areas this soil is more than 20 inches deep over sandstone, and in some, it is less than 10 inches deep. In places the underlying sandstone is glauconitic.

Included with this soil in mapping are small areas of Boone soil and Eleva variant. Also included are small sloping areas and severely eroded areas of Elkmound sandy loam. The excessively drained Boone soil is in landscape positions similar to those of this Elkmound soil where there is more sand and less clay in the soil and the soil is deeper over sandstone bedrock. The somewhat poorly drained Eleva variant is in shallow depressions and drainageways and on foot slopes adjacent to wet bottoms. It is deeper over sandstone than this Elkmound soil. Included soils make up 5 to 10 percent of the unit.

Permeability is moderately rapid in this Elkmound soil. The available water capacity is very low. Surface runoff is medium. Root penetration is limited by the underlying sandstone. Natural fertility is low. The surface layer is low in organic-matter content. It is very friable and can be easily tilled throughout a wide range in moisture content.

Some areas of this soil are native woodland, and some have been planted to pines. Some areas are used for cultivated crops, hay, and pasture. The potential is fair for cultivated crops and pasture. It is poor for trees. The potential is poor for openland and woodland wildlife habitat and very poor for wetland habitat. It is good for most recreational development and fair or poor for most engineering uses.

This soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture, but crop yields are limited during most seasons by the very low available water capacity. Better and more consistent

yields can be produced if the soil is irrigated and intensely managed. In cultivated areas there is a slight hazard of erosion, and the soil is subject to blowing. Crop residue management, minimum tillage, windbreaks, contour stripcropping, and winter cover crops help to control erosion and soil blowing. Fertilization, irrigation, and protection from soil blowing are needed for dependable crop production.

This soil is suited to hay and pasture, but forage yields generally are somewhat limited unless the soil is fertilized and irrigated. Overgrazing destroys the plant cover and results in erosion and soil blowing. Fertilization, renovation, and controlled grazing help to maintain the plant cover.

This soil is poorly suited to trees. The very low available water capacity and shallow root zone result in slow growth and poor form, which sharply limit the potential for production. The use of equipment can be limited to harvest operations in some areas where the soil is too shallow for machine planting. Mortality of seedlings can be reduced by careful planting and by planting vigorous nursery stock. Clear-cut or area-selection harvest helps to prevent windthrow of trees left after harvest.

This soil is poorly suited to septic tank absorption fields because of the depth to bedrock. The suitability can be improved by building a filtering mound of suitable material. The soil is moderately suited to dwellings without basements and to small commercial buildings and is poorly suited to dwellings with basements because of the depth to rock. This limitation can be overcome by adding fill to the building site to increase the thickness of the base material. The soil is moderately suited to local roads and streets because of the depth to rock, the potential frost heaving, and the lack of sufficient strength to support vehicular traffic. If no cuts are made during road construction, the depth to rock is not a problem. The frost action potential and the low strength can be overcome by replacing this soil with suitable base material. The soil is a fair source of topsoil.

The capability unit is IIIe-12. The woodland suitability subclass is 4d.

EnC—Elkmound sandy loam, 6 to 12 percent slopes. This sloping, well drained soil is on convex ridgetops and side slopes on sandstone uplands. Most areas are oblong and range from 3 to 50 acres.

Typically, the surface layer is dark grayish brown sandy loam about 8 inches thick. The subsoil is brown, friable sandy loam about 8 inches thick. The substratum is reddish brown and light brown, hard sandstone. In some small areas this soil is eroded. In places the surface layer is loamy sand, loam, or silt loam. In some areas the subsoil is loamy sand, loam, or sandy clay loam. In some small areas this soil is more than 20 inches deep over sandstone, and in some, it is less than 10 inches deep. In places the underlying sandstone is glauconitic.

Included with this soil in mapping are small areas of Boone soils. Also included are small gently sloping, moderately steep, and severely eroded areas of Elkmound sandy loam. The excessively drained Boone soil is in landscape positions similar to those of this Elkmound soil where there is more sand and less clay in the soil and the soil is deeper over sandstone bedrock. Included soils make up 5 to 10 percent of the unit.

Permeability is moderately rapid in this Elkmound soil. The available water capacity is very low. Surface runoff is medium. Root penetration is limited by the underlying sandstone. Natural fertility is low. The surface layer is low in organic-matter content. It is very friable and can be easily tilled throughout a wide range in moisture content.

Some areas of this soil are used for cultivated crops, hay, and pasture, some are native woodland, and some have been planted to pines. The potential is fair for cultivated crops and for pasture. It is poor for trees. The potential is poor for openland and woodland wildlife habitat and very poor for wetland habitat. It is fair for most recreational development and fair or poor for most engineering uses.

This soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture, but crop yields are limited during most seasons by the very low available water capacity. If the soil is irrigated and intensively managed, better and more consistent yields can be produced. In cultivated areas the hazard of erosion is moderate, and the soil is subject to blowing. Crop residue management, minimum tillage, contour stripcropping, grassed waterways, windbreaks, and winter cover crops help to control erosion and soil blowing. Fertilization, irrigation, and protection from soil blowing are needed for dependable crop production.

The use of this soil as pastureland or hayland is effective in controlling erosion and soil blowing, but forage yields generally are limited unless the soil is fertilized and irrigated. Overgrazing destroys the plant cover and results in erosion and soil blowing. Fertilization, renovation, and controlled grazing help to maintain the plant cover.

This soil is poorly suited to trees. The very low available water capacity and shallow root zone result in slow growth and poor form, which sharply limit the potential for production. The use of equipment is limited to harvest operations in some areas because the soil is too shallow for machine planting. Mortality of seedlings can be reduced by careful planting and by planting vigorous nursery stock. Clear-cut or area-selection harvest helps to prevent windthrow of trees left after harvest.

This soil is poorly suited to septic tank absorption fields because of the depth to bedrock. The suitability can be improved by building a filtering mound of suitable material. The soil is moderately suited to dwellings without basements because of the slope and the depth to rock. Adding fill to the building site to increase the thickness of the base material and shaping it to the proper slope will overcome these limitations. This soil is poorly suited to small commercial buildings because of the

slope. Land shaping overcomes this limitation, but cuts are hindered by the underlying hard sandstone. The soil is poorly suited to dwellings with basements because of the depth to rock, but this limitation can be overcome by adding fill to the building site to increase the thickness of the base material. The soil is moderately suited to local roads and streets because of the depth to rock, the lack of sufficient strength to support vehicular traffic, and the slope. If no cuts are made during road construction, the depth to rock is not a problem. Using fill and constructing roads on the contour eliminate the need for cuts and minimize the slope limitation. The low strength can be overcome by replacing this soil with suitable base material.

The capability unit is IVe-12. The woodland suitability subclass is 4d.

EnD—Elkmound sandy loam, 12 to 20 percent slopes. This moderately steep, well drained soil is on convex side slopes on sandstone uplands. Most areas are oblong and range from 3 to 30 acres. One area is 75 acres.

Typically, the surface layer is black sandy loam about 3 inches thick. The subsurface layer is dark grayish brown sandy loam about 2 inches thick. The subsoil is brown, friable sandy loam about 7 inches thick. The substratum is reddish brown and light brown, hard sandstone. In some small areas this soil is eroded. In places the surface layer is loamy sand, loam, or silt loam. In some areas the subsoil is loamy sand, loam, or sandy clay loam. In some small areas this soil is more than 20 inches deep over sandstone, and in others it is less than 10 inches deep. In places the underlying sandstone is glauconitic.

Included with this soil in mapping are some small areas of Boone soils. Also included are small sloping areas and severely eroded areas of Elkmound sandy loam and some small areas of this soil where slopes are more than 20 percent. The excessively drained Boone soil is in landscape positions similar to those of this Elkmound soil where there is more sand and less clay in the soil and the soil is deeper over sandstone. Included soils make up 5 to 10 percent of the unit.

Permeability is moderately rapid in this Elkmound soil. The available water capacity is very low. Surface runoff is rapid. Root penetration is limited by the underlying sandstone. Natural fertility is low. The surface layer is low in organic-matter content. It is friable and can be easily worked throughout a wide range in moisture content.

Many areas of this soil are woodland, and some have been planted to pines. The potential is poor for cultivated crops, hay, pasture, and trees. It is poor for openland and woodland habitat and very poor for wetland habitat. The potential is poor for most recreational development and for engineering uses.

This soil generally is not suitable for row crops because of the very low available water capacity and the severe hazards of erosion and soil blowing.

This soil is suited to pasture and hay, which are effective in controlling erosion and soil blowing, but forage yields are generally limited by the very low available water capacity. Overgrazing destroys the plant cover and results in erosion and soil blowing. Fertilization, renovation, and controlled grazing help to maintain the plant cover.

This soil is poorly suited to trees. The very low available water capacity and shallow root zone result in slow growth and poor form, which sharply limit the potential for production. Precautions must be taken during logging operations to minimize erosion. If the soil is left bare of vegetation after harvesting or planting, erosion becomes a serious problem. Bare soil areas are also subject to blowing. Steepness of slope and shallowness of the soil limit the use of equipment. Hand planting, contour planting, and careful location of access roads help to offset trafficability problems and aid in erosion control. Mortality of seedlings can be reduced by careful planting and by planting vigorous nursery stock. Clear-cut or area-selection harvest helps to prevent windthrow of trees left after harvest.

This soil is poorly suited to septic tank absorption fields because of the slope and the depth to rock. In places the suitability can be improved by building a filtering mound and shaping the site to a suitable slope. Generally, a less sloping site where the soil is deeper over bedrock should be selected. The soil is poorly suited to building site development because of the slope and the depth to rock. Unless these limitations can be overcome by filling and reshaping the site, a less sloping site where the soil is deeper over rock should be selected.

The capability unit is VIe-12. The woodland suitability group is 4d.

Et—Ettrick silt loam. This nearly level, poorly drained and very poorly drained soil is on flood plains, in drainageways, on low stream terraces, and in lake basins. In most areas it is subject to flooding or ponding during wet periods and after heavy rains. Most areas are oblong or irregular in shape and range from 3 to 375 acreas. A few areas are larger, and one is 1,700 acres.

Typically, the surface layer is black silt loam about 11 inches thick. The subsoil is about 35 inches thick. It is olive gray, firm silty clay loam in the upper part; olive gray and light olive gray, firm silt loam in the middle part; and light olive gray, friable stratified silt loam, loam, and fine sandy loam in the lower part. It is mottled with yellowish brown throughout. The substratum to a depth of about 60 inches is light brownish gray and yellowish brown stratified loamy and sandy sediments. In some small areas slopes are more than 2 percent. In places the dark surface layer is more than 20 inches thick. In some small areas the surface layer is loam or silt clay loam. In some, the subsoil is dominantly loam. In some areas the organic surface layer is as much as 15 inches thick. In some, the silty mantle is more than 40 inches thick. In some small areas this soil is underlain by sand.

Included with this soil in mapping are small areas of Curran, Jackson, Orion, Palms, and Rowley soils. The somewhat poorly drained Curran and Rowley soils are in slightly higher landscape positions than this Ettrick soil. The moderately well drained Jackson soil is in even higher landscape positions on low terraces. The somewhat poorly drained Orion soil is on flood plains and in drainageways where there is 20 to 40 inches of recent, light colored silty sediments. The poorly drained and very poorly drained Palms soil is in landscape positions similar to those of this Ettrick soil where there is a 16- to 50-inch organic layer. Included soils make up 10 to 15 percent of the unit.

Permeability is moderately slow in this Ettrick soil. The available water capacity is high. Surface runoff is slow. Unless drained, this soil has a water table within 1 foot of the surface during much of the year. Root penetration is limited by the water table. Natural fertility is high. The surface layer is very high in organic-matter content. It is friable and can be easily worked throughout a wide range in moisture content.

Drained areas of this soil are used for cultivated crops and pasture. Undrained areas provide wildlife habitat, and some are used for unimproved pasture. The potential is good for cultivated crops and pasture. It is poor for trees. The potential is fair for openland wildlife habitat and woodland habitat and good for wetland habitat. It is poor for recreational development and for most engineering uses.

If drained, this soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture. Surface drainage is needed to remove excess surface water rapidly. Deep ditches and tiles are used for internal drainage. If tiles are placed in the underlying stratified deposits, loose sand will enter the tile lines unless precautions are taken. Ditchbanks are easily eroded by flowing water, and vertical banks will cave and plug the ditch. Undrained areas are not suitable for cultivated crops.

Because of the high water table and periodic ponding, undrained areas of this soil are not suitable for most forage species and are restricted to such species as reed canarygrass. Under proper management, alfalfa and red clover can be grown successfully in drained areas. Overgrazing destroys the plant cover and encourages undesirable plants. Grazing when the soil is wet compacts the surface and results in poor tilth and reduced water infiltration. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is poorly suited to trees. Growth is slow, and form is poor. Where natural regeneration is unreliable, soil wetness generally necessitates planting on prepared ridges. Planting large, vigorous nursery stock is essential to avoid seedling mortality. Soil wetness also limits the use of machinery on this soil. Planting by hand generally is needed, and harvesting is frequently limited to periods when the soil is frozen. Windthrow of trees left after harvest is reduced by clear-cut or group-selection harvest. Competing vegetation, which hinders natural regeneration or the establishment of plantings, can be mechanically removed or controlled through the use of suitable herbicides.

This soil is poorly suited to septic tank absorption fields because of the high water table, the frequent flooding, and the moderately slow permeability. These limitations are difficult to overcome. The soil is also poorly suited to building site development because of the high water table and frequent flooding. These limitations can be overcome by draining the soil to lower the water table and constructing dikes and levees to protect the soil from flooding. In addition to the high water table and flooding limitations, the soil is poorly suited to local roads and streets because it lacks sufficient strength to adequately support vehicular traffic. This limitation can be overcome by replacing this soil with suitable base material.

The capability unit is IIw-1. The woodland suitability subclass is 4w.

FaB—Fayette silt loam, 2 to 6 percent slopes. This gently sloping, well drained soil is on broad ridgetops and valley floors on deeply dissected unglaciated uplands. Slopes are plane or convex. Most areas are irregular in shape and range from 3 to 160 acres.

Typically, the surface layer is dark grayish brown silt loam about 8 inches thick. The subsoil is about 37 inches thick. It is brown, firm silty clay loam in the upper part and dark yellowish brown, friable silt loam in the lower part. The substratum to a depth of about 60 inches is yellowish brown, friable silt loam. In some small areas this soil has a thicker, darker surface layer. In some, it is eroded. In some small areas this soil is underlain by clay residuum, sand, or sandstone bedrock at a depth of 40 inches.

Included with this soil in mapping are small areas of Atterberry soil. Also included are small sloping areas and severely eroded areas of Fayette silt loam, some small areas of this Fayette soil where slopes are less than 2 percent, and some areas of this soil which are saturated with water at a depth of 3 to 5 feet during wet periods. The somewhat poorly drained Atterberry soil is in drainageways and depressions and on foot slopes adjacent to wet bottoms. Included soils make up about 5 to 10 percent of the unit.

Permeability is moderate in this Fayette soil. The available water capacity is very high. Surface runoff is medium. Natural fertility is high. The surface layer is moderately low or moderate in organic-matter content. It is friable and can be easily tilled throughout a fairly wide range in moisture content. It tends to crust, however, after hard rains.

Most areas of this soil are used for cultivated crops, hay, and pasture. Some areas are native woodland. The potential is good for cultivated crops, hay, pasture, and trees. It is good for openland and woodland wildlife habi-

tat but very poor for wetland habitat. The potential is good for recreational development and good or fair for most engineering uses.

This soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture. The hazard of erosion is slight in cultivated areas. Crop residue management, minimum tillage, contour stripcropping, grassed waterways, and winter cover crops help to control erosion. Regular additions of organic matter help to maintain fertility and good tilth and increase water infiltration.

Erosion is generally not a problem in areas where this soil is used for pasture and hay. Overgrazing, however, destroys the plant cover and results in erosion. Grazing when the soil is wet compacts the surface, which results in poor tilth and increases runoff and the hazard of erosion. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is suited to trees. Competing vegetation, however, interferes with natural regeneration and the establishment of plantings. It can be removed mechanically or controlled through the use of suitable herbicides.

This soil is suited to septic tank absorption fields. It is only moderately suited to dwellings with or without basements and to small commercial buildings because it lacks sufficient strength and stability to adequately support building foundations. These limitations can be overcome by replacing the soil with suitable base material. The soil is poorly suited to local roads and streets because of the high potential frost action and the lack of sufficient strength to adequately support vehicular traffic. These limitations can be overcome by replacing this soil with suitable base material.

The capability unit is IIe-1. The woodland suitability subclass is 1o.

FaC2—Fayette silt loam, 6 to 12 percent slopes, eroded. This sloping, well drained soil is on convex ridgetops, side slopes, and valley floors of the deeply dissected unglaciated uplands. Most areas are oblong and range from 3 to 65 acres. One area is about 275 acres.

Typically, the surface layer is dark grayish brown silt loam about 8 inches thick. In most cultivated areas it contains some brown subsoil material that has been mixed in by plowing. The subsoil is about 35 inches thick. It is brown, firm silty clay loam in the upper part and dark yellowish brown, friable silt loam in the lower part. The substratum to a depth of about 60 inches is yellowish brown, friable silt loam. In some areas this soil is not eroded. In some small areas on foot slopes, the surface layer is loam or sandy loam. In some small areas this soil is only 20 to 40 inches deep over sandstone. In other areas it is underlain by clay residuum or sandstone at a depth of 40 inches.

Included with this soil in mapping are small gently sloping, moderately steep, and severely eroded areas of Fayette silt loam. In some severely eroded areas, the surface layer is silty clay loam. Also included are small areas of this Fayette soil which are saturated with water at a depth of 3 to 5 feet during wet periods. Included soils make up about 5 percent of the unit.

Permeability is moderate in this Fayette soil. The available water capacity is very high. Surface runoff is medium. Natural fertility is high. The surface layer is moderately low or moderate in organic-matter content. It is friable and can be easily tilled throughout a wide range in moisture content. It tends to crust, however, after hard rains, especially in areas where the plow layer contains subsoil material.

Most areas of this soil are used for cultivated crops, hay, and pasture. Some areas are native woodland. The potential is fair for cultivated crops. It is good for hay, pasture, and trees. The potential is good for openland and woodland wildlife habitat but very poor for wetland habitat. It is fair for recreational development and for most engineering uses.

This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. The hazard of further erosion is moderate in cultivated areas. Crop residue management, minimum tillage, contour stripcropping, grassed waterways, and winter cover crops help to control erosion. Regular additions of organic matter help to maintain fertility and good tilth and increase water infiltration.

Erosion is generally not a problem in areas where this soil is used for pasture or hay. Overgrazing, however, destroys the plant cover and results in erosion. Grazing when the soil is wet compacts the surface, which results in poor tilth and increases runoff and the hazard of further erosion. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is suited to trees. Competing vegetation, however, interferes with natural regeneration and the establishment of plantings. It can be removed mechanically or controlled through the use of suitable herbicides.

This soil is moderately suited to septic tank absorption fields because of the slope. This limitation can be overcome by reshaping the site or installing the field on the contour. The soil is moderately suited to dwellings with or without basements because of the slope and the lack of sufficient strength and stability to adequately support building foundations. The slope limitation can be overcome by reshaping the site. Low strength and poor stability can be overcome by replacing the soil with suitable base material. The soil is poorly suited to small commercial buildings because of the slope. This limitation can be overcome by reshaping the site. The soil is poorly suited to local roads and streets because of the high potential frost action and the lack of sufficient strength to adequately support vehicular traffic. These limitations can be overcome by replacing this soil with suitable base material.

The capability unit is IIIe-1. The woodland suitability subclass is 1o.

FaD2—Fayette silt loam, 12 to 20 percent slopes, eroded. This moderately steep, well drained soil is on concave and convex side slopes on deeply dissected unglaciated uplands. Most areas are oblong and range from 3 to 40 acres.

Typically, the surface layer is dark grayish brown silt loam about 7 inches thick. In most cultivated areas it contains some brown subsoil material that has been mixed in by plowing. The subsoil is about 33 inches thick. It is brown, firm silty clay loam in the upper part and dark yellowish brown, friable silt loam in the lower part. The substratum to a depth of about 60 inches is yellowish brown, friable silt loam. In some small areas this soil is not eroded. In some small areas on foot slopes, the surface layer is loam or sandy loam. In some small areas this soil is only 20 to 40 inches deep over sandstone. In other areas it is underlain by clay residuum or sandstone at a depth of 40 inches.

Included with this soil in mapping are small sloping areas and severely eroded areas of Fayette silt loam and some small areas of this Fayette soil where slopes are more than 20 percent. In some severely eroded areas, the surface layer is silty clay loam. Included soils make up about 5 percent of the unit.

Permeability is moderate in this Fayette soil. The available water capacity is very high. Surface runoff is rapid. Natural fertility is high. The surface layer is moderately low or moderate in organic-matter content. It is friable and can be easily worked throughout a wide range in moisture content. It tends to crust, however, after hard rains, especially in areas where the plowed layer contains subsoil material.

Most areas of this soil are used for cultivated crops, hay, and pasture. Some are native woodland. The potential is fair for cultivated crops but good for hay, pasture, and trees. It is fair for openland wildlife habitat, good for woodland habitat, and very poor for wetland habitat. The potential is poor for most recreational development and for most engineering uses.

This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay or pasture. The hazard of further erosion is severe in cultivated areas. Crop residue management, minimum tillage, contour stripcropping, grassed waterways, and winter cover crops are necessary to minimize erosion. Regular additions of organic matter help to maintain fertility and tilth and increase water infiltration.

Erosion is generally not a problem in areas where this soil is used for pasture or hay. Overgrazing, however, destroys plant cover and results in erosion. Grazing when the soil is wet compacts the surface, which results in poor tilth and increases runoff and the hazard of further erosion. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is suited to trees. Soil related problems in forest management are associated with steepness of slope; mortality of seedlings on hot, dry sites; and brush encroachment following harvest. Planting trees on the contour and selecting the best location for skid roads during harvest minimize erosion and improve equipment trafficability. Seedling mortality on south- and west-facing slopes can be reduced by careful planting and by planting vigorous nursery stock. Vegetation that competes with planted seedlings or natural reproduction following harvest can be removed mechanically or controlled through use of suitable herbicides.

This soil is poorly suited to septic tank absorption fields because of the slope. This limitation can be overcome by reshaping the site or by selecting a less sloping site. The soil is also poorly suited to dwellings with or without basements and to small commercial buildings because of the slope. This limitation can be overcome by reshaping the site or by selecting a less sloping site. This soil is poorly suited to local roads and streets because of the slope, the high potential frost action, and the lack of sufficient strength to support vehicular traffic. The slope limitation can be overcome by reshaping the site or by constructing roads on the contour. The frost action and low strength limitations can be overcome by replacing this soil with suitable base material.

The capability unit is IVe-2. The woodland suitability subclass is 1r.

Fu—Fluvaquents. These nearly level, moderately well drained and somewhat poorly drained soils are on flood plains and in drainageways. They are subject to frequent flooding. Slopes are plane. Most areas are long and narrow or irregular in shape and range from 3 to 175 acres. A few areas are larger. Many areas are dissected by old stream channels.

Typically, soil characteristics have a wide range. The surface layer ranges from silt loam to sand. The soil below the surface layer is stratified sandy and loamy material. In some areas this soil is dominantly sandy, and in others it is dominantly loamy.

Included with these soils in mapping are small areas of Arenzville, Chaseburg, Curran, and Orion soils and Fluvaquents, wet. The moderately well drained Arenzville and Chaseburg soils are in similar or slightly higher, better drained landscape positions. The somewhat poorly drained Curran soil is in landscape positions similar to those of Fluvaquents where there has been little or no alluvial deposition. The poorly drained and very poorly drained Fluvaquents, wet, are in slightly lower, wetter positions on flood plains and in drainageways. The somewhat poorly drained Orion soil is in landscape positions similar to those of Fluvaquents. Included soils make up about 10 to 15 percent of the unit.

Permeability of Fluvaquents ranges from moderate to rapid. The available water capacity, natural fertility, and organic-matter content of the surface layer range from high to low. Surface runoff is slow. In some areas the water table is within 1 foot of the surface. In some, root penetration is limited by the water table during wet periods of the growing season.

Most areas are used for woodland, wildlife habitat, or unimproved pasture. In loamy areas of these soils that have been drained and protected from flooding, the potential is good for cultivated crops, hay, and pasture. Even if sandy areas are drained and protected from flooding, the potential is poor for cultivated crops unless these areas are irrigated. The potential is good or fair for trees. It is good or fair for openland wildlife habitat and woodland habitat and fair for wetland habitat. It is poor for recreational development and for most engineering uses.

Some areas of these soils that are adequately drained and protected from flooding are suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. Sandy areas are poorly suited to these crops unless irrigated. Drainage is not feasible in some areas. Where feasible, deep ditches and tiles are used for internal drainage of these soils. In some areas, however, loose sand will enter the tile lines unless precautions are taken. Ditchbanks are easily eroded, and vertical banks will cave and plug the ditch.

If adequately drained and protected from flooding, some areas are suited to hay and pasture. Sandy areas are poorly suited unless they are irrigated. Overgrazing destroys the plant cover and encourages undesirable plants. Loss of plant cover can also result in erosion during periods of overflow. Grazing when the soil is wet compacts the surface in some areas, which results in poor tilth.

These soils are suited to trees. Competing vegetation, however, interferes with natural regeneration or the establishment of plantings. It can be removed mechanically or controlled through the use of suitable herbicides.

These soils are poorly suited to septic tank absorption fields because they have a seasonal high water table and are frequently flooded. The limitations are difficult to overcome. These soils are poorly suited to building site development because of the seasonal high water table and frequent flooding. These limitations can be overcome by draining the soils to lower the water table and by constructing dikes and levees to prevent flooding.

The capability unit is IIIw-12. The woodland suitability subclass is not assigned.

Fw—Fluvaquents, wet. These nearly level, poorly drained and very poorly drained soils are on flood plains and in drainageways. They are subject to frequent flooding. Slopes are plane. Most areas are long and narrow and range from 3 to 250 acres. Many areas are dissected by old stream channels.

Typically, soil characteristics have a wide range. The surface layer ranges from silt loam to sand, and in some areas it is organic. The soil below the surface layer is stratified sandy, loamy, and silty material and in some areas organic material.

Included with these soils in mapping are small areas of Adrian, Ettrick, Houghton, Fluvaquents, Marshan, and Palms soils. The poorly drained and very poorly drained Adrian, Ettrick, Houghton, Marshan, and Palms soils occupy landscape positions similar to those of Fluvaquents, wet, where there has been little or no alluvial deposition. The moderately well drained and somewhat poorly drained Fluvaquents are in slightly higher, better drained areas. Included soils make up 10 to 15 percent of the unit.

Permeability of Fluvaquents, wet, ranges from moderate to rapid. The available water capacity, natural fertility, and organic-matter content of the surface layer range from high to low. Surface runoff is very slow or ponded. Unless the soil is drained, a water table is at or near the surface much of the year. Root penetration is limited by the water table.

Most areas are used for woodland, wildlife habitat, or unimproved pasture. The potential is very poor for cultivated crops, pasture, and hay. It is poor for trees. The potential is poor for openland wildlife habitat, fair for woodland habitat, and good for wetland habitat. The potential is poor for recreational development and for all engineering uses.

Fluvaquents, wet, are generally not suitable for cultivated crops because of the high water table and frequent flooding. Some areas that are adequately drained and protected from flooding are suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture. Drainage is not feasible in many areas. Where feasible, deep ditches and tiles are used for internal drainage. In some areas, however, loose sand will enter the tile lines unless precautions are taken. Ditchbanks are easily eroded by flowing water, and vertical banks will cave and plug the ditch.

Because of the high water table and frequent flooding, Fluvaquents, wet, are not suited to most forage species and are restricted to such species as reed canarygrass. If drained and protected from flooding, they are suited to such species as alfalfa and red clover. Overgrazing destroys the plant cover and encourages undesirable plants. Loss of plant cover can also result in erosion during periods of overflow. Grazing when the soil is wet compacts the surface in some areas, which results in poor tilth. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

These soils are poorly suited to trees. Growth and form are so poor that trees are barely merchantable at best. Soil wetness generally requires planting by hand or machine on prepared ridges if natural regeneration is unreliable. Planting large, vigorous nursery stock is essential to avoid mortality. Harvest is frequently limited to periods when the soils are frozen. Clear-cut or area selection harvest helps to reduce windthrow of the remaining trees. Competing vegetation, which interferes with natural regeneration or establishment of plantings, can be removed mechanically or controlled through the use of suitable herbicides.

These soils are poorly suited to septic tank absorption fields because they are frequently flooded and have a

high water table. These limitations are difficult to overcome. The soils are also poorly suited to building site development because of the frequent flooding and high water table. These limitations can be overcome by draining the soil to lower the water table and by constructing dikes and levees to prevent flooding.

The capability unit is Vw-1. The woodland suitability subclass is not assigned.

FxB—Fox loam, 2 to 6 percent slopes. This gently sloping, well drained soil is on outwash plains and stream terraces. Slopes are plane and convex. Most areas are irregular in shape and range from 3 to 60 percent.

Typically, the surface layer is dark grayish brown loam about 9 inches thick. The subsoil is about 28 inches thick. It is dark yellowish brown, firm loam in the upper part; dark yellowish brown, firm clay loam in the middle part; and dark yellowish brown, friable gravelly sandy loam in the lower part. The substratum to a depth of about 60 inches is pale brown, loose sand and gravel. In some small areas the surface layer is thicker and darker colored. In some areas this soil is eroded. In some small areas the soil is more than 40 inches deep over sand and gravel. In some, the surface layer is sandy loam.

Included with this soil in mapping are small areas of Billett and Wyocena soils. Also included are small sloping areas and severely eroded areas of Fox loam and some areas of this soil where slopes are less than 2 percent. Billett and Wyocena soils are in landscape positions similar to those of this Fox soil where there is more sand and less silt and clay in the soil. Included soils make up about 5 to 10 percent of the unit.

In this Fox soil permeability is moderate in the subsoil and very rapid in the substratum. The available water capacity is moderate. Surface runoff is medium. Root penetration is limited by the underlying sand and gravel. Natural fertility is moderate. The surface layer is moderately low or moderate in organic-matter content. It is friable and can be easily worked throughout a wide range in moisture content.

Most areas of this soil are used for cultivated crops, hay, and pasture. Some small areas are woodland. The potential is good for cultivated crops, pasture, and trees. It is good for openland and woodland wildlife habitat but very poor for wetland habitat. It is good for recreational development and good or fair for most engineering uses.

This soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture. The hazard of erosion is slight in cultivated areas. Crop residue management, minimum tillage, contour stripcropping, grassed waterways, and winter cover crops help to control erosion. Regular additions of organic matter help to maintain fertility and good tilth and increase water infiltration.

Erosion is generally not a problem in areas where this soil is used for pasture and hay. Overgrazing, however, destroys the plant cover and results in erosion. Grazing when the soil is wet compacts the surface, which results in poor tilth and increases runoff and the hazard of erosion. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is suited to trees. Competing vegetation, however, interferes with natural regeneration and the establishment of plantings. It can be removed mechanically or controlled through the use of suitable herbicides.

This soil is suited to septic tank absorption fields. However, there is a danger of ground water pollution because the substratum is very rapidly permeable. The soil is only moderately suited to dwellings with or without basements and to small commercial buildings because it lacks sufficient strength and stability to adequately support building foundations. These limitations can be overcome by replacing the soil with suitable base material. The soil is poorly suited to local roads and streets because it lacks sufficient strength to adequately support vehicular traffic. This limitation can be overcome by replacing the soil with suitable base material. The substratum is a good source of sand and gravel.

The capability unit is IIe-2. The woodland suitability subclass is 2o.

FxC2—Fox loam, 6 to 15 percent slopes, eroded. This sloping and moderately steep, well drained soil is on low convex ridges and knobs and along drainageways on outwash plains and stream terraces. Most areas are irregular in shape and range from 3 to 10 acres.

Typically, the surface layer is dark grayish brown loam about 7 inches thick. In most cultivated areas it contains some dark yellowish brown subsoil material that has been mixed in by plowing. The subsoil is about 26 inches thick. It is dark yellowish brown, firm loam in the upper part; dark yellowish brown, firm clay loam in the middle part; and dark yellowish brown, friable gravelly sandy loam in the lower part. The substratum to a depth of about 60 inches is pale brown, loose sand and gravel. In some areas this soil is not eroded. In some small areas it is more than 40 inches deep over sand and gravel. In some, the surface layer is sandy loam.

Included with this soil in mapping are small areas of Billett and Wyocena soils. Also included are small gently sloping areas and severely eroded areas of Fox loam and small areas of this soil where slopes are more than 15 percent. Billett and Wyocena soils are in landscape positions similar to those of this Fox soil where there is more sand and less silt and clay in the soil. Included soils make up about 5 to 10 percent of the unit.

In this Fox soil permeability is moderate in the subsoil and very rapid in the substratum. The available water capacity is moderate. Surface runoff is medium. Root penetration is limited by the underlying sand and gravel. Natural fertility is moderate. The surface layer is moderately low or moderate in organic-matter content. It is friable and can be easily worked throughout a wide

range in moisture content. It tends to crust, however, after hard rains in areas where the plow layer contains subsoil material.

Most areas of this soil are used for cultivated crops, hay, and pasture. Some areas are native woodland. The potential is fair for cultivated crops and good for hay, pasture and trees. It is good for openland wildlife habitat and woodland habitat but very poor for wetland habitat. The potential is fair for most recreational development and fair or poor for most engineering uses.

This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. The hazard of further erosion is moderate in cultivated areas. Crop residue management, minimum tillage, contour stripcropping, grassed waterways, and winter cover crops help to control erosion. Regular additions of organic matter help to maintain fertility and good tilth and increase water infiltration.

Erosion is generally not a problem in areas where this soil is used for hay or pasture. Overgrazing, however, destroys the plant cover and results in erosion. Grazing when the soil is wet compacts the surface, which results in poor tilth and increases runoff and the hazard of further erosion. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is moderately suited to septic tank absorption ever, interferes with natural regeneration and the establishment of plantings. It can be removed mechanically or controlled through the use of suitable herbicides.

This soil is moderatly suited to septic tank absorption fields because of the slope. This limitation can be overcome by reshaping the site or by installing the field on the contour. The soil is moderately suited to dwellings with or without basements because of the slope and the lack of sufficient strength and stability to adequately support foundations. The slope limitation can be overcome by reshaping the site. Low strength and poor stability can be overcome by replacing the soil with suitable base material. The soil is poorly suited to small commercial buildings because of the slope. This limitation can be overcome by reshaping the site. The soil is poorly suited to local roads and streets because it lacks sufficient strength to adequately support vehicular traffic. This limitation can be overcome by replacing the soil with suitable base material. This soil is a good source of sand and gravel.

The capability unit is IIIe-2. The woodland suitability subclass is 2o.

GaB—Gale silt loam, 2 to 6 percent slopes. This gently sloping, well drained soil is on convex ridgetops, foot slopes, and valley floors on sandstone uplands. Most areas are irregular or oblong in shape and range from 3 to 100 acres.

Typically, the surface layer is dark grayish brown silt loam about 9 inches thick. The subsoil is about 25 inches thick. It is brown and dark yellowish brown, friable and firm silt loam in the upper part and brown, firm loam in the lower part. The substratum to a depth of about 60 inches is yellowish brown, loose sand over brown, yellowish brown, and brownish yellow, soft sandstone. Soft sandstone bedrock is at a depth of about 39 inches. In some small areas this soil is eroded. In some, slopes are less than 2 percent. In some small areas the surface layer is loam or sandy loam. In some, the subsoil is dominantly loam, clay loam, or sandy clay loam. In some small areas this soil is more than 40 inches deep over sandstone. In some the underlying sandstone is glauconitic.

Included with this soil in mapping are small areas of Eleva and Urne soils. Also included are small sloping areas and severely eroded areas of Gale silt loam and small areas of this soil which are saturated with water at a depth of 1 foot during wet periods. The somewhat excessively drained Eleva and Urne soils are in landscape positions similar to those of this Gale soil where there is more sand and less silt and clay in the soil. The Urne soil is underlain by glauconitic sandstone. Included soils make up about 10 to 15 percent of the unit.

In this Gale soil permeability is moderate in the subsoil and rapid in the sand substratum. The available water capacity is moderate. Surface runoff is medium. Root penetration is limited by the underlying sand and sandstone bedrock. Natural fertility is moderate. The surface layer is moderately low or moderate in organic-matter content. It is friable and can be easily tilled throughout a wide range in moisture content. It tends to crust, however, after heavy rains.

Most areas of this soil are used for cultivated crops, hay, and pasture. Some are native woodland. The potential is good for cultivated crops, hay, pasture, and trees. It is good for openland wildlife habitat and woodland habitat but very poor for wetland habitat. The potential is good for most recreational development and fair or poor for most engineering uses.

This soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture. The hazard of erosion is slight in cultivated areas. Crop residue management, minimum tillage, contour stripcropping, grassed waterways, and winter cover crops help to control erosion. Regular additions of organic matter help to maintain fertility and good tilth and increase water infiltration.

Erosion is generally not a problem in areas where this soil is used for pasture and hay. Overgrazing, however, destroys the plant cover and results in erosion. Grazing when the soil is wet compacts the surface, which results in poor tilth and increases the runoff and the hazard of erosion. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is suited to trees. Competing vegetation, however, interferes with natural regeneration and the establishment of plantings. It can be removed mechanically or controlled through the use of suitable herbicides.

This soil is poorly suited to septic tank absorption fields because of the depth to rock. The suitability can be improved by building a filtering mound of suitable material. The soil is only moderately suited to dwellings without basements and to small commercial buildings because it lacks sufficient strength and stability to support building foundations. These limitations can be overcome by replacing the soil with suitable base material. The soil is moderately suited to dwellings with basements because of the unstable subsoil and the depth to rock. These limitations can be overcome by replacing the soil with suitable base material and filling with suitable material to increase the thickness of the soil. The soil is poorly suited to local roads and streets because of the high potential frost action and the lack of sufficient strength to support vehicular traffic. These limitations can be overcome by replacing this soil with suitable base material.

The capability unit is IIe-2. The woodland suitability subclass is 2o.

GaC2—Gale silt loam, 6 to 12 percent slopes, eroded. This sloping, well drained soil is on convex ridgetops and side slopes on sandstone uplands. Most areas are oblong and range from 3 to 150 acres.

Typically, the surface layer is dark grayish brown silt loam about 7 inches thick (fig. 8). In most cultivated areas it contains some brown subsoil material that has been mixed in by plowing. The subsoil is about 24 inches thick. It is brown and dark yellowish brown, friable and firm silt loam in the upper part and brown, firm loam in the lower part. The substratum to a depth of about 60 inches is yellowish brown, loose sand over brown, yellowish brown, and brownish yellow, soft sandstone. Soft sandstone bedrock is at a depth of about 35 inches. In some small areas this soil is not eroded. In some, the surface layer is loam or sandy loam. In some, the subsoil is dominantly loam, clay loam, or sandy clay loam. In some small areas this soil is more than 40 inches deep over sandstone. In some, the underlying sandstone is glauconitic.

Included with this soil in mapping are small areas of Eleva and Urne soils. Also included are small gently sloping, moderately steep, and severely eroded areas of Gale silt loam. The somewhat excessively drained Eleva and Urne soils are in landscape positions similar to those of this Gale soil where there is more sand and less silt and clay in the soil. The Urne soil is underlain by glauconitic sandstone. Included soils make up about 10 to 15 percent of the unit.

In this Gale soil permeability is moderate in the subsoil and rapid in the sand substratum. The available water capacity is moderate. Surface runoff is medium. Root penetration is limited by the underlying sand and sandstone bedrock. Natural fertility is moderate. The surface layer is moderately low or moderate in organic-matter content. It is friable and can be easily tilled throughout a wide range in moisture content. It tends to crust, however, after heavy rains, especially in areas where the plow layer contains subsoil material.

Figure 8.—Profile of Gale silt loam. This soil formed in loess and the residuum from sandstone bedrock.

Most areas of this soil are used for cultivated crops, hay, and pasture. Some are native woodland. The potential is fair for cultivated crops. It is good for pasture and trees. It is good for openland and woodland habitat but very poor for wetland habitat. The potential is fair for most recreational development and fair or poor for most engineering uses.

This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. The hazard of further erosion is moderate in cultivated areas. Crop residue management, minimum tillage, contour stripcropping, grassed waterways, and winter cover crops help to control erosion. Regular additions of organic matter help to maintain fertility and good tilth and increase water infiltration.

Erosion is generally not a problem in areas where this soil is used for pasture or hay. Overgrazing, however, destroys the plant cover and results in erosion. Grazing when the soil is wet compacts the surface, which results in poor tilth and increases runoff and the hazard of further erosion. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is suited to trees. Competing vegetation, however, interferes with natural regeneration and the establishment of plantings. It can be removed mechanically or controlled through the use of suitable herbicides.

This soil is poorly suited to septic tank absorption fields because of the depth to bedrock. The suitability can be improved by building a filtering mound of suitable material. The soil is only moderately suited to dwellings without basements because of the slope and the lack of sufficient strength and stability to adequately support building foundations. These limitations can be overcome by replacing the soil with suitable base material and reshaping to a more suitable slope. The soil is only moderately suited to dwellings with basements because of the slope, the depth to bedrock, and the unstable subsoil. These limitations can be overcome by replacing the soil with suitable base material, filling to increase the thickness of the soil, and reshaping the site. The soil is poorly suited to small commercial buildings because of the slope. This limitation can be overcome by reshaping the site. The soil is poorly suited to local roads and streets because of the high potential frost action and the lack of sufficient strength to adequately support vehicular traffic. These limitations can be overcome by replacing this soil with suitable base material.

The capability unit is IIIe-2. The woodland suitability subclass is 2o.

GaD2—Gale silt loam, 12 to 20 percent slopes, eroded. This moderately steep, well drained soil is on narrow convex ridgetops and side slopes on sandstone uplands. Most areas are oblong and range from 3 to 160 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 7 inches thick. In most cultivated areas it contains some brown subsoil material that has been mixed in by plowing. The subsoil is about 20 inches thick. It is brown and dark yellowish brown, friable and firm silt loam in the upper part and brown, firm loam in the lower part. The substratum to a depth of about 60 inches is yellowish brown, loose sand over brown, yellowish brown, and brownish yellow, soft sandstone. Soft sandstone bedrock is at a depth of about 30 inches. In some small areas this soil is not eroded. In some, the surface layer is loam or sandy loam. In some, the subsoil is dominantly loam, clay loam, or sandy clay loam. In some small areas this soil is more than 40 inches deep over sandstone, and in others it is less than 20 inches deep. In some small areas the underlying sandstone is glauconitic.

Included with this soil in mapping are small areas of Eleva and Urne soils. Also included are small sloping, steep, and severely eroded areas of Gale silt loam. The somewhat excessively drained Eleva and Urne soils are in landscape positions similar to those of this Gale soil where there is more sand and less silt and clay in the soil. The Urne soil is underlain by glauconitic sandstone. Included soils make up about 10 to 15 percent of the unit.

In this Gale soil permeability is moderate in the subsoil and rapid in the sand substratum. The available water capacity is moderate. Surface runoff is rapid. Root penetration is limited by the underlying sand and sandstone bedrock. Natural fertility is moderate. The surface layer is moderately low or moderate in organic-matter content. It is friable and can be easily tilled throughout a wide range in moisture content. It tends to crust, however, after heavy rains, especially in areas where the plow layer contains subsoil material.

Many areas of this soil are used for cultivated crops, hay, and pasture. Some are native woodland. The potential is fair for cultivated crops and good for hay, pasture, and trees. It is fair for openland wildlife habitat, good for woodland habitat, and very poor for wetland habitat. The potential is poor for most recreational development and most engineering uses.

This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay or pasture. The hazard of further erosion is severe in cultivated areas. Crop residue management, minimum tillage, contour stripcropping, grassed waterways, and winter cover crops are necessary to minimize erosion. Regular additions of organic matter help to maintain fertility and good tilth and increase water infiltration.

Erosion is generally not a problem in areas where this soil is used for pasture or hay. Overgrazing, however, destroys the plant cover and results in erosion. Grazing when the soil is wet compacts the surface, which results in poor tilth and increases runoff and the hazard of further erosion. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is suited to trees. Soil related problems in forest management are associated with steepness of slope; mortality of seedlings on hot, dry sites; and brush encroachment following harvest. Planting trees on the contour and selecting the best location for skid roads during harvest minimize erosion and improve equipment trafficability. Seedling mortality on south- and west-facing slopes can be reduced by careful plantings and by planting vigorous nursery stock. Vegetation that competes with planted seedlings or natural reproduction following harvest can be removed mechanically or controlled through use of suitable herbicides.

This soil is poorly suited to septic tank absorption fields because of the slope and depth to rock. In places the suitability can be improved by building a filtering mound and reshaping the site. Generally, however, a less sloping site where the soil is deeper over the rock should be selected. The soil is poorly suited to dwellings with or without basements and to small commercial buildings because of the slope. Unless this limitation can be overcome by reshaping the site, a less sloping site should be selected. This soil is poorly suited to local roads and streets because of the slope, the high potential frost action, and the lack of sufficient strength to adequately support vehicular traffic. The slope limitation

can be overcome by reshaping the site and by constructing roads on the contour. Frost action and low strength can be overcome by replacing the soil with suitable base material.

The capability unit is IVe-2. The woodland suitability subclass is 2r.

GaE—Gale silt loam, 20 to 30 percent slopes. This steep, well drained soil is on convex side slopes on sandstone uplands. Most areas are long and narrow and range from 3 to 115 acres in size.

Typically, the surface layer is very dark gray silt loam about 3 inches thick. The subsurface layer is dark grayish brown silt loam about 4 inches thick. The subsoil is about 26 inches thick. It is brown and dark yellowish brown, friable and firm silt loam in the upper part and brown, firm loam in the lower part. The substratum to a depth of about 60 inches is yellowish brown, loose sand over brown, yellowish brown, and brownish yellow, soft sandstone. Soft sandstone bedrock is at a depth of about 30 inches. In some small areas this soil is eroded. In some, the surface layer is loam or sandy loam. In some, the subsoil is dominantly loam, clay loam, or sandy clay loam. In some small areas this soil is more than 40 inches deep over sandstone, and in others it is less than 20 inches deep. In some small areas the underlying sandstone is glauconitic.

Included with this soil in mapping are small areas of Eleva and Urne soils. Also included are small moderately steep areas and severely eroded areas of Gale silt loam and small areas of this soil where slopes are more than 30 percent. The somewhat excessively drained Eleva and Urne soils are in landscape positions similar to those of this Gale soil where there is more sand and less silt and clay in the soil. The Urne soil is underlain by glauconitic sandstone. Included soils make up about 10 to 15 percent of the unit.

In this Gale soil permeability is moderate in the subsoil and rapid in the sand substratum. The available water capacity is moderate. Surface runoff is very rapid. Root penetration is limited by the underlying sand and sandstone bedrock. Natural fertility is moderate. The surface layer is moderately low or moderate in organic-matter content. It is friable and can be easily worked throughout a wide range in moisture content. It tends to crust, however, after heavy rains.

Many areas of this soil are native woodland. Some areas are used for cultivated crops, hay, and pasture. The potential is poor for cultivated crops but good for hay, pasture, and trees. It is fair for openland wildlife habitat, good for woodland habitat, and very poor for wetland habitat. The potential is poor for recreational development and for most engineering uses.

This soil is generally not suitable for row crops. The hazard of erosion is very severe in cultivated areas.

Erosion generally is not a problem in areas where this soil is used for hay and pasture. Overgrazing, however, destroys the plant cover and results in erosion. Grazing when the soil is wet compacts the surface, which results in poor tilth and increases runoff and the hazard of erosion. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is suited to trees. Soil related problems in forest management are associated with steepness of slope; mortality of seedlings on hot, dry sites; and brush encroachment following harvest. Planting trees on the contour and selecting the best location for skid roads during harvest minimize erosion and improve equipment trafficability. Seedling mortality on south- and west-facing slopes can be reduced by careful planting and by planting vigorous nursery stock. Vegetation that competes with planted seedlings or natural reproduction following harvest can be removed mechanically or controlled through use of suitable herbicides.

This soil is poorly suited to septic tank absorption fields because of the slope and the depth to bedrock. Generally, a less sloping site where the soil is thicker over bedrock should be selected. The soil is poorly suited to dwellings with or without basements and to small commercial buildings because of the slope. Unless this limitation can be overcome by reshaping the site, a less sloping site should be selected. The soil is poorly suited to local roads and streets because of the slope, the high potential frost action, and the lack of sufficient strength to support vehicular traffic. The slope limitation can be overcome by reshaping the site and by constructing roads on the contour. The frost action and low strength limitations can be overcome by replacing this soil with suitable base material.

The capability unit is VIe-2. The woodland suitability subclass is 2r.

GoB—Gotham loamy sand, 1 to 6 percent slopes. This nearly level to gently sloping, somewhat excessively drained soil is on smooth flats and uneven side slopes on outwash plains and stream terraces and in sandy deposits on uplands. Most areas are irregular in shape and range from 3 to 160 acres. Some areas are as much as 600 acres.

Typically, the surface layer is very dark grayish brown loamy sand about 9 inches thick. The subsoil is dark yellowish brown and yellowish brown, very friable loamy sand about 25 inches thick. The substratum to a depth of about 60 inches is yellowish brown, loose sand. In some areas this soil is eroded, mainly as a result of soil blowing. In some, the soil is sloping. In some small areas the surface layer is sandy loam or sand.

Included with this soil in mapping are small areas of Billett and Plainfield soils and small areas of Gotham loamy sand, which have been severely eroded as a result of soil blowing. Also included are small areas that are saturated with water at a depth of 3 to 5 feet during wet periods. Billett and Plainfield soils are in landscape positions similar to those of this Gotham soil. Billett soils have slightly more clay and less sand in the surface

layer and subsoil than this Gotham soil, and Plainfield soils have slightly more sand and less clay in the surface layer and subsoil. Included soils make up 10 to 15 percent of the unit.

Permeability is rapid in this Gotham soil. The available water capacity is low. Surface runoff is slow. Natural fertility is low. The surface layer is low in organic-matter content. It is very friable and can be easily tilled throughout a wide range in moisture content.

Many areas of this soil are used for cultivated crops, hay, and pasture. Some are native woodland, and some have been planted to pines. The potential is fair for cultivated crops and pasture. It is improved if the soil is intensively managed and irrigated. The potential is fair for trees, openland and woodland wildlife habitat, and recreational development. It is very poor for wetland habitat. It is good for most engineering uses.

This soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture, but crop yields are limited during most seasons by the low available water capacity. The soil is suited to sprinklers and if it is fertilized and irrigated, better and more consistent yields can be expected. Erosion is generally not a hazard, but the soil is subject to blowing. Crop residue management, minimum tillage, windbreaks, and winter cover crops help to control soil blowing. Fertilization, irrigation, and protection from soil blowing are needed for dependable crop production. Because the soil is rapidly permeable, irrigation rates should be limited to prevent washing plant nutrients out of the root zone.

The use of this soil as pastureland or hayland is effective in controlling soil blowing. Yields are generally low unless the soil is fertilized and irrigated. Planting early in spring before the soil has a chance to dry is best. Later plantings are likely to have a poor survival rate. Overgrazing destroys the plant cover and results in soil blowing. Fertilization, renovation, and controlled grazing help to maintain the plant cover.

This soil is suited to trees. Poor seedling survival in dry years can be offset by careful planting and by planting vigorous nursery stock. Competing vegetation that interferes with natural regeneration and the establishment of plantings can be removed mechanically or controlled through the use of suitable herbicides.

This soil is suited to septic tank absorption fields. There is, however, a danger of ground water pollution as a result of the rapidly permeable substratum. The soil is suited to building site development and local roads and streets.

The capability unit is IVs-3. The woodland suitability subclass is 3s.

GoC—Gotham loamy sand, 6 to 12 percent slopes. This sloping, somewhat excessively drained soil is on uneven convex side slopes on outwash plains and stream terraces and in sandy deposits on uplands. Most areas are oblong and range from 3 to 180 acres.

Typically, the surface layer is very dark grayish brown loamy sand about 9 inches thick. The subsoil is dark yellowish brown and yellowish brown, very friable loamy sand about 25 inches thick. The substratum to a depth of about 60 inches is yellowish brown, loose sand. In some small areas this soil is eroded. In some areas it is gently sloping. In some small areas the surface layer is sandy loam or sand.

Included with this soil in mapping are small areas of Billett and Plainfield soils. Also included are small moderately steep and severely eroded areas of Gotham loamy sand. The severe erosion commonly is the result of soil blowing. Billett and Plainfield soils are in landscape positions similar to those of this Gotham soil. Billett soils have more clay and less sand in the surface layer and subsoil than this Gotham soil, and Plainfield soils have more sand and less clay in the surface layer and subsoil. Included soils make up 5 to 10 percent of the unit.

Permeability is rapid in this Gotham soil. The available water capacity is low. Surface runoff is medium. Natural fertility is low. The surface layer is low in organic-matter content. It is very friable and can be easily tilled throughout a wide range in moisture content.

Many areas of this soil are used for cultivated crops, hay, and pasture. Some are native woodland, and some have been planted to pines. The potential is fair for cultivated crops, pasture, and trees. It is fair for openland and woodland wildlife habitat and recreational development. It is very poor for wetland wildlife habitat. It is fair or poor for most engineering uses.

This soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture, but crop yields are limited during most seasons by the low available water capacity. The soil is suited to sprinkler irrigation, and if it is fertilized, better and more consistent yields can be expected. The hazard of erosion is moderate in cultivated areas, and the soil is also subject to blowing. Minimum tillage, crop residue management, winter cover crops, contour strips, windbreaks, and grassed waterways help to control erosion and soil blowing. Fertilization, irrigation, and protection from soil blowing are needed for dependable crop production.

The use of this soil as pastureland or hayland is effective in controlling erosion and soil blowing. Forage yields are generally low unless the soil is irrigated. Planting early in spring before the soil has a chance to dry is best. Later plantings are likely to have a poor survival rate. Overgrazing destroys the plant cover and results in soil blowing. Fertilization, renovation, and controlled grazing help to maintain the plant cover.

This soil is suited to trees. Poor seedling survival in dry years can be offset by careful planting and by planting vigorous nursery stock. Competing vegetation that interferes with natural regeneration and the establishment of plantings can be removed mechanically or controlled through the use of suitable herbicides.

This soil is moderately suited to septic tank absorption fields because of the slope. This limitation can be overcome by reshaping the site or by installing the field on the contour. Also, there is a danger of ground water

pollution because the substratum is rapidly permeable. The soil is moderately suited to dwellings with or without basements and to local roads and streets because of the slope. It is poorly suited to small commercial buildings because of the slope. The slope limitation for all of these uses can be overcome by reshaping the site. Local roads and streets can be constructed on the contour.

The capability unit is IVs-3. The woodland suitability subclass is 3s.

GoD—Gotham loamy sand, 12 to 25 percent slopes. This moderately steep and steep, somewhat excessively drained soil is on uneven convex side slopes on outwash plains and stream terraces. Most areas are oblong and range from 3 to 60 acres.

Typically, the surface layer is very dark grayish brown loamy sand about 8 inches thick. The subsoil is dark yellowish brown and yellowish brown, very friable loamy sand about 22 inches thick. The substratum to a depth of about 60 inches is yellowish brown, loose sand. In some small areas this soil is eroded. In some, the surface layer is sandy loam or sand.

Included with this soil in mapping are small areas of Billett and Plainfield soils. Also included are small sloping areas and severely eroded areas of Gotham loamy sand and small areas of this soil where slopes are more than 25 percent. The severe erosion commonly is the result of soil blowing. Billett and Plainfield are in landscape positions similar to those of this Gotham soil. The Billett soil has more clay and less sand than this Gotham soil, and the Plainfield soil has more sand and less clay. Included soils make up 5 to 10 percent of the unit.

Permeability is rapid in this Gotham soil. The available water capacity is low. Surface runoff is rapid. Natural fertility is low. The surface layer is low in organic-matter content. It is very friable and can be easily worked throughout a wide range in moisture content.

Some areas of this soil are native woodland, and many have been planted to pines. Some areas are used for cultivated crops, hay, and pasture. The potential is poor for cultivated crops and pasture. It is fair for trees. It is fair for openland and woodland wildlife habitat and very poor for wetland habitat. The potential is poor for recreational development and for most engineering uses.

This soil is generally not suitable for cultivated crops because the available water capacity is low and the soil is not suited to irrigation. In cultivated areas, the erosion hazard is severe or very severe, and the soil is subject to blowing. Minimum tillage, crop residue management, contour stripcropping, windbreaks, and grassed waterways help to control erosion and soil blowing and increase water infiltration.

The use of this soil as pastureland or hayland is effective in controlling erosion and soil blowing, but forage yields are generally low. Planting early in spring, before the surface layer dries, is best. Later plantings are likely to have poor survival. Overgrazing destroys the plant cover and results in erosion and soil blowing. Fertilization, renovation, and controlled grazing help to maintain the plant cover.

This soil is suited to trees. Erosion can be controlled by planting trees on the contour and by selecting the best location for skid roads during harvest. Poor seedling survival in dry years can be offset by careful planting and by planting vigorous nursery stock. Competing vegetation that interferes with natural regeneration and the establishment of plantings can be removed mechanically or controlled through the use of suitable herbicides.

This soil is poorly suited to septic tank absorption fields because of the slope. This limitation can be overcome by reshaping the site. Also, there is a danger of ground water pollution as a result of the rapidly permeable substratum. This soil is poorly suited to building site development because of the slope. This limitation can be overcome by reshaping the site. Local roads and streets can also be constructed on the contour.

The capability unit is VIe-13. The woodland suitability subclass is 3s.

Gr—Granby loamy sand. This nearly level, poorly drained and very poorly drained soil is on flood plains, in drainageways, and in glacial lake basins. In most areas it is subject to flooding or ponding during wet periods and after heavy rains. Most areas are oblong and range from 3 to 120 acres.

Typically, the surface layer is black loamy sand about 11 inches thick. The subsoil is about 18 inches thick. It is dark grayish brown, very friable sand in the upper part and grayish brown, very friable sand in the lower part. The substratum to a depth of about 60 inches is grayish brown, loose sand over brown, loose sand. Some areas have an organic surface layer up to 16 inches thick. In some small areas the surface layer is sandy loam or sand. Some small areas are mantled with up to 20 inches of loamy overwash.

Included with this soil in mapping are small areas of Adrian, Brems, Granby variant, and Marshan soils. Adrian and Marshan soils occupy landscape positions similar to those of the Granby soil. Adrian soils have an organic layer 16 to 50 inches thick over sand, and Marshan soils have a loamy surface layer and subsoil 20 to 40 inches thick over sand. Granby variant soils occupy landscape positions similar to those of this Granby soil where silty and loamy layers are at a depth of less than 40 inches. Brems soils occupy slightly elevated, better drained positions than the Granby soil. Included soils make up 5 to 15 percent of the unit.

Permeability is rapid in this Granby soil. The available water capacity is low. Surface runoff is very slow. Unless drained, this soil has a water table at the surface or within 1 foot of the surface throughout the year. Root penetration is limited by the water table. Natural fertility is low. The surface layer is moderate in organic-matter content. It is very friable and can be easily tilled throughout a wide range in moisture content.

Most drained areas of this soil are used for corn. Undrained areas provide wildlife habitat, and some are used for unimproved pasture. The potential is fair for cultivated crops, pasture, and trees. It is poor for openland and woodland wildlife habitat and good for wetland habitat. The potential is poor for recreational development and for most engineering uses.

If drained, this soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture. Surface drainage is needed to remove excess surface water rapidly. Deep ditches and tiles are used for internal drainage. If tiles are used, loose sand will enter the tile lines unless precautions are taken. Ditchbanks are easily eroded by flowing water, and vertical banks will cave and plug the ditch. Drained and cultivated areas are subject to soil blowing. Minimum tillage, crop residue management, windbreaks, and winter cover crops help to prevent soil blowing. If the water table is lowered excessively, crop yields are limited during most seasons by the low available water capacity. This soil is suited to irrigation. Fertilization, irrigation, and controlled drainage are needed for dependable crop production.

Because of the high water table, the periodic ponding, and the low available water capacity in drained areas, this soil is not suited to most forage species. Even under good management, yields are generally low.

This soil is suited to trees. Soil wetness generally requires planting by hand or machine on prepared ridges if natural regeneration is unreliable. Planting large, vigorous nursery stock is essential to avoid mortality. Harvest is frequently limited to periods when the soil is frozen. Clear-cut or area-selection harvest helps to reduce the hazard of windthrow to the remaining trees. Competing vegetation, which interferes with natural regeneration and the establishment of plantings, can be removed mechanically or controlled through the use of suitable herbicides.

This soil is poorly suited to septic tank absorption fields because of the high water table and frequent flooding. These limitations are difficult to overcome. This soil is also poorly suited to building site development because it has a high water table and is frequently flooded. These limitations can be overcome by draining the soil to lower the water table and by constructing dikes and levees to protect the soil from flooding.

The capability unit is IVw-6. The woodland suitability subclass is 3w.

Gv—Granby Variant loamy sand. This nearly level, poorly drained and very poorly drained soil is on outwash plains, in glacial lake basins, and in drainageways. In most areas it is subject to flooding or ponding during wet periods and after heavy rains. Most areas are long and narrow and range from 3 to 220 acres.

Typically, the surface layer is black loamy sand about 10 inches thick. The subsoil is about 18 inches thick. It is dark gray, very friable loamy fine sand in the upper part and mixed grayish brown and light brownish gray, very friable fine sand in the lower part. It is mottled with yellowish brown. The substratum extends to a depth of about 60 inches or more. It is gray, firm stratified sandy loam, loam, clay loam, and silty clay loam in the upper part; light olive gray, loose fine sand in the middle part; and light yellowish brown, very friable loamy fine sand in the lower part. It is mottled with yellowish brown, strong brown, grayish brown, and olive. In some areas the surface layer is sandy loam, loam, or silt loam. Some small areas have an organic surface layer up to 15 inches thick, and some are mantled with up to 20 inches of loamy overwash.

Included with this soil in mapping are small areas of Adrian and Marshan soils. Also included are small better drained areas and small areas in which the substratum is not loamy. The very poorly drained Adrian soil and the poorly drained and very poorly drained Marshan soil are in landscape positions similar to those of this Granby variant. The Adrian soil is in areas where a 16- to 50-inch organic layer is over sand, and the Marshan soil is in areas where a loamy soil is 20 to 40 inches deep over sand. Included soils make up about 5 to 10 percent of the unit.

In this Granby variant permeability is moderately slow in the loamy part of the substratum and rapid in the sandy part of the substratum. The available water capacity is low. Surface runoff is slow. Unless drained, this soil has a water table at the surface or within 1 foot of the surface much of the year. Root penetration is limited by the water table. Natural fertility is low. The surface layer is moderate in organic-matter content. It is very friable and can be easily tilled throughout a wide range in moisture content.

Most drained areas of this soil are used for corn. Undrained areas provide wildlife habitat, and some are used for unimproved pasture. The potential is fair for cultivated crops, hay, pasture, and trees. It is fair for openland, woodland, and wetland wildlife habitat. The potential is poor for recreational development and for most engineering uses.

Undrained areas of this soil generally are not suitable for crops. If drained, the soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture. Surface drainage is needed to remove excess surface water rapidly. Deep ditches and tiles are used for internal drainage. If tiles are used, loose sand will enter the tile lines unless precautions are taken. Ditchbanks are easily eroded by flowing water, and vertical banks will cave and plug the ditch. Drained and cultivated areas are subject to soil blowing. Minimum tillage, crop residue management, windbreaks, and winter cover crops help to prevent soil blowing.

The use of this soil as pastureland or hayland is effective in controlling soil blowing. Under good management and if adequately drained, the soil is suited to pasture or hay. Planting early in spring, before the surface layer dries, is best. Later plantings are likely to have poor survival. Overgrazing destroys the plant cover and re-

sults in soil blowing. Fertilization, renovation, and controlled grazing help to maintain the plant cover.

This soil is suited to trees. Soil wetness generally requires planting by hand or machine on prepared ridges if natural regeneration is unreliable. Planting large, vigorous nursery stock is essential to avoid mortality. Harvest is frequently limited to periods when the soil is frozen. Clear-cut or area-selection harvest helps to reduce windthrow of the remaining trees. Competing vegetation that interferes with natural regeneration and the establishment of plantings can be removed mechanically or controlled through the use of suitable herbicides.

This soil is poorly suited to septic tank absorption fields because of the high water table, the frequent flooding, and the moderately slow permeability. These limitations are difficult to overcome. This soil is also poorly suited to building site development because it has a high water table and is frequently flooded. These limitations can be overcome by draining the soil to lower the water table and by constructing dikes and levees to protect the soil from flooding.

The capability unit is IIIw-5. The woodland suitability subclass is 3w.

Ho—Houghton muck. This nearly level, very poorly drained soil is in depressions of flood plains, in glacial lake basins, and along drainageways. In most areas it is subject to flooding or ponding during wet periods and after heavy rains. Most areas are irregular in shape and range from 3 to 230 acres. One area is 1,700 acres.

Typically, the organic layer is black muck more than 60 inches thick. In some small areas the slope is as much as 4 percent. In some, there is up to 20 inches of sandy or loamy overburden. In some areas a layer of marl up to 5 inches thick is in the organic layer.

Included with this soil in mapping are small areas of Adrian, Ettrick, Granby, Marshan, Ossian, and Palms soils. Adrian and Palms soils occupy landscape positions similar to those of the Houghton soil where the organic layer is less than 51 inches thick. Ettrick, Granby, Marshan, and Ossian soils occupy similar or slightly elevated landscape positions where there is no organic layer or the organic layer is less than 16 inches thick. These included soils make up 5 to 15 percent of the unit.

Permeability is moderately rapid in this Houghton soil. The available water capacity is very high. Surface runoff is very slow or ponded. Unless drained, this soil has a water table at the surface or within 1 foot of the surface throughout the year. Root penetration is limited by the water table. Natural fertility is low. If this soil is drained, the organic matter decomposes and subsides.

In most drained areas this soil is used for corn. In some, it is used for vegetable crops, such as potatoes, carrots, and onions, and for specialty crops such as mint (fig. 9). Undrained areas provide wildlife habitat. Some are used for unimproved pasture. The potential is fair for cultivated crops, pasture, and trees. It is good for wetland wildlife habitat but poor for openland and woodland habitat. The potential is poor for recreational development and for most engineering uses.

If drained, this Houghton muck is suited to cultivated crops and pasture. In undrained areas it is not suited to cultivated crops. Deep ditches and tiles are used for internal drainage. Draining this soil is difficult. Some areas lack suitable outlets. Ditchbanks are easily eroded by flowing water, and vertical banks will cave and plug the ditch. Drained areas are subject to burning. Cultivated areas are subject to soil blowing. Excessive lowering of the water table increases subsidence. Minimum tillage, crop residue management, windbreaks, and winter cover crops help to prevent soil blowing. Controlled drainage helps to minimize subsidence.

Because of the high water table, the periodic ponding, and the low fertility, this soil is not suited to most forage species unless it is drained. It is suited only to reed canarygrass. In drained areas red clover can be grown, but the low soil strength restricts livestock grazing and the use of machinery.

This soil is suited to trees. Soil wetness during planting season limits reforestation to natural regeneration. The heavy equipment needed in harvesting can be used only when the soil is frozen because of the wetness and low bearing capacity. The hazard of windthrow of the trees left after harvest can be reduced by clear-cut or group-selection harvesting. Competing vegetation, which hinders natural regeneration, can be removed mechanically or controlled through the use of suitable herbicides.

Houghton muck is poorly suited to septic tank absorption fields because of the high water table and frequent flooding. This soil is also poorly suited to building site development because it has a high water table, is frequently flooded, and lacks sufficient strength to support building foundations and vehicular traffic.

The capability unit is IIIw-9. The woodland suitability subclass is 3w.

JaA—Jackson silt loam, 0 to 2 percent slopes. This nearly level, moderately well drained soil is on broad outwash plains and on stream terraces. Most areas are oblong or irregular in shape and range from 3 to 60 acres.

Typically, the surface layer is dark grayish brown silt loam about 8 inches thick. The subsoil is about 50 inches thick. It is brown and dark yellowish brown, firm silt loam and silty clay loam in the upper part; mixed brown and yellowish brown, firm silt loam in the middle part; and brown, yellowish brown, and dark yellowish brown, friable stratified silt loam, loam, sandy loam, and loamy sand in the lower part. It is mottled with yellowish brown and grayish brown in the middle and lower parts. The substratum to a depth of about 60 inches is yellowish brown, loose fine sand. In some small areas the surface layer is thicker and darker colored than is typical. In some small areas the subsoil is not mottled. In some areas this soil is underlain by soft sandstone or stratified sandy and loamy deposits. In some small areas the silty

Figure 9.—Potatoes on drained area of Houghton soils.

mantle is less than 40 inches thick, and in others it is more than 60 inches thick.

Included with this soil in mapping are small areas of Curran soils and small gently sloping areas of Jackson silt loam. The somewhat poorly drained Curran soil is in drainageways and depressions and along the edges of wet bottoms. Included soils make up about 5 percent of the unit.

In this Jackson soil permeability is moderate in the subsoil and rapid in the substratum. The available water capacity is high. Surface runoff is slow. This soil has a water table at a depth of 2-1/2 to 5 feet during wet periods. Natural fertility is high. The surface layer is moderately low or moderate in organic-matter content. It is friable and can be easily worked throughout a wide range in moisture content. It tends to crust, however, after hard rains.

Most areas of this soil are used for cultivated crops, hay, and pasture. Some are native woodland. The potential is good for cultivated crops, hay, pasture, and trees. It is good for openland and woodland wildlife habitat but very poor for wetland habitat. The potential is good for recreational development and fair or poor for most engineering uses.

This soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture. Erosion is generally not a problem. Regular additions of organic matter help to maintain fertility and good tilth and increase water infiltration. Under good management, the soil can be cropped intensively.

This soil is suited to pasture and hay. Overgrazing, however, destroys the plant cover and encourages undesirable species. Grazing when the soil is wet compacts the surface, which results in poor tilth. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is suited to trees. Competing vegetation, however, interferes with natural regeneration and the estab-

lishment of seedlings. It can be removed mechanically or controlled through the use of suitable herbicides.

This soil is poorly suited to septic tank absorption fields because of the seasonal high water table. The suitability can be improved by building a filtering mound or by draining the soil to lower the water table. The soil is moderately suited to dwellings with or without basements and to small commercial buildings because it lacks sufficient strength and stability to adequately support building foundations. The seasonal high water table is a limitation for dwellings with basements. Low strength and poor stability can be overcome by replacing the soil with suitable base material. Draining the soil lowers the seasonal water table. The soil is poorly suited to local roads and streets because of the high potential frost action and the lack of sufficient strength to adequately support vehicular traffic. These limitations can be overcome by replacing this soil with suitable base material.

The capability unit is I-1. The woodland suitability subclass is 1o.

JaB—Jackson silt loam, 2 to 6 percent slopes. This gently sloping, moderately well drained soil is on broad outwash plains and on stream terraces. Slopes are plane and convex. Most areas are oblong and range from 3 to 65 acres.

Typically, the surface layer is dark grayish brown silt loam about 8 inches thick. The subsoil is about 48 inches thick. It is brown and dark yellowish brown, firm silt loam and silty clay loam in the upper part; mixed brown and yellowish brown, firm silt loam in the middle part; and brown, yellowish brown, and dark yellowish brown, friable stratified silt loam, loam, sandy loam, and loamy sand in the lower part. It is mottled with yellowish brown and grayish brown in the middle and lower parts. The substratum to a depth of about 60 inches is yellowish brown loose fine sand. In some small areas the surface layer is thicker and darker colored than is typical. In some areas the subsoil is not mottled. In some areas the soil is underlain by soft sandstone or stratified sandy and loamy deposits. In some small areas the silty mantle is less than 40 inches thick, and in others it is more than 60 inches thick.

Included with this soil in mapping are small areas of Curran soils. Also included are small nearly level areas of Jackson silt loam and small areas of this soil where slopes are more than 6 percent. The somewhat poorly drained Curran soil is in drainageways and depressions and on foot slopes along wet bottoms. Included soils make up 5 to 10 percent of the unit.

In this Jackson soil permeability is moderate in the subsoil and rapid in the substratum. The available water capacity is high. Surface runoff is slow. This soil has a water table at a depth of 2-1/2 to 5 feet during wet periods. Natural fertility is high. The surface layer is moderately low or moderate in organic-matter content. It is friable and can be easily worked throughout a wide range in moisture content. It tends to crust, however, after hard rains.

Most areas of this soil are used for cultivated crops, hay, and pasture. Some are native woodland. The potential is good for cultivated crops, hay, pasture, and trees. It is good for openland and woodland wildlife habitat but very poor for wetland habitat. The potential is good for recreational developments and fair or poor for most engineering uses.

This soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture. There is a slight hazard of erosion in cultivated areas. Crop residue management, minimum tillage, contour stripcropping, grassed waterways, and winter cover crops help to control erosion. Regular additions of organic matter help to maintain fertility and good tilth and increase water infiltration.

Erosion is generally not a problem in areas where this soil is used for pasture and hay. Overgrazing, however, destroys the plant cover and results in erosion. Grazing when the soil is wet compacts the surface, which results in poor tilth and increases runoff and the hazard of erosion. Fertilization, renovation, controlled grazing, and restricted use during wet periods help keep the soil and the plant cover in good condition.

This soil is suited to trees. Competing vegetation, however, interferes with natural regeneration and the establishment of plantings. It can be removed mechanically or controlled through the use of suitable herbicides.

This soil is poorly suited to septic tank absorption fields because of the seasonal high water table. The suitability can be improved by building a filtering mound or by draining the soil to lower the water table. The soil is moderately suited to dwellings with or without basements and to small commercial buildings because it lacks sufficient strength and stability to adequately support building foundations. The seasonal water table is a limitation for dwellings with basements. Low strength and poor stability can be overcome by replacing the soil with suitable base material. Draining the soil lowers the water table. The soil is poorly suited to local roads and streets because of the high potential frost action and the lack of sufficient strength to adequately support vehicular traffic. These limitations can be overcome by replacing this soil with suitable base material.

The capability unit is IIe-1. The woodland suitability subclass is 1o.

KlA—Kendall silt loam, 0 to 3 percent slopes. This nearly level to gently sloping, somewhat poorly drained soil is on concave slopes in drainageways and depressions of outwash plains and till plains and in glacial lake basins. In some areas it is subject to flooding or ponding during wet periods and after heavy rains. Most areas are oblong and range from 3 to 50 acres.

Typically, the surface layer is dark grayish brown silt loam about 8 inches thick. The subsurface layer is brown silt loam about 3 inches thick. The subsoil is about 47

inches thick. It is brown, friable silt loam in the upper part; grayish brown, firm and friable silty clay loam and silt loam in the middle part; and grayish brown friable loam in the lower part. It is mottled with grayish brown, yellowish brown, and strong brown. The substratum to a depth of about 60 inches is yellowish brown, friable stratified silt loam, loam, and sandy loam. In some small areas the surface layer is darker colored than is typical. In some, slopes are more than 3 percent. In some small areas the silty mantle is less than 40 inches thick, and in others it is more than 60 inches thick.

Included with this soil in mapping are small areas of Ossian, McHenry, and St. Charles soils. The poorly drained Ossian soil is in lower wetter areas of drainageways and depressions than the Kendall soil. The well drained McHenry and St. Charles soils occupy slightly higher, better drained sites than the Kendall soil. Included soils make up 5 to 10 percent of the unit.

Permeability is moderate in this Kendall soil. The available water capacity is high. Surface runoff is slow. This soil has a water table at a depth of 1 to 3 feet during wet periods. Root penetration is limited by the water table during wet periods of the growing season. Natural fertility is high. The surface layer is moderately low or moderate in organic-matter content. It is friable and can be easily worked throughout a wide range in moisture content.

Drained areas of this soil are used for cultivated crops, hay, and pasture. Undrained areas provide wildlife habitat, and some are used for unimproved pasture. Some areas are native woodland. The potential is good for cultivated crops, pasture, and trees. It is good for openland and woodland wildlife habitat and fair for wetland habitat. The potential is fair or poor for recreational development and poor for most engineering uses.

If drained, this soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture. Surface drainage is needed to remove excess surface water rapidly. Deep ditches and tiles are used for internal drainage. Ditchbanks are easily eroded by flowing water, and vertical banks will cave and plug the ditch. Regular additions of organic matter help to maintain fertility and good tilth.

If drained, this soil is suited to legumes and grasses for hay and pasture. Overgrazing, however, destroys the plant cover and encourages undesirable plants. Grazing when the soil is wet compacts the surface and results in poor tilth and reduced water infiltration. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is suited to trees. Competing vegetation, however, interferes with natural regeneration and establishment of plantings. It can be removed mechanically or controlled through the use of suitable herbicides.

This soil is poorly suited to septic tank absorption fields because of the occasional flooding in some areas and the seasonal high water table. The suitability can be improved by building a filtering mound of suitable material and by constructing dikes and levees to protect the soil from flooding. The soil is poorly suited to dwellings with or without basements and to small commercial buildings because of the seasonal high water table and the occasional flooding in some areas. These limitations can be overcome by draining the soil to lower the seasonal water table and by constructing dikes and levees. This soil is poorly suited to local roads and streets because of the high potential frost action, the occasional flooding in some areas, and the insufficient strength to adequately support vehicular traffic. The frost action and low strength limitations can be overcome by replacing the soil with suitable base material. Dikes and levees prevent flooding.

The capability unit is IIw-2. The woodland suitability subclass is 2o.

LfB—La Farge silt loam, 2 to 6 percent slopes. This gently sloping, well drained soil is on convex ridgetops, foot slopes, and valley floors on unglaciated sandstone uplands. Most areas are irregular or oblong in shape and range from 3 to 65 acres.

Typically, the surface layer is dark grayish brown silt loam about 9 inches thick. The subsoil is about 29 inches thick. It is brown, friable silt loam in the upper part; dark yellowish brown, firm silt loam in the middle part; and light olive brown, firm clay loam in the lower part. Glauconitic sandstone and siltstone bedrock begins at a depth of about 39 inches and extends to 60 inches or more. It is light olive brown, soft, and interbedded. In some small areas this soil is eroded. In some, slopes are less than 2 percent. In some, most of the subsoil is loam, clay loam, or sandy clay loam. In some areas this soil is more than 40 inches thick over glauconitic sandstone. In others, the sandstone is not glauconitic.

Included with this soil in mapping are small areas of Urne soil. Also included are small sloping areas and severely eroded areas of La Farge silt loam and small areas of this soil which have a perched water table during wet periods. The somewhat excessively drained Urne soil is in landscape positions similar to those of this La Farge soil where there is more sand and less silt and clay in the soil. Included soils make up about 10 percent of the unit.

Permeability is moderate in this La Farge soil. The available water capacity is moderate. Surface runoff is medium. Root penetration is limited by the underlying bedrock. Natural fertility is moderate. The surface layer is moderately low or moderate in organic-matter content. It is friable and can be easily tilled throughout a wide range in moisture content. It tends to crust, however, after heavy rains. The glauconite in the underlying bedrock is high in content of available potash.

Most areas of this soil are used for cultivated crops, hay, and pasture. Some areas are native woodland. The potential is good for cultivated crops, pasture, and trees. It is good for openland and woodland wildlife habitat but very poor for wetland habitat. The potential is good for

recreational development and fair or poor for most engineering uses.

This soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture. There is a slight hazard of erosion in cultivated areas. Crop residue management, minimum tillage, contour stripcropping, grassed waterways, and winter cover crops help to control erosion. Regular additions of organic matter help to maintain fertility and good tilth and increase water infiltration.

Erosion is generally not a problem in areas where this soil is used for pasture and hay. Overgrazing, however, destroys the plant cover and results in erosion. Grazing when the soil is wet compacts the surface, which results in poor tilth and increases runoff and the hazard of erosion. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is suited to trees. Competing vegetation, however, interferes with natural regeneration and the establishment of plantings. It can be removed mechanically or controlled through the use of suitable herbicides.

This soil is poorly suited to septic tank absorption fields because of the depth to rock. The suitability can be improved by building a filtering mound of suitable material. The soil is moderately suited to dwellings without basements and to small commercial buildings because it lacks sufficient strength and stability to support building foundations. These limitations can be overcome by replacing the soil with suitable base material. The soil is moderately suited to dwellings with basements because of the unstable subsoil and the depth to rock. These limitations can be overcome by replacing the soil with suitable base material and by filling with suitable material to increase the thickness of the soil. The soil is poorly suited to local roads and streets because of high potential frost action and the lack of sufficient strength to support vehicular traffic. These limitations can be overcome by replacing this soil with suitable base material.

The capability unit is IIe-2. The woodland suitability subclass is 2o.

LfC2—La Farge silt loam, 6 to 12 percent slopes, eroded. This sloping, well drained soil is on convex ridgetops and side slopes on unglaciated sandstone uplands. Most areas are oblong and range from 3 to 160 acres.

Typically, the surface layer is dark grayish brown, silt loam about 8 inches thick. In most cultivated areas it contains some brown subsoil material that has been mixed in by plowing. The subsoil is about 27 inches thick. It is brown, friable silt loam in the upper part; dark yellowish brown, firm, silt loam in the middle part; and light olive brown, firm clay loam in the lower part. Glauconitic sandstone and siltstone bedrock begins at a depth of about 35 inches and extends to a depth of 60 inches or more. It is light olive brown, soft, and interbedded. In some areas this soil is not eroded. In some small areas on foot slopes, the surface layer is loam or sandy loam. In some areas most of the subsoil is loam, clay loam, or sandy clay loam. In some, this soil is more than 40 inches deep over underlying glauconitic sandstone. In others, the sandstone is not glauconitic.

Included with this soil in mapping are small areas of Urne soil. Also included are small gently sloping areas, moderately steep areas, and severely eroded areas of La Farge silt loam. The somewhat excessively drained Urne soil is in landscape positions similar to those of this La Farge soil where there is more sand and less silt and clay in the soil. Included soils make up about 10 percent of the unit.

Permeability is moderate in this La Farge soil. The available water capacity is moderate. Surface runoff is medium. Root penetration is limited by the underlying bedrock. Natural fertility is moderate. The surface layer is moderately low or moderate in organic-matter content. It is friable and can be easily tilled throughout a wide range in moisture content. It tends to crust, however, after heavy rains, especially in areas where the plow layer contains subsoil material. The glauconite in the underlying bedrock is high in content of available potash.

Most areas of this soil are used for cultivated crops, hay, and pasture. Some areas are native woodland. The potential is fair for cultivated crops and is good for pasture and trees. It is good for openland and woodland wildlife habitat but very poor for wetland habitat. The potential is fair for recreational development and fair or poor for most engineering uses.

This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. The hazard of further erosion is moderate in cultivated areas. Crop residue management, minimum tillage, contour stripcropping, grassed waterways, and winter cover crops help to control erosion. Regular additions of organic matter help to maintain fertility and good tilth and increase water infiltration.

Erosion is generally not a problem in areas where this soil is used for pasture or hay. Overgrazing, however, destroys the plant cover and results in erosion. Grazing when the soil is wet compacts the surface, which results in poor tilth and increases runoff and the hazard of further erosion. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is suited to trees. Competing vegetation, however, interferes with natural regeneration or the establishment of plantings. It can be removed mechanically or controlled through the use of suitable herbicides.

This soil is poorly suited to septic tank absorption fields because of the depth to bedrock. The suitability can be improved by building a filtering mound of suitable material. The soil is moderately suited to dwellings without basements because of the slope and the lack of sufficient strength and stability to adequately support building foundations. These limitations can be overcome

by replacing the soil with suitable base material and reshaping to a more suitable slope. The soil is moderately suited to dwellings with basements because of the slope, the depth to bedrock, and the unstable subsoil. These limitations can be overcome by replacing the soil with suitable material, filling with suitable material to increase the thickness of the soil, and reshaping the site. The soil is poorly suited to small commercial buildings because of the slope. This limitation can be overcome by reshaping the site. The soil is poorly suited to local roads and streets because the potential frost action is high and because the soil lacks sufficient strength to adequately support vehicular traffic. These limitations can be overcome by replacing this soil with suitable base material.

The capability unit is IIIe-2. The woodland suitability subclass is 2o.

LfD2—La Farge silt loam, 12 to 20 percent slopes, eroded. This moderately steep, well drained soil is on narrow, convex ridgetops and side slopes on unglaciated sandstone uplands. Most areas are oblong and range from 3 to 225 acres.

Typically, the surface layer is dark grayish brown silt loam about 8 inches thick. In most cultivated areas it contains some brown subsoil material that has been mixed in by plowing. The subsoil is about 25 inches thick. It is brown, friable silt loam in the upper part; dark yellowish brown, firm silt loam in the middle part; and light olive brown, firm clay loam in the lower part. Glauconitic sandstone and siltstone bedrock begins at a depth of 33 inches and extends to 60 inches or more. It is light olive brown, soft, and interbedded. In some areas this soil is not eroded. In some small areas the surface layer is loam or sandy loam. In some areas most of the subsoil is loam, clay loam, or sandy clay loam. In some, this soil is more than 40 inches deep over glauconitic sandstone. In others, the sandstone is not glauconitic.

Included with this soil in mapping are small areas of Urne soil. Also included are small sloping areas, steep areas, and severely eroded areas of La Farge silt loam. The somewhat excessively drained Urne soil is in landscape positions similar to those of this La Farge soil where there is more sand and less clay and silt in the soil. Included soils make up about 10 percent of the unit.

Permeability is moderate in this La Farge soil. The available water capacity is moderate. Surface runoff is rapid. Root penetration is limited by the underlying bedrock. Natural fertility is moderate. The surface layer is moderately low or moderate in organic-matter content. It is friable and can be easily tilled throughout a wide range in moisture content. It tends to crust, however, after heavy rains, especially in areas where the plow layer contains subsoil material. The glauconite in the underlying bedrock is high in content of available potash.

Most areas of this soil are used for cultivated crops, hay, and pasture. Some are native woodland. The potential is fair for cultivated crops but good for hay, pasture, and trees. The potential is fair for openland wildlife habitat, good for woodland habitat, and very poor for wetland habitat. It is poor for most recreational development and for all engineering uses.

This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay or pasture. The hazard of further erosion is severe in cultivated areas. Crop residue management, minimum tillage, contour stripcropping, grassed waterways, and winter cover crops are needed to minimize erosion. Regular additions of organic matter help to maintain fertility and good tilth and increase water infiltration.

Erosion is generally not a problem in areas where this soil is used for pasture or hay. Overgrazing, however, destroys the plant cover and results in erosion. Grazing when the soil is wet compacts the surface, which results in poor tilth and increases runoff and the hazard of further erosion. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is suited to trees. Soil related problems in forest management are associated with steepness of slope; mortality of seedlings on hot, dry sites; and brush encroachment following harvest. Planting trees on the contour and selecting the best location for skid roads during harvest minimize erosion and improve equipment trafficability. Seedling mortality on south- and west-facing slopes can be reduced by careful planting and by planting vigorous nursery stock. Vegetation that competes with planted seedlings and natural reproduction following harvest can be removed mechanically or controlled through use of suitable herbicides.

This soil is poorly suited to septic tank absorption fields because of the slope and the depth to rock. In places the suitability can be improved by building a filtering mound and shaping the site to a suitable slope. Generally, however, a less sloping site where the soil is deeper over the rock should be selected. The soil is poorly suited to dwellings with or without basements and to small commercial buildings because of the slope. Unless this limitation can be overcome by reshaping the site, a less sloping site should be selected. The soil is poorly suited to local roads and streets because of the slope, the high potential frost action, and the lack of sufficient strength to adequately support building foundations. The slope limitation can be overcome by reshaping the site and by constructing roads on the contour. The frost action potential and low strength can be overcome by replacing this soil with suitable base material.

The capability unit is IVe-2. The woodland suitability subclass is 2r.

LfE—La Farge silt loam, 20 to 30 percent slopes. This steep, well drained soil is on convex side slopes on unglaciated sandstone uplands. Most areas are oblong and range from 3 to 160 acres.

Typically, the surface layer is very dark gray silt loam about 3 inches thick. The subsurface layer is dark gray-

ish brown silt loam about 3 inches thick. The subsoil is about 25 inches thick. It is brown, friable silt loam in the upper part; dark yellowish brown, firm silt loam in the middle part; and light olive brown, firm clay loam in the lower part. Glauconitic sandstone and siltstone bedrock begins at a depth of about 31 inches and extends to 60 inches or more. It is light olive brown, soft, and interbedded. In some areas this soil is eroded. In some small areas the surface layer is loam or sandy loam. In some areas most of the subsoil is loam, clay loam, or sandy clay. In some, this soil is less than 20 inches deep over glauconitic sandstone, and in others it is more than 40 inches deep. In some areas the sandstone is not glauconitic.

Included with this soil in mapping are small areas of Urne soil. Also included are small moderately steep areas and severely eroded areas of La Farge silt loam and some small areas of this soil where slopes are more than 30 percent. The somewhat excessively drained Urne soil is in landscape positions similar to those of this La Farge soil where there is more sand and less silt and clay in the soil. Included soils make up about 10 percent of the unit.

Permeability is moderate in this La Farge soil. The available water capacity is moderate. Surface runoff is very rapid. Root penetration is limited by the underlying bedrock. Natural fertility is moderate. The surface layer is moderately low or moderate in organic-matter content. It is friable and can be easily worked throughout a wide range in moisture content. It tends to crust, however, after heavy rains. The glauconite in the underlying bedrock is high in content of available potash.

Many areas of this soil are native woodland. Some areas are used for cultivated crops, hay, and pasture. The potential is very poor for cultivated crops. It is good for hay, pasture, and trees. The potential is fair for openland wildlife habitat, good for woodland habitat, and very poor for wetland habitat. It is poor for recreational development and for all engineering uses.

This soil generally is not suitable for cultivated crops. The erosion hazard is very severe in cultivated areas. Erosion is generally not a problem in areas where this soil is used for hay and pasture. Overgrazing, however, destroys the plant cover and results in erosion. Grazing when the soil is wet compacts the surface, which results in poor tilth and increases runoff and the hazard of erosion. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is suited to trees. Soil related problems in forest management are associated with steepness of slope; mortality of seedlings on hot, dry sites; and brush encroachment following harvest. Planting trees on the contour and selecting the best location for skid roads during harvest minimize erosion and improve equipment trafficability. Seedling mortality on south- and west-facing slopes can be reduced by careful planting and by planting vigorous nursery stock. Vegetation that competes with planted seedlings and natural reproduction can be removed mechanically following harvest or controlled through use of suitable herbicides.

This soil is poorly suited to septic tank filter fields because of the slope and the depth to bedrock. Generally, a less sloping site where the soil is deeper over bedrock should be selected. The soil is poorly suited to dwellings with or without basements and to small commercial buildings because of the slope. Unless this limitation can be overcome by reshaping the site, a less sloping site should be selected. The soil is poorly suited to local roads and streets because of the slope, the high potential frost action, and the lack of sufficient strength to adequately support vehicular traffic. The slope limitation can be overcome by reshaping the site and by constructing the roads on the contour. The frost action potential and low strength limitations can be overcome by replacing this soil with suitable base material.

The capability unit is VIe-2. The woodland suitability subclass is 2r.

Mc—Marshan loam. This nearly level, poorly drained and very poorly drained soil is on flood plains, in drainageways, and in depressions of outwash plains. In most areas it is subject to flooding or ponding during wet periods and after heavy rains. Most areas are irregular in shape and range from 3 to 70 acres. One area is 470 acres.

Typically, the surface layer is black loam about 10 inches thick. The subsurface layer is black clay loam about 4 inches thick. It is mottled with yellowish red. The subsoil is about 16 inches thick. It is dark gray, firm clay loam in the upper part; gray, firm clay loam in the middle part; and dark gray, firm sandy loam in the lower part. It is mottled with yellowish red and yellowish brown. The substratum to a depth of about 60 inches is grayish brown over brown loose sand. In some areas this soil is less than 20 inches deep over sand. In some small areas the substratum is stratified with silt loam, loam, and sand. In some, the surface layer is silt loam or sandy loam.

Included with this soil in mapping are small areas of Shiffer soils. Also included are small areas of this Marshan soil where the subsoil contains more sand and less clay than is typical. The somewhat poorly drained Shiffer soils are in slightly higher positions on flood plains and in drainageways than this Marshan soil. Included soils make up about 5 to 10 percent of the unit.

In this Marshan soil permeability is moderate in the subsoil and rapid in the substratum. The available water capacity is moderate. Surface runoff is slow. Unless drained, this soil has a water table at the surface or within 1 foot of the surface most of the year. Root penetration is limited by the water table or, in drained areas, by the underlying sand. Natural fertility is moderate. The surface layer is very high in organic-matter content. It is friable and can be easily worked throughout a wide range in moisture content.

Most drained areas of this soil are used for cultivated crops and for pasture. Undrained areas provide wildlife habitat, and some are used for unimproved pasture. The potential is good for cultivated crops and pasture. It is fair for trees. The potential is fair for openland and woodland wildlife habitat and good for wetland habitat. It is poor for recreational development and for most engineering uses.

If drained, this soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture. Surface drainage is needed to remove excess surface water rapidly. Deep ditches and tiles are used for internal drainage. If tiles are placed in the underlying sand, loose sand will enter the tile lines unless precautions are taken. Ditchbanks are easily eroded by flowing water, and vertical banks will cave and plug the ditch. Undrained areas are not suitable for cultivated crops.

As a result of the high water table and periodic ponding, undrained areas of this soil are not suitable for most forage species and are restricted to such species as reed canarygrass. Drained areas are suited to such species as alfalfa and red clover. Overgrazing destroys the plant cover and encourages undesirable plant species. Grazing when the soil is wet compacts the surface and results in poor tilth and reduced water infiltration. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is poorly suited to trees. Growth and form are poor. Where natural regeneration is unreliable, soil wetness generally necessitates planting on prepared ridges. Planting large, vigorous nursery stock is essential to avoid seedling mortality. Soil wetness also limits the use of machinery. Planting may have to be done by hand, and harvest is frequently limited to periods when the soil is frozen. Windthrow of the trees left after harvest can be reduced by clear-cut or group-selection harvest. Competing vegetation that hinders natural regeneration and the establishment of plantings can be controlled through the use of suitable herbicides or by mechanical removal.

This soil is poorly suited to septic tank absorption fields because it has a high water table and is frequently flooded. These limitations are difficult to overcome. The soil is poorly suited to building site development because of the high water table and frequent flooding. These limitations can be overcome by draining the soil to lower the water table and by constructing dikes and levees to protect the soil from flooding. In addition to the high water table and the flooding hazard, this soil is poorly suited to local roads and streets because it lacks sufficient strength to adequately support vehicular traffic. This limitation can be overcome by replacing this soil with suitable base material.

The capability unit is IIw-1. The woodland suitability subclass is not assigned.

MdB—McHenry silt loam, 2 to 6 percent slopes. This gently sloping, well drained soil is on convex ridgetops and side slopes and in undulating areas on loess-covered till plains and moraines. Most areas are irregular in shape and range from 3 to 150 acres. A few areas are larger.

Typically, the surface layer is dark grayish brown silt loam about 9 inches thick. The subsurface layer is brown silt loam about 2 inches thick. The subsoil is about 51 inches thick. It is dark yellowish brown, firm silty clay loam in the upper part; dark yellowish brown, firm clay loam and sandy clay loam in the middle part; and dark yellowish brown, friable sand loam in the lower part. The substratum to a depth of about 60 inches is yellowish brown, very friable gravelly sandy loam. In some areas this soil is eroded. In some, the surface layer is loam. In some small areas the loess mantle is less than 15 inches thick, and in others, it is more than 30 inches thick. In some small areas this soil is less than 50 inches deep over gravelly sandy loam till. In some areas the substratum is loamy sand or sand glacial till or sand and gravel outwash.

Included with this soil in mapping are small areas of Wyocena soil, small sloping areas and severely eroded areas of McHenry silt loam, and some small areas of this soil where slopes are less than 2 percent. Also included are some areas of this soil where stones are on the surface and throughout the soil and some small areas that are saturated with water at a depth of 3 feet during wet periods. The well drained Wyocena soil is in landscape positions similar to those of this McHenry soil where there is more sand and less silt and clay in the soil. Included soils make up about 10 to 15 percent of the unit.

Permeability is moderate in this McHenry soil. The available water capacity is high. Surface runoff in medium. Natural fertility is high. The surface layer is moderately low or moderate in organic-matter content. It is friable and can be easily worked throughout a wide range in moisture content. It tends to crust, however, after heavy rains.

Many areas of this soil are used for cultivated crops, hay, and pasture. Some are native woodland. The potential is good for cultivated crops, hay, pasture, and trees. It is good for openland and woodland wildlife habitat and very poor for wetland habitat. The potential is good for recreational development and fair for most engineering uses.

This soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture. There is a slight hazard of erosion in cultivated areas. Crop residue management, minimum tillage, contour stripcropping, grassed waterways, and winter cover crops help to control erosion. Regular additions of organic matter help to maintain fertility and good tilth and increase water infiltration.

Erosion is generally not a problem in areas where this soil is used for pasture and hay. Overgrazing, however, destroys the plant cover and results in erosion. Grazing when the soil is wet compacts the surface, which results

in poor tilth and increases runoff and the hazard of erosion. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is suited to trees. Competing vegetation, however, interferes with natural regeneration and the establishment of plantings. It can be removed mechanically or controlled through the use of suitable herbicides.

This soil is suited to septic tank absorption fields. It is moderately suited to dwellings with or without basements and to small commercial buildings because it lacks sufficient strength and stability to adequately support building foundations. These limitations can be overcome by replacing the soil with suitable base material. The soil is poorly suited to local roads and streets because it lacks sufficient strength to adequately support vehicular traffic. This limitation can be overcome by replacing this soil with suitable base material.

The capability unit is IIe-1. The woodland suitability subclass is 2o.

MdC2—McHenry silt loam, 6 to 12 percent slopes, eroded. This sloping, well drained soil is on convex side slopes of loess-covered till plains and moraines. Most areas are oblong or irregular in shape and range from 3 to 130 acres. A few areas are larger.

Typically, the surface layer is dark grayish brown silt loam about 6 inches thick. The subsurface layer is brown silt loam about 2 inches thick. The subsoil is about 51 inches thick. It is dark yellowish brown, firm silty clay loam in the upper part; dark yellowish brown, firm clay loam and sandy clay loam in the middle part; and dark yellowish brown, friable sandy loam in the lower part. The substratum to a depth of about 60 inches is yellowish brown, very friable gravelly sandy loam. In some areas this soil is not eroded. In some small areas the surface layer is loam. In some, the loess mantle is less than 15 inches thick, and in others, it is more than 30 inches thick. In some small areas this soil is less than 50 inches deep over gravelly sandy loam till. In some areas the substratum is loamy sand or sand glacial till or sand and gravel outwash.

Included with this soil in mapping are small areas of Wyocena soil and small gently sloping, moderately steep, and severely eroded areas of McHenry silt loam. Also included are some areas of this soil where stones are on the surface and throughout the soil. The well drained Wyocena soil is in landscape positions similar to those of this McHenry soil where there is more sand and less silt and clay in the soil. Included soils make up about 10 to 15 percent of the unit.

Permeability is moderate in this McHenry soil. The available water capacity is high. Surface runoff is medium. Natural fertility is high. The surface layer is moderately low or moderate in organic-matter content. It is friable and can be easily worked throughout a wide range in moisture content. It tends to crust, however, after heavy rains.

Many areas of this soil are used for cultivated crops, hay, and pasture. Some are native woodland. The potential is fair for cultivated crops and good for hay, pasture, and trees. It is good for openland and woodland wildlife habitat but very poor for wetland habitat. The potential is fair for recreational development and fair for most engineering uses.

This soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture. The hazard of further erosion is moderate in cultivated areas. Crop residue management, minimum tillage, contour stripcropping, grassed waterways, and winter cover crops help to control erosion. Regular additions of organic matter help to maintain fertility and good tilth and to increase water infiltration.

Erosion is generally not a problem in areas where this soil is used for pasture and hay. Overgrazing, however, destroys the plant cover and results in erosion. Grazing when the soil is wet compacts the surface, which results in poor tilth and increases runoff and the hazard of erosion. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is suited to trees. Competing vegetation, however, interferes with natural regeneration and the establishment of seedlings. It can be removed mechanically or controlled through the use of suitable herbicides.

This soil is moderately suited to septic tank absorption fields because of the slope. This limitation can be overcome by shaping the site to a more suitable slope or by installing the field on the contour. The soil is moderately suited to dwellings with or without basements because of the slope and the lack of sufficient strength and stability to adequately support building foundations. These limitations can be overcome by replacing the soil with suitable material and by reshaping the site. The soil is poorly suited to small commercial buildings because of the slope. This limitation can be overcome by reshaping the site. This soil is poorly suited to local roads and streets because it lacks sufficient strength to adequately support vehicular traffic. This limitation can be overcome by replacing the soil with suitable base material.

The capability unit is IIIe-1. The woodland suitability subclass is 2o.

MdD2—McHenry silt loam, 12 to 20 percent slopes, eroded. This moderately steep, well drained soil occupies uneven convex side slopes and hilly areas on loess-covered till plains and moraines. Most areas are oblong and range from 3 to 75 acres. A few areas are larger.

Typically, the surface layer is dark grayish brown silt loam about 6 inches thick. In most cultivated areas it contains dark yellowish brown subsoil material that has been mixed in by plowing. The subsoil is about 42 inches thick. It is dark yellowish brown, firm silty clay loam in the upper part; dark yellowish brown, firm clay loam and sandy clay loam in the middle part; and dark yellowish brown, friable sandy loam in the lower part. The substra-

tum to a depth of about 60 inches is yellowish brown, very friable gravelly sandy loam. In some areas this soil is not eroded. In some small areas the surface layer is loam. In some, the loess mantle is less than 15 inches thick, and in others, it is more than 25 inches thick. In some small areas this soil is less than 40 inches deep over gravelly sandy loam glacial till. In some areas the substratum is loamy sand or sand glacial till or sand and gravel outwash.

Included with this soil in mapping are small areas of Wyocena soil and small sloping areas, steep areas, and severely eroded areas of McHenry silt loam. Also included are some areas where stones are on the surface and throughout the soil. The well drained Wyocena soil is in landscape positions similar to those of this McHenry soil where there is more sand and less silt and clay in the soil. Included soils make up 5 to 10 percent of the unit.

Permeability is moderate in this McHenry soil. The available water capacity is high. Surface runoff is rapid. Natural fertility is high. The surface layer is moderately low or moderate in organic-matter content. It is friable and can be easily worked throughout a wide range in moisture content. It tends to crust, however, after heavy rains, especially in areas where the plow layer contains subsoil material.

Many areas of this soil are used for cultivated crops, hay, and pasture. Some are native woodland. The potential is fair for cultivated crops and good for hay, pasture, and trees. It is good for openland and woodland wildlife habitat but very poor for wetland habitat. The potential is poor for recreational development and for most engineering uses.

This soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture. The hazard of further erosion is severe in cultivated areas. Crop residue management, minimum tillage, contour stripcropping, grassed waterways, and winter cover crops are needed to minimize erosion. Regular additions of organic matter help to maintain fertility and good tilth and increase water infiltration.

Erosion is generally not a problem in areas where the soil is used for pasture and hay. Overgrazing, however, destroys the plant cover and results in erosion. Grazing when the soil is wet compacts the surface, which results in poor tilth and increases runoff and the hazard of erosion. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is suited to trees. Soil related problems in forest management are associated with steepness of slope; mortality of seedlings on hot, dry sites; and brush encroachment following harvest. Planting trees on the contour and selecting the best location for skid roads during harvest minimize erosion and improve equipment trafficability. Seedling mortality on south- and west-facing slopes can be reduced by careful planting and by planting vigorous nursery stock. Vegetation that competes with planted seedlings and natural reproduction following harvest can be removed mechanically or controlled through the use of suitable herbicides.

This soil is poorly suited to septic tank absorption fields, to dwellings with or without basements, and to small commercial buildings because of the slope. This limitation can be overcome by reshaping the site or by selecting a less sloping site. The soil is poorly suited to local roads and streets because of the slope and the lack of sufficient strength to adequately support vehicular traffic. The slope limitation can be overcome by reshaping the site or by constructing roads on the contour. Low strength can be overcome by replacing this soil with suitable base material.

The capability unit is IVe-1. The woodland suitability subclass is 2r.

MdE—McHenry silt loam, 20 to 30 percent slopes. This steep, well drained soil is on convex side slopes of loess-covered till plains and moraines. Most areas are oblong and range from 3 to 200 acres. One area is 350 acres.

Typically, the surface layer is very dark gray silt loam about 4 inches thick. The subsurface layer is dark grayish brown silt loam about 3 inches thick. The subsoil is about 40 inches thick. It is dark yellowish brown, firm silty clay loam in the upper part; dark yellowish brown, firm clay loam and sandy clay loam in the middle part; and dark yellowish brown, friable sandy loam in the lower part. The substratum to a depth of about 60 inches is yellowish brown, very friable gravelly sandy loam. In some small areas this soil is eroded. In some, the surface layer is loam or sandy loam. In some areas the loess mantle is less than 15 inches thick. In some small areas this soil is less than 40 inches deep over gravelly sandy loam glacial till. In some areas the substratum is loamy sand or sand glacial till or sand and gravel outwash.

Included with this soil in mapping are small areas of Wyocena soil, small moderately steep areas and severely eroded areas of McHenry silt loam, and some small areas of this soil where slopes are more than 30 percent. Also included are some areas of this soil where stones are on the surface and throughout the soil. The well drained Wyocena soil is in landscape positions similar to those of this McHenry soil where there is more sand and less silt and clay in the soil. Included soils make up about 10 to 15 percent of the unit.

Permeability is moderate in this McHenry soil. The available water capacity is high. Surface runoff is very rapid. Natural fertility is high. The surface layer is moderately low or moderate in organic-matter content. It is friable and can be easily worked throughout a wide range in moisture content. It tends to crust, however, after heavy rains.

Most areas of this soil are native woodland. Some areas are used for cultivated crops, hay, and pasture. The potential is poor for cultivated crops. It is good for hay, pasture, and trees. The potential is fair for openland

wildlife habitat, good for woodland habitat, but very poor for wetland habitat. It is poor for recreational development and for all engineering uses.

This soil generally is not suitable for row crops. The erosion hazard is very severe in cultivated areas.

This soil is suited to hay and pasture. Erosion is generally not a problem in areas where it is used for these crops. Overgrazing, however, destroys the plant cover and results in erosion. Grazing when the soil is wet compacts the surface, which results in poor tilth and increases runoff and the hazard of erosion. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is suited to trees. Soil related problems in forest management are associated with steepness of slope; mortality of seedlings on hot, dry sites; and brush encroachment following harvest. Planting trees on the contour and selecting the best location for skid roads minimize erosion and improve equipment trafficability. Seedling mortality on south- and west-facing slopes can be reduced by careful planting and by planting vigorous nursery stock. Vegetation that competes with planted seedlings and natural regeneration following harvest can be removed mechanically or controlled through the use of suitable herbicides.

This soil is poorly suited to septic tank absorption fields, dwellings with or without basements, and small commercial buildings because of the slope. A less sloping site is better suited. The soil is poorly suited to local roads and streets because of the slope and the lack of sufficient strength to adequately support vehicular traffic. The slope limitation can be overcome by reshaping the site or by constructing roads on the contour. Low strength can be overcome by replacing the soil with suitable base material.

The capability unit is VIe-1. The woodland suitability subclass is 2r.

MsA—Mosel loam, 0 to 3 percent slopes. This nearly level to gently sloping, somewhat poorly drained soil is in drainageways and depressions of glacial lake basins. In some areas it is subject to flooding or ponding during wet periods and after heavy rains. Slopes are plane or concave. Most areas are oblong and range from 3 to 80 acres.

Typically, the surface layer is black loam about 9 inches thick. The subsoil is about 27 inches thick. It is dark brown, firm loam in the upper part; brown, firm clay loam in the middle part; and brown, firm silty clay loam in the lower part. It is mottled with yellowish brown, grayish brown, light brownish gray, and strong brown. The substratum to a depth of about 60 inches is brown, firm silty clay loam with thin lenses of silt loam. It is mottled with light brownish gray. In some small areas slopes are more than 3 percent. In some areas the surface layer is silt loam, sandy loam, or fine sandy loam. In some, the entire subsoil is silty clay loam. In some small areas the soil is underlain by stratified silt, silt loam, and fine sand.

Included with this soil in mapping are small areas of Briggsville, Sisson, and Colwood soils. The Briggsville and Sisson soils occupy higher, better drained, convex areas on the landscape. The Colwood soil is in lower and wetter areas of drainageways and depressions. Included soils make up about 5 to 10 percent of the unit.

Permeability is moderately slow in this Mosel soil. The available water capacity is high. Surface runoff is slow. Unless drained, this soil has a water table at a depth of 1 to 3 feet during wet periods. Root penetration is limited by the water table during wet periods of the growing season. Natural fertility is high. The surface layer is moderate in organic-matter content. It is friable and can be easily worked throughout a wide range in moisture content.

Drained areas of this soil are used for cultivated crops, hay, and pasture. Undrained areas provide wildlife habitat, and some are used for unimproved pasture. Some areas are native woodland. The potential is good for cultivated crops, pasture, and trees. It is good for openland and woodland wildlife habitat and fair for wetland habitat. The potential is fair or poor for recreational development and poor for most engineering uses.

If drained, this soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture. Surface drainage is needed to remove excess surface water rapidly. Tiles are generally used for internal drainage. If tile lines are placed in the underlying stratified deposits, however, loose sand will enter the tile lines unless precautions are taken. Regular additions of organic matter help to maintain fertility and good tilth.

If drained, this soil is suited to hay and pasture. Overgrazing, however, destroys the plant cover and encourages undesirable plants. Grazing when the soil is wet compacts the surface, which results in poor tilth and reduced water infiltration. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is suited to trees. Competing vegetation, however, interferes with natural regeneration and the establishment of plantings. It can be removed mechanically or controlled through the use of suitable herbicides.

This soil is poorly suited to septic tank absorption fields because of the seasonal high water table, the moderately slow permeability, and the occasional flooding. The suitability can be improved by building a filtering mound of suitable material and by constructing dikes and levees to protect the soil from flooding. The soil is poorly suited to dwellings with or without basements and to small commercial buildings because of the seasonal high water table, the occasional flooding, and the lack of sufficient strength to adequately support building foundations. Draining the soil lowers the water table. Dikes and levees protect the soil from flooding. Low strength can be overcome by replacing the soil with suitable base material. This soil is poorly suited to local roads and streets because of the high potential frost action, the

lack of sufficient strength to support vehicular traffic, and the occasional flooding. The frost action limitation can be overcome by draining the soil to lower the seasonal water table and by replacing the soil with suitable base material. Substituting suitable base material also overcomes the low strength limitation. Dikes and levees protect the soil from flooding.

The capability unit is IIw-2. The woodland suitability subclass is 2o.

NlB—Norden loam, 2 to 6 percent slopes. This gently sloping, well drained soil is on convex ridgetops, foot slopes, and valley floors of unglaciated sandstone uplands. Most areas are oblong or irregular in shape and range from 3 to 70 acres.

Typically, the surface layer is dark grayish brown loam about 8 inches thick. The subsoil is about 27 inches thick. It is dark yellowish brown, friable loam in the upper part; olive brown, firm loam in the middle part; and light olive brown, firm gravelly loam in the lower part. Glauconitic sandstone bedrock begins at a depth of about 35 inches and extends to 60 inches or more. It is light olive brown, soft, and platy and has thin lenses of siltstone. In some small areas this soil is eroded. In some, slopes are less than 2 percent. In some small areas the surface layer is silt loam or sandy loam. In some areas most of the subsoil is silt loam and silty clay loam. In some, this soil is less than 40 inches deep over glauconitic sandstone. In others, the sandstone is not glauconitic.

Included with this soil in mapping are small areas of Urne soil. Also included are small sloping areas and severely eroded areas of Norden loam, small areas of soils where the surface layer is silt loam, and small areas of this soil that have a perched water table during wet periods. The somewhat excessively drained Urne soil is in landscape positions similar to those of this Norden soil where there is more sand and less silt and clay in the soil. Included soils make up 5 to 10 percent of the unit.

Permeability is moderate in this Norden soil. The available water capacity is moderate. Surface runoff is medium. Root penetration is limited by the underlying bedrock. Natural fertility is moderate. The surface layer is moderately low or moderate in organic-matter content. It is friable and can be easily tilled throughout a wide range in moisture content. The glauconite in the underlying bedrock is high in content of available potash.

Most areas of this soil are used for cultivated crops, hay, and pasture. Some are native woodland. The potential is good for cultivated crops, pasture, and trees. It is good for openland and woodland wildlife habitat but very poor for wetland habitat. The potential is good for recreational development but fair or poor for most engineering uses.

This soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture. There is a slight hazard of erosion in cultivated areas. Crop residue management, minimum tillage, contour stripcropping, grassed waterways, and winter cover crops help to control erosion. Regular additions of organic matter help to maintain fertility and good tilth and increase water infiltration.

Erosion is generally not a problem in areas where this soil is used for pasture and hay. Overgrazing, however, destroys the plant cover and results in erosion. Grazing when the soil is wet compacts the surface, which results in poor tilth and increases runoff and the hazard of erosion. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is suited to trees. Competing vegetation, however, interferes with natural regeneration and the establishment of plantings. It can be removed mechanically or controlled through the use of suitable herbicides.

This soil is poorly suited to septic tank absorption fields because of the depth to rock. The suitability can be improved by building a filtering mound. The soil is moderately suited to dwellings without basements and to small commercial buildings because it lacks sufficient strength and stability to support building foundations. These limitations can be overcome by replacing the soil with suitable material. The soil is moderately suited to dwellings with basements because of the unstable subsoil and the depth to rock. These limitations can be overcome by replacing the soil with suitable material to increase the thickness of the soil. This soil is poorly suited to local roads and streets because of the lack of sufficient strength to support vehicular traffic. This limitation can be overcome by replacing the soil with suitable base material.

The capability unit is IIe-2. The woodland suitability subclass is 2o.

NlC2—Norden loam, 6 to 12 percent slopes, eroded. This sloping, well drained soil is on convex ridgetops and side slopes on unglaciated sandstone uplands. Most areas are oblong and range from 3 to 80 acres.

Typically, the surface layer is dark grayish brown loam about 8 inches thick. In most cultivated areas it contains some dark yellowish brown subsoil material that has been mixed in by plowing. The subsoil is about 23 inches thick. It is dark yellowish brown, friable loam in the upper part; olive brown, firm loam in the middle part; and light olive brown, firm gravelly loam in the lower part. Glauconitic sandstone bedrock begins at a depth of about 31 inches and extends to 60 inches or more. It is light olive brown, soft, and platy and has thin lenses of siltstone. In some areas this soil is not eroded. In some small areas the surface layer is silt loam or sandy loam. In some areas most of the subsoil is silt loam or silty clay loam. In some, this soil is more than 40 inches deep over glauconitic sandstone. In others, the sandstone is not glauconitic.

Included with this soil in mapping are small areas of Urne soil. Also included are small gently sloping areas, moderately steep areas, severely eroded areas of

Norden loam and small areas where the surface layer is silt loam. The somewhat excessively drained Urne soil is in landscape positions similar to those of this Norden soil where there is more sand and less silt and clay in the soil. Included soils make up 5 to 10 percent of the unit.

Permeability is moderate in this Norden soil. The available water capacity is moderate. Surface runoff is medium. Root penetration is limited by the underlying bedrock. Natural fertility is moderate. The surface layer is moderately low or moderate in organic-matter content. It is friable and can be easily tilled throughout a wide range in moisture content. After heavy rains it tends to crust in areas where the plow layer contains subsoil material. The glauconite in the underlying bedrock is high in content of available potash.

Most areas of this soil are used for cultivated crops, hay, and pasture. Some are native woodland. The potential is fair for cultivated crops and good for pasture and trees. It is good for openland and woodland wildlife habitat but very poor for wetland habitat. The potential is fair for recreational development and fair or poor for most engineering uses.

This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. The hazard of further erosion is moderate in cultivated areas. Crop residue management, minimum tillage, contour stripcropping, grassed waterways, and winter cover crops help to control erosion. Regular additions of organic matter help to maintain fertility and good tilth and increase water infiltration.

Erosion is generally not a problem in areas where this soil is used for pasture or hay. Overgrazing, however, destroys the plant cover and results in erosion. Grazing when the soil is wet compacts the surface, which results in poor tilth and increases runoff and the hazard of further erosion. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is suited to trees. Competing vegetation, however, interferes with natural regeneration and the establishment of plantings. It can be removed mechanically or controlled through the use of suitable herbicides.

This soil is poorly suited to septic tank absorption fields because of the depth to bedrock. The suitability can be improved by building a filtering mound. The soil is moderately suited to dwellings without basements because of the slope and the lack of sufficient strength and stability to adequately support building foundations. These limitations can be overcome by replacing the soil with suitable base material and by reshaping the site. The soil is moderately suited to dwellings with basements because of the slope, the depth to bedrock, and the unstable subsoil. These limitations can be overcome by replacing the soil with suitable material, filling to increase the thickness of the soil, and reshaping the site. The soil is poorly suited to small commercial buildings because of the slope. This limitation can be overcome by reshaping the site. This soil is poorly suited to local roads and streets because it lacks sufficient strength to adequately support vehicular traffic. This limitation can be overcome by replacing the soil with suitable base material.

The capability unit is IIIe-2. The woodland suitability subclass is 2o.

NID2—Norden loam, 12 to 20 percent slopes, eroded. This moderately steep, well drained soil is on narrow, convex ridgetops and side slopes on unglaciated sandstone uplands. Most areas are oblong and range from 3 to 60 acres.

Typically, the surface layer is dark grayish brown loam about 8 inches thick. In most cultivated areas it contains some dark yellowish brown subsoil material that has been mixed in by plowing. The subsoil is about 21 inches thick. It is dark yellowish brown, friable loam in the upper part; olive brown, firm loam in the middle part; and light olive brown, firm gravelly loam in the lower part. Glauconitic sandstone bedrock begins at a depth of about 29 inches and extends to 60 inches or more. It is light olive brown, soft and platy and has thin lenses of siltstone. In some areas this soil is not eroded. In some areas the surface layer is silt loam or sandy loam. In some areas most of the subsoil is silt loam or silty clay loam. In some, this soil is more than 40 inches deep over glauconitic sandstone. In others, the sandstone is not glauconitic.

Included with this soil in mapping are small areas of Urne soil. Also included are small sloping areas, steep areas, severely eroded areas of Norden loam and small areas where the surface layer is silt loam. The somewhat excessively drained Urne soil is in landscape positions similar to those of this Norden soil where there is more sand and less clay and silt in the soil. Included soils make up 5 to 10 percent of the unit.

Permeability is moderate in this Norden soil. The available water capacity is moderate. Surface runoff is rapid. Root penetration is limited by the underlying bedrock. Natural fertility is moderate. The surface layer is moderately low or moderate in organic-matter content. It is friable and can be easily tilled throughout a wide range in moisture content. After heavy rains it tends to crust in areas where the plowed layer contains subsoil material. The glauconite in the underlying bedrock is high in content of available potash.

Most areas of this soil are used for cultivated crops, hay, and pasture. Some are native woodland. The potential is fair for cultivated crops but is good for hay, pasture, and trees. The potential is fair for openland wildlife habitat, good for woodland habitat, and very poor for wetland habitat. It is poor for most recreational development and for all engineering uses.

This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay or pasture. The hazard of further erosion is severe in cultivated areas. Crop residue management, minimum tillage, contour stripcropping, grassed waterways, and winter cover

crops are needed to minimize erosion. Regular additions of organic matter help to maintain fertility and good tilth and increase water infiltration.

Erosion is generally not a problem in areas where this soil is used for pasture or hay. Overgrazing, however, destroys the plant cover and results in erosion. Grazing when the soil is wet compacts the surface, which results in poor tilth and increases runoff and the hazard of further erosion. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

The soil is suited to trees. Soil related problems in forest management are associated with steepness of slope; mortality of seedlings on hot, dry sites; and brush encroachment following harvest. Planting trees on the contour and selecting the best location for skid roads during harvest minimize erosion and improve equipment trafficability. Seedling mortality on south- and west-facing slopes can be reduced by careful planting and by planting vigorous nursery stock. Vegetation that competes with planted seedlings or natural reproduction following harvest can be removed mechanically or controlled through use of suitable herbicides.

This soil is poorly suited to septic tank absorption fields because of the slope and the depth to rock. In places the suitability can be improved by building a filtering mound of suitable material and reshaping the site. Generally, however, a less sloping site where the soil is deeper over rock should be selected. The soil is poorly suited to dwellings with or without basements and to small commercial buildings because of the slope. Unless this limitation can be overcome by reshaping the site, a less sloping site should be selected. This soil is poorly suited to local roads and streets because of the slope and the lack of sufficient strength to adequately support vehicular traffic. The slope limitation can be overcome by reshaping the site and by constructing the roads on the contour. Low strength can be overcome by replacing the soil with suitable base material.

The capability unit is IVe-2. The woodland suitability subclass is 2r.

NIE—Norden loam, 20 to 30 percent slopes. This steep, well drained soil is on convex side slopes on unglaciated sandstone uplands. Most areas are long and narrow and range from 3 to 225 acres.

Typically, the surface layer is very dark gray loam about 3 inches thick. The subsurface layer is brown loam about 4 inches thick. The subsoil is about 21 inches thick. It is dark yellowish brown, friable loam in the upper part; olive brown, firm loam in the middle part; and light olive brown, firm gravelly loam in the lower part. Glauconitic sandstone bedrock begins at a depth of about 28 inches and extends to 60 inches or more. It is light olive brown, soft, and platy and has thin lenses of siltstone. In some areas this soil is eroded. In some small areas the surface layer is silt loam or sandy loam. In some areas most of the subsoil is silt loam or silty clay loam. In some, this soil is less than 20 inches deep over glauconitic sandstone, and in others, it is more than 40 inches deep. In some areas the sandstone is not glauconitic.

Included with this soil in mapping are small areas of Urne soil. Also included are small moderately steep areas and severely eroded areas of Norden loam, small areas where the surface layer is silt loam, and some small areas of this soil where slopes are more than 30 percent. The somewhat excessively drained Urne soil is in landscape positions similar to those of this Norden soil where there is more sand and less silt and clay in the soil. Included soils make up 5 to 10 percent of the unit.

Permeability is moderate in this Norden soil. The available water capacity is moderate. Surface runoff is very rapid. Root penetration is limited by the underlying bedrock. Natural fertility is moderate. The surface layer is moderately low or moderate in organic-matter content. It is friable and can be easily worked throughout a wide range in moisture content. The glauconite in the underlying bedrock is high in content of available potash.

Many areas of this soil are native woodland. Some areas are used for cultivated crops, hay, and pasture. The potential is poor for cultivated crops. It is good for hay, pasture, and trees. The potential is fair for openland wildlife habitat, good for woodland habitat, and very poor for wetland habitat. It is poor for recreational development and for all engineering uses.

This soil generally is not suitable for cultivated crops. The erosion hazard is very severe in cultivated areas.

This soil is suited to hay and pasture. Erosion is generally not a problem in areas where it is used for these crops. Overgrazing, however, destroys the plant cover and results in erosion. Grazing when the soil is wet compacts the surface, which results in poor tilth and increases runoff and the hazard of erosion. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is suited to trees. Soil related problems in forest management are associated with steepness of slope; mortality of seedlings on hot, dry sites; and brush encroachment following harvest. Planting trees on the contour and selecting the best location for skid roads during harvest minimize erosion and improve equipment trafficability. Seedling mortality on south- and west-facing slopes can be reduced by careful planting and by planting vigorous nursery stock. Vegetation that competes with planted seedlings or natural reproduction following harvest can be removed mechanically or controlled through use of suitable herbicides.

This soil is poorly suited to septic tank absorption fields because of slope and the depth to bedrock. Generally, a less sloping site where the soil is deeper over the bedrock should be selected. The soil is poorly suited to dwellings with or without basements and to small commercial buildings because of the slope. Unless this limitation can be overcome by reshaping the site, a less sloping site should be selected. This soil is poorly suited

to local roads and streets because of the slope and the lack of sufficient strength to support vehicular traffic. The slope limitation can be overcome by reshaping the site and by constructing roads on the contour. The low strength can be overcome by replacing the soil with suitable base material.

The capability unit is VIe-2. The woodland suitability subclass is 2r.

NrE—Norden and Eleva soils and Rock outcrop, 12 to 60 percent slopes. This map unit consists of moderately steep to very steep, well drained and somewhat excessively drained soils and areas of bare sandstone bedrock on convex side slopes in sandstone uplands. Most areas are long and narrow and range from 3 to 850 acres. Some are 40 to 55 percent Norden soil, 0 to 15 percent Eleva soil, and 10 to 20 percent Rock outcrop. Some are 0 to 15 percent Norden soil, 40 to 55 percent Eleva soil, and 10 to 20 percent Rock outcrop. Others are 30 to 40 percent Norden soil, 25 to 35 percent Eleva soil, and 10 to 20 percent Rock outcrop. The soils in this map unit are similar enough in morphology and behavior characteristics that mapping them separately is not important for the objectives of the survey. The areas of Rock outcrop are so small in size that it is not practical to map them separately.

Typically, the Norden soil has a surface layer of very dark gray loam about 3 inches thick. The subsurface layer is brown loam about 4 inches thick. The subsoil is about 21 inches thick. It is dark yellowish brown, friable loam in the upper part; olive brown, firm loam in the middle part; and light olive brown, firm gravelly loam in the lower part. The substratum to a depth of about 60 inches is light olive brown, soft, very fine grained glauconitic sandstone and siltstone. Soft sandstone is at a depth of about 28 inches. In some areas this soil is eroded. In some small areas the surface layer is silt loam or sandy loam. In some areas most of the subsoil is sandy loam, silt loam, or silty clay loam. In some areas this soil is more than 40 inches deep over glauconitic sandstone. In some, the sandstone substratum is not glauconitic.

Typically, the Eleva soil has a surface layer of very dark gray sandy loam about 3 inches thick. The subsurface layer is dark grayish brown sandy loam about 3 inches thick. The subsoil is about 21 inches thick. It is brown and dark yellowish brown, friable sandy loam in the upper part and dark yellowish brown, very friable loamy sand in the lower part. The substratum to a depth of about 60 inches is brownish yellow, loose sand over light yellowish brown soft sandstone. Soft sandstone is at a depth of about 37 inches. In some small areas this soil is eroded. In some areas the surface layer is loamy sand or loam. In others the surface layer is silt loam and the subsoil is dominantly silt loam or silty clay loam. In some small areas the soil is more than 40 inches deep over sandstone. In some small areas the underlying sandstone is glauconitic.

Typically, the Rock outcrop part of this unit consists of exposures of soft or hard sandstone or glauconitic sandstone and siltstone. In some small areas, however, there are small exposures of dolomite. The exposures of dolomite are at the highest elevations in the map unit.

Included with this unit in mapping are small areas of Boone and Elkmound soils. Also included are small sloping areas of Norden and Eleva soils and some small areas of a soil that is very shallow over sandstone. The excessively drained Boone soils are in landscape positions similar to those of Norden and Eleva soils where there is more sand and less silt and clay in the soil. The well drained Elkmound soils are in landscape positions similar to those of Norden and Eleva soils where the soil is shallow over sandstone. Included soils make up 10 to 15 percent of the unit.

Permeability is moderate in the Norden soil and moderately rapid in the Eleva soil. The available water capacity is moderate in the Norden soil and low in the Eleva soil. Surface runoff is rapid or very rapid in this map unit. Natural fertility is moderate in the Norden soil and low in the Eleva soil. The organic-matter content of the surface layer is moderately low or moderate in the Norden soil and low in the Eleva soil.

Most areas are native woodland. Some have been planted to pine trees. Some are used for hay and pasture. Some areas of the moderately steep soils are used for cultivated crops. The potential is fair for cultivated crops in the moderately steep areas and poor in the steep and very steep areas. The potential is good for hay or pasture. It is also good for trees. The potential is poor for openland wildlife habitat, good for woodland habitat, and very poor for wetland habitat. It is poor for most recreational development and most engineering uses.

The moderately steep soils are suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture. The erosion hazard is severe in cultivated areas. Crop yields on the Eleva soil are generally limited by the low available water capacity. Crop residue management, minimum tillage, contour stripcropping, grassed waterways, and winter cover crops are needed to minimize erosion. Regular additions of organic matter help to maintain fertility and good tilth and increase water infiltration.

This unit is suited to grasses and legumes for hay and pasture. Erosion is generally not a problem. Overgrazing, however, destroys the plant cover and results in erosion. Grazing when the soil is wet compacts the surface in areas of Norden soils, which results in poor tilth, and increases runoff and the hazard of erosion. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soils and the plant cover in good condition.

Soil areas in this map unit are suited to trees. Soil related problems in forest management are associated with steepness of slope, mortality of seedlings on hot dry sites, and brush encroachment following harvest. Con-

touring of planted trees and selecting the best location of skid roads during harvest minimize erosion and improve equipment trafficability. Seedling mortality on south- and west-facing slopes can be reduced by careful planting and by planting vigorous nursery stock. Vegetation that competes with planted seedlings or natural reproduction following harvest can be removed mechanically or controlled through the use of suitable herbicides.

This map unit is poorly suited to septic tank absorption fields because of the slope and depth to bedrock. In places the suitability can be improved by building a filtering mound and reshaping to a suitable slope. Generally, however, a less sloping site where the soil is deeper over bedrock should be selected. The slope also makes this unit poorly suited to building site development. Unless this limitation can be overcome by reshaping the site, a less sloping site should be selected.

The capability unit is VIe-2. The woodland suitability subclass is 2r for Norden and 4r for Eleva.

Or—Orion silt loam. This nearly level, somewhat poorly drained soil is on flood plains. It is subject to frequent flooding of brief duration. Most areas are long and narrow and range from 3 to 250 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 8 inches thick. The upper 28 inches of the substratum is stratified dark grayish brown and brown, friable silt loam. It has a few thin lenses of fine sand and is mottled with strong brown. The next 12 inches, a buried layer, is black, friable silt loam. The lower part of the substratum to a depth of about 60 inches is dark gray over gray, friable silt loam. It is mottled with yellowish brown and light brownish gray. In some small areas slopes are more than 2 percent. In some, the surface layer is fine sandy loam or loamy fine sand.

Included with this soil in mapping are small areas of Arenzville, Chaseburg, and Ettrick soils. Also included are small areas of this Orion soil that are fine sandy loam throughout with thin lenses of fine sand. The moderately well drained Arenzville and Chaseburg soils occupy slightly higher, better drained positions on flood plains and in drainageways. The poorly drained and very poorly drained Ettrick soil is in wetter areas that do not have recent alluvium. Included soils make up about 10 to 15 percent of the unit.

Permeability is moderate in this Orion soil. The available water capacity is very high. Surface runoff is slow. Unless drained, this soil has a water table at a depth of 1 to 3 feet during wet periods. Root penetration is limited by the water table during wet periods of the growing season. Natural fertility is high. The surface layer is moderately low or moderate in organic-matter content. It is friable and can be easily worked throughout a wide range in moisture content.

Most areas of this soil are used for pasture. Some drained areas are used for cultivated crops and hay. Some areas are native woodland. If this soil is drained and protected from flooding, the potential is good for cultivated crops and pasture. It is fair for trees. It is good for openland and woodland wildlife habitat and fair for wetland wildlife habitat. The potential is fair or poor for recreational development and for most engineering uses.

If drained and protected from frequent overflow, this soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture. Surface drainage is needed to remove excess water rapidly. Tiles are used for internal drainage. Dikes and diversions prevent flooding. Regular additions of organic matter help to maintain fertility and good tilth.

If drained and protected from overflow, this soil is suited to hay and pasture. Overgrazing, however, destroys the plant cover and encourages undesirable plants. Loss of plant cover can also result in erosion during periods of overflow. Grazing when the soil is wet compacts the surface, which results in poor tilth and reduced water infiltration. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is suited to trees. Competing vegetation, however, interferes with natural regeneration and the establishment of plantings. It can be removed mechanically or controlled through the use of suitable herbicides.

This soil is poorly suited to septic tank absorption fields because it has a seasonal high water table and is frequently flooded. The suitability can be improved by building a filtering mound of suitable material and by constructing dikes and levees to protect the soil from flooding. The soil is poorly suited to dwellings with or without basements and to small commercial buildings because of the seasonal high water table and the frequent flooding. Draining the soil lowers the water table, and dikes and levees protect the site from flooding. This soil is poorly suited to local roads and streets because of the high potential frost action, the lack of sufficient strength to support vehicular traffic, and the frequent flooding. The frost action limitation can be overcome by draining the soil to lower the water table and by replacing the soil with suitable base material. Substituting suitable base material also overcomes the low strength limitation. Dikes and levees protect the site from flooding.

The capability unit is IIw-13. The woodland suitability subclass is 3o.

Os—Ossian silt loam. This nearly level, poorly drained soil is on flood plains and low stream terraces and in drainageways and depressions of glaciated uplands. In most areas it is subject to flooding or ponding during wet periods and after heavy rains. Most areas are irregular in shape and range from 3 to 45 acres. One area is more than 600 acres.

Typically, the surface layer is black silt loam about 11 inches thick. The subsoil is about 24 inches thick. It is dark grayish brown, friable silt loam in the upper part; gray, firm silty clay loam in the middle part; and light olive gray, firm silty clay loam in the lower part. It is

mottled with yellowish brown. The substratum to a depth of about 60 inches is light olive gray, friable silt loam. It is mottled with yellowish brown. In some small areas slopes are as much as 4 percent. In some, the substratum below a depth of 40 inches is stratified silt loam, silt, and fine sand.

Included with this soil in mapping are small areas of Kendall soil. The somewhat poorly drained Kendall soil is in slightly elevated positions on bottom lands and along drainageways and depressions. It makes up about 5 percent of the unit.

Permeability is moderate in this Ossian soil. The available water capacity is very high. Surface runoff is slow. This soil has a water table at the surface or within 1 foot of the surface most of the year, unless it is drained. Root penetration is limited by the water table. Natural fertility is high. The surface layer is very high in organic-matter content. It is friable and can be easily worked throughout a wide range in moisture content.

Most drained areas of this soil are used for cultivated crops, but some are used for hay and pasture. Undrained areas provide wildlife habitat, and some are used for unimproved pasture. The potential is good for cultivated crops and pasture. It is fair for trees. The potential is good for openland and wetland wildlife habitat and fair for woodland habitat. It is poor for recreational development and for most engineering uses.

If drained, this soil is suited to corn, soybeans, and small grain. Surface drainage is needed to remove excess surface water rapidly. Deep ditches and tiles are used for internal drainage. Regular additions of organic matter help to maintain fertility and good tilth.

Because of the high water table and the periodic ponding, undrained areas of this soil are not suitable for most forage species and are restricted to such species as reed canarygrass. Drained areas are suited to such species as red clover and alfalfa. Overgrazing destroys the plant cover and encourages undesirable plants. Grazing when the soil is wet compacts the surface, which results in poor tilth and reduced water infiltration. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is suited to trees. Soil wetness generally requires planting by hand or machine on prepared ridges if natural regeneration is unreliable. Planting large, vigorous nursery stock is essential to avoid mortality. Harvest is frequently limited to periods when the soil is frozen. Clear-cut or area-selection harvest helps to reduce windthrow of the remaining trees. Competing vegetation, which interferes with natural regeneration and the establishment of plantings, can be removed mechanically or controlled through the use of suitable herbicides.

This soil is poorly suited to septic tank absorption fields because it has a high water table and is frequently flooded. These limitations are difficult to overcome. The soil is also poorly suited to dwellings with or without basements and to small commercial buildings because of the high water table and frequent flooding. These limitations can be overcome by draining the soil to lower the water table and constructing dikes and levees to prevent flooding. This soil is poorly suited to local roads and streets because of the high water table, the frequent flooding, and the lack of sufficient strength to support vehicular traffic. These limitations can be overcome by draining the soil to lower the water table, constructing dikes and levees to protect the soil from flooding, and replacing the soil with suitable base material.

The capability unit is IIw-1. The woodland suitability subclass is 3w.

Pa—Palms muck. This nearly level, very poorly drained soil is in glacial lake basins, drainageways, and depressions. In most areas it is subject to flooding or ponding during wet periods and after heavy rains. Most areas are irregular in shape and range from 3 to 175 acres.

Typically, the organic layer is black muck about 37 inches thick. The substratum to a depth of about 60 inches is very dark gray and dark gray, friable silt loam. The slope is dominantly 0 to 1 percent, but in some areas it is more than 1 percent. Some areas are mantled with up to 20 inches of sandy or loamy overwash.

Included with this soil in mapping are small areas of Adrian, Ettrick, Houghton, Marshan, and Ossian soils. The Adrian soil occupies landscape positions similar to those of the Palms soil where the organic layer is underlain by sand. The Houghton soil occupies landscape positions similar to those of Palms soil where the organic layer is more than 50 inches thick. Ettrick, Marshan, and Ossian soils are in similar to slightly elevated landscape positions where the organic layer is lacking or less than 16 inches thick. Included soils make up about 5 to 10 percent of the unit.

Permeability is moderately rapid in the organic layer of this Palms soil and moderate in the substratum. The available water capacity is very high. Surface runoff is very slow. Unless drained, this soil has a water table at the surface or within 1 foot of the surface throughout the year. Natural fertility is low. Root penetration is limited by the water table. If this soil is drained, the organic layer decomposes and subsides.

In most drained areas this soil is used for corn. In some it is used for vegetable crops, such as potatoes, carrots, and onions, and for specialty crops, such as mint. Undrained areas provide wildlife habitat. Some are used for unimproved pasture. The potential is fair for cultivated crops, pasture, and trees. It is poor for openland and woodland wildlife habitat but good for wetland habitat. The potential is poor for recreational development and for most engineering uses.

If drained, this Palms muck is suited to cultivated crops and pasture. In undrained areas it is not suited to cultivated crops. Deep ditches and tiles are used for internal drainage. Draining this soil is difficult. Some areas lack suitable outlets. Ditchbanks are easily eroded

by flowing water, and vertical banks will cave and plug the ditch. Drained areas are subject to burning. Cultivated areas are subject to soil blowing. Excessive lowering of the water table increases subsidence. Minimum tillage, crop residue management, windbreaks, and winter cover crops help to prevent soil blowing. Controlled drainage helps to minimize subsidence.

Because of the high water table, the periodic ponding, and the low fertility, this soil is not suited to most forage species unless it is drained. It is suited only to reed canarygrass. In drained areas red clover can be grown, but the low soil strength restricts grazing and the use of machinery.

This soil is suited to trees. Soil wetness and the high water table during the planting season limit reforestation to natural regeneration. Harvest is frequently limited to periods when the soil is frozen. Clear-cut or area-selection harvest helps to reduce windthrow of the remaining trees. Competing vegetation, which interferes with natural regeneration following harvest, can be removed mechanically or controlled through the use of suitable herbicides.

Palms muck is poorly suited to septic tank absorption fields because it has a high water table and is frequently flooded. This soil is also poorly suited to building site development because it has a high water table, is frequently flooded, and lacks sufficient strength to support building foundations and vehicular traffic.

The capability unit is IIIw-8. The woodland suitability subclass is 3w.

PcA—Pillot silt loam, 0 to 2 percent slopes. This nearly level, well drained soil is on broad, smooth outwash plains and stream terraces. Most areas are irregular in shape and range from 3 to 125 acres. One area is 244 acres.

Typically, the surface layer is black silt loam about 11 inches thick. The subsoil is about 26 inches thick. It is dark brown, friable silt loam in the upper part; brown and dark yellowish brown, firm silty clay loam in the middle part; and dark yellowish brown, firm clay loam in the lower part. The substratum to a depth of about 60 inches is dark yellowish brown, loose sand. In some small areas this soil is gently sloping. In some, the surface layer is loam. In some areas the silty mantle is less than 20 inches thick, and in others, it is more than 40 inches thick. In some small areas this soil is less than 24 inches deep over sand. In some, the substratum is sand and gravel.

Included with this soil in mapping are small areas of Dickinson soil. The somewhat excessively drained Dickinson soil is in landscape positions similar to those of this Pillot soil where there is less silt and clay and more sand in the soil. It makes up about 5 percent of the unit.

In this Pillot soil permeability is moderate in the subsoil and rapid in the substratum. The available water capacity is moderate. Surface runoff is slow. In most areas, root penetration is limited by the underlying sand. Natural fertility is moderate. The surface layer is high in organic-matter content. It is friable and can be easily worked throughout a wide range in moisture content.

Most areas of this soil are used for cultivated crops, and some are used for hay and pasture. A few small areas are native woodland, and some areas have been planted to pines. The potential is good for cultivated crops, hay, pasture, openland and woodland wildlife habitat, and recreational development. The potential is poor for trees and very poor for wetland wildlife habitat. It is good or fair for most engineering uses.

This soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture. Erosion is generally not a problem. Regular additions of organic matter help to maintain fertility and good tilth and increase water infiltration.

This soil is suited to pasture and hay. Overgrazing, however, destroys the plant cover and encourages undesirable species. Grazing when the soil is wet compacts the surface, which results in poor tilth. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is not naturally forested and generally is not managed for woodland.

This soil is suited to septic tank absorption fields. There is, however, a danger of ground water pollution because the substratum is rapidly permeable. The soil is moderately suited to dwellings with or without basements and to small commercial buildings because it lacks sufficient strength and stability to adequately support building foundations. These limitations can be overcome by replacing the soil with suitable base material. This soil is poorly suited to local roads and streets because of the high potential frost action and the lack of sufficient strength to adequately support vehicular traffic. These limitations can be overcome by replacing the soil with suitable base material.

The capability unit is IIs-1. The woodland suitability subclass is not assigned.

PcB—Pillot silt loam, 2 to 6 percent slopes. This gently sloping, well drained soil is in undulating areas and on short, uneven convex side slopes of outwash plains and stream terraces. Most areas are oblong and range from 3 to 45 acres. A few areas are larger.

Typically, the surface layer is black silt loam about 11 inches thick. The subsoil is about 26 inches thick. It is dark brown, friable silt loam in the upper part; brown and dark yellowish brown, firm silty clay loam in the middle part; and dark yellowish brown, firm clay loam in the lower part. The substratum to a depth of about 60 inches is dark yellowish brown, loose sand. In some small areas this soil is nearly level. In some, it is eroded. In some, the surface layer is loam. In some, the silty mantle is less than 20 inches thick, and in others, it is more than 40 inches thick. In some small areas this soil is less than 24 inches deep over sand. In some, the substratum is sand and gravel.

Included with this soil in mapping are small areas of Dickinson soil and small areas of Pillot silt loam where slopes are more than 6 percent. The somewhat excessively drained Dickinson soil is in landscape positions similar to those of this Pillot soil where there is less silt and clay and more sand in the soil. Included soils make up about 5 percent of the unit.

In this Pillot soil permeability is moderate in the subsoil and rapid in the substratum. The available water capacity is moderate. Surface runoff is medium. In most areas root penetration is limited by the underlying sand. Natural fertility is moderate. The surface layer is high in organic-matter content. It is friable and can be easily worked throughout a wide range in moisture content.

Most areas of this soil are used for cultivated crops, hay, and pasture. Some small areas are woodland. The potential is good for cultivated crops and pasture and poor for trees. It is good for openland and woodland wildlife habitat but very poor for wetland habitat. The potential is good for recreational development and good or fair for most engineering uses.

This soil is suited to corn and small grain and to legumes and grasses for hay and pasture. There is a slight hazard of erosion in cultivated areas. Crop residue management, minimum tillage, contour stripcropping, grassed waterways, and winter cover crops help to control erosion. Regular additions of organic matter help to maintain fertility and good tilth and increase water infiltration.

Erosion is generally not a problem in areas where this soil is used for pasture and hay. Overgrazing, however, destroys the plant cover and results in erosion. Grazing when the soil is wet compacts the surface, which results in poor tilth and increases runoff and the hazard of erosion. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is not naturally forested and generally is not managed for woodland.

This soil is suited to septic tank absorption fields. There is, however, a danger of ground water pollution because the substratum is rapidly permeable. The soil is moderately suited to dwellings with or without basements and to small commercial buildings because it lacks sufficient strength and stability to adequately support building foundations. These limitations can be overcome by replacing the soil with suitable base material. This soil is poorly suited to local roads and streets because of the high potential frost action and the lack of sufficient strength to adequately support vehicular traffic. These limitations can be overcome by replacing the soil with suitable base material.

The capability unit is IIe-2. The woodland suitability subclass is not assigned.

Pd—Pits, gravel. This map unit consists of areas where sand or gravel has been removed for use in highway construction and other engineering projects. Most areas include spoil banks and piles of large stones. Most are rectangular or round and range from 3 to 25 acres. One area is about 90 acres. All of the pits are in glaciated uplands or in the outwash plain adjacent to the terminal moraine of the glacier. Most are in or near areas of Dakota, Dickinson, Fox, and Wyocena soils. Some are no longer used as a source of sand and gravel. Pits, gravel have some potential for use for recreation or wildlife habitat.

Pe—Pits, quarries. This map unit consists of areas where bedrock has been removed for use in engineering projects or other purposes. Most areas include spoil banks. Most are rectangular and range from 3 to 25 acres. Two quartzite quarries are about 60 and 100 acres. The quarries are in limestone, sandstone, and quartzite bedrock. The limestone quarries are in areas of Reedsburg and Valton soils. The sandstone quarries are in areas of Boone, Eleva, Gale, La Farge, Norden, and Urne soils. The quartzite quarries are in areas of Baraboo soils or Rock outcrop, quartzite.

PfB—Plainfield loamy sand, 1 to 6 percent slopes. This nearly level and gently sloping, excessively drained soil is on broad flats and on side slopes of outwash plains, stream terraces, and moraines. Most areas are irregular or oblong in shape and range from 3 to 220 acres. A few areas are larger.

Typically, the surface layer is dark grayish brown loamy sand about 7 inches thick. The subsoil is about 23 inches thick. It is yellowish brown, very friable sand in the upper part and dark yellowish brown, loose sand in the lower part. The substratum to a depth of about 60 inches is yellowish brown, loose fine sand over light yellowish brown, loose sand. In some small areas this soil is eroded, mainly as a result of soil blowing. In some areas the surface layer is sand. In some small areas thin bands of sandy loam are in the substratum.

Included with this soil in mapping are small areas of Billett, Brems, Gotham, and Sparta soils. Also included are some small sloping areas and severely eroded areas of Plainfield loamy sand. The severely eroded areas are mainly a result of soil blowing. The well drained Billett soil is in landscape positions similar to those of this Plainfield soil where there is less sand and more silt and clay in the soil. The moderately well drained Brems soil is in drainageways and depressions and along the edges of wet bottoms. The somewhat excessively drained Gotham soil is in landscape positions similar to those of the Plainfield soil where there is a little less sand and a little more clay in the soil. The excessively drained Sparta soil is in similar landscape positions where there is a thicker, darker surface layer. Included soils make up 10 to 15 percent of the unit.

Permeability is rapid in this Plainfield soil. The available water capacity is low. Surface runoff is slow. Natural fertility is low. The surface layer is low in organic-matter content. It is very friable and can be easily worked throughout a wide range in moisture content.

Many areas of this soil are used for cultivated crops, hay, and pasture. Some areas are native woodland, and

some have been planted to pines. The potential is fair for cultivated crops and pasture. Under intensive management and irrigation, the potential is good for these uses. The potential is fair for trees. It is poor for openland and woodland habitat and very poor for wetland habitat. The potential is fair for recreational development and good for most engineering uses.

This soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture. Crop yields are generally limited by the low available water capacity, but the soil is suited to sprinkler irrigation. If the soil is irrigated, better and more consistent yields can be expected. Erosion is generally not a problem, but the soil is subject to blowing. Crop residue management, minimum tillage, windbreaks, and winter cover crops help to control soil blowing. Fertilization, irrigation, and protection from soil blowing are needed for dependable crop production. Because the soil is rapidly permeable, irrigation rates should be limited to prevent washing plant nutrients out of the root zone.

The use of this soil as pastureland or hayland is also effective in controlling soil blowing. Yields are generally low unless the soil is fertilized and irrigated. Planting early in spring, before the soil has a chance to dry, is best on this soil. Later plantings are likely to have a poor survival rate. Overgrazing destroys the plant cover and results in soil blowing. Fertilization, renovation, and controlled grazing help to maintain the plant cover.

This soil is suited to trees. Poor seedling survival in dry years can be offset by careful planting and by planting vigorous nursery stock. Competing vegetation that interferes with natural regeneration and the establishment of plantings can be removed mechanically or controlled through the use of suitable herbicides.

This soil is suited to septic tank absorption fields. There is, however, a danger of ground water pollution because of the rapid permeability. The soil is suited to building site development.

The capability unit is IVs-3. The woodland suitability subclass is 3s.

PfC—Plainfield loamy sand, 6 to 12 percent slopes. This sloping, excessively drained soil is on uneven convex side slopes on outwash plains, stream terraces, and moraines. Most areas are oblong and range from 3 to 180 acres in size.

Typically, the surface layer is dark grayish brown loamy sand about 7 inches thick. The subsoil is about 20 inches thick. It is yellowish brown, very friable sand in the upper part and dark yellowish brown, loose sand in the lower part. The substratum to a depth of about 60 inches is yellowish brown, loose fine sand over light yellowish brown, loose sand. In some small areas this soil is eroded, mainly as a result of blowing. In some, the surface layer is sand. In some, thin bands of sandy loam are in the substratum.

Included with this soil in mapping are some areas of Billett, Gotham, and Sparta soils. Also included are some small severely eroded areas, gently sloping areas, and moderately steep areas of Plainfield sand. The severely eroded areas are commonly the result of soil blowing. The well drained Billett soil is in landscape positions similar to those of this Plainfield soil where there is less sand and more silt and clay in the soil. The somewhat excessively drained Gotham soil is in landscape positions similar to those of the Plainfield soil where there is a little less sand and a little more clay in the soil. The excessively drained Sparta soil is in landscape positions similar to those of the Plainfield soil where the surface layer is thicker and darker. Included soils make up 10 to 15 percent of the unit.

Permeability is rapid in this Plainfield soil. The available water capacity is low. Surface runoff is medium. Natural fertility is low. The surface layer is low in organic-matter content. It is very friable and can be worked throughout a wide range in moisture content.

Many areas of this soil are used for cultivated crops, hay, and pasture. Some areas are native woodland, and some have been planted to pines. The potential is poor for cultivated crops and pasture. Under intensive management and irrigation, the potential is fair for these uses. The potential is fair for trees. It is poor for openland and woodland wildlife habitat and very poor for wetland habitat. It is fair for recreational development and for most engineering uses.

This soil generally is not suitable for crop production. Crop yields are limited during most seasons by the low available water capacity. The soil is suited to sprinkler irrigation, and if irrigated, it is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture. In cultivated areas, the hazard of erosion is moderate and the soil is subject to blowing. Crop residue management, minimum tillage, windbreaks, contour stripcropping, grassed waterways, and winter cover crops help to control erosion and soil blowing. Fertilization, irrigation, and protection from soil blowing are needed for dependable crop production. Because the soil is rapidly permeable, irrigation rates should be limited to prevent washing plant nutrients out of the root zone.

The use of this soil as pastureland or hayland is also effective in controlling erosion and soil blowing. Forage yields are generally low unless the soil is fertilized and irrigated. Planting early in spring, before the soil has a chance to dry, is best. Later plantings are likely to have a poor survival rate. Overgrazing destroys the plant cover and results in soil blowing. Fertilization, renovation, and controlled grazing help to maintain the plant cover.

This soil is suited to trees. Poor seedling survival in dry years can be offset by careful planting and by planting vigorous nursery stock. Competing vegetation that interferes with natural regeneration and the establishment of plantings can be removed mechanically or controlled through the use of suitable herbicides.

This soil is moderately suited to septic tank absorption fields because of the slope. This limitation can be overcome by reshaping the site or by installing the field on

the contour. There is, however, a danger of ground water pollution because of the rapidly permeable substratum. This soil is moderately suited to dwellings with or without basements and to local roads and streets because of the slope. It is poorly suited to small commercial buildings because of the slope. The slope limitation for all these uses can be overcome by reshaping the site. Local roads and streets can also be constructed on the contour.

The capability unit is VIs-4. The woodland suitability subclass is 3s.

PfD—Plainfield loamy sand, 12 to 30 percent slopes. This moderately steep and steep, excessively drained soil is on convex uneven side slopes on outwash plains, stream terraces, and moraines. Most areas are oblong and range from 3 to 115 acres.

Typically, the surface layer is very dark grayish brown loamy sand about 3 inches thick. The subsurface layer is dark grayish brown sand about 2 inches thick. The subsoil is dark yellowish brown and yellowish brown, loose sand about 21 inches thick. The substratum to a depth of about 60 inches is yellowish brown and light yellowish brown, loose sand. In some small areas this soil is eroded. In some, slopes are more than 30 percent. In some, the surface layer is sand. In some, thin bands of sandy loam are in the substratum.

Included with this soil in mapping are small areas of Billett and Gotham soils. Also included are small sloping areas and severely eroded areas of Plainfield sand. The well drained Billett soil is in landscape positions similar to those of this Plainfield soil where there is more silt and clay and less sand in the soil. The somewhat excessively drained Gotham soil is in similar landscape positions where there is a little less sand and a little more clay in the soil. Included soils make up 5 to 10 percent of the unit.

Permeability is rapid in this Plainfield soil. The available water capacity is low. Surface runoff is rapid or very rapid. Natural fertility is low. Organic-matter content of the surface layer is low.

Most areas of this soil are native woodland, and some areas have been planted to pines. A few small areas are used for cultivated crops, mainly as part of larger, less sloping map units. The potential is very poor for hay and pasture. It is fair for trees. The potential is poor for openland and woodland wildlife habitat and very poor for wetland habitat. It is poor for recreational development and for most engineering uses.

Because of the low available water capacity, the severe and very severe hazard of water erosion, and the hazard of soil blowing, this soil is not suitable for cultivated crops.

The use of this soil as pastureland or hayland is effective in controlling erosion, but forage yields are generally low as a result of the low available water capacity. Planting in early spring, before the soil has a chance to dry, is best. Later plantings are likely to have a poor survival rate. Overgrazing destroys the plant cover and results in erosion and soil blowing. Fertilization, renovation, and controlled grazing help to maintain the plant cover.

This soil is suited to trees. Erosion can be controlled by planting trees on the contour and by selecting the best location for skid roads during harvest. Poor seedling survival in dry years can be offset by careful planting and by planting vigorous nursery stock. Competing vegetation that interferes with natural regeneration and the establishment of plantings can be removed mechanically or controlled through the use of suitable herbicides.

This soil is poorly suited to septic tank absorption fields because of the slope. This limitation can be overcome by reshaping the site. There is, however, a danger of ground water pollution as a result of the rapidly permeable substratum. This soil is poorly suited to building site development because of the slope. This limitation can be overcome by reshaping the site. Local roads and streets can be constructed on the contour.

The capability unit is VIIs-4. The woodland suitability subclass is 3s.

RbB—Reedsburg silt loam, 2 to 6 percent slopes. This gently sloping, somewhat poorly drained soil is on convex slopes on ridgetops and concave slopes in drainageways on unglaciated uplands covered with loess over clayey material (fig. 10). Most areas are oblong or irregular in shape and range from 3 to 80 acres. A few areas are larger, and one area is about 2,000 acres.

Typically, the surface layer is very dark grayish brown silt loam about 9 inches thick. The subsoil to a depth of about 60 inches is brown, mottled, friable silt loam in the upper part; light brownish gray, mottled, firm silty clay loam in the middle part; and strong brown, reddish brown, and red, mottled, very firm cherty clay in the lower part. In some areas this soil is eroded. In some small areas slopes are less than 2 percent. In some areas the loess mantle is more than 40 inches thick. In some, the surface layer is lighter in color than is typical. In others, the dark surface layer is more than 9 inches thick.

Included with this soil in mapping are small areas of Valton and Wildale soils. Also included are some areas of Reedsburg silt loam where slopes are more than 6 percent. The well drained Valton and Wildale soils are in landscape positions similar to those of this Reedsburg soil where the soil is better drained. The Wildale soil is in areas where the loess mantle is less than 15 inches thick. Included soils make up 5 to 10 percent of the unit.

In this Reedsburg soil permeability is moderate in the silty mantle and slow in the cherty clay. The available water capacity is moderate. Surface runoff is medium. This soil has a perched water table at a depth of 1 to 3 feet during wet periods. Root penetration is limited by the water table during wet periods of the growing season unless the soil is drained. Natural fertility is moderate. The surface layer is moderate or high in organic-matter content. It is very friable and can be easily worked

Figure 10.—Corn and alfalfa on broad dolomite ridgetop of gently sloping Reedsburg soils.

throughout a wide range in moisture content. It tends to crust, however, after hard rains.

Most areas of this soil are used for cultivated crops, hay, and pasture. Some areas are native woodland. The potential is good for cultivated crops and fair for hay and pasture. It is good for trees. The potential is good for openland and woodland wildlife habitat and very poor for wetland habitat. It is fair or poor for recreational development and poor for most engineering uses.

This soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture. In most areas artificial drainage is not required for dependable crop production. The perched water table is generally a problem for crops only early in spring. Spring planting is delayed by the water table for 2 to 3 weeks. Any loss in growth caused by the later planting date generally is made up in the dry months of July and August when the soil still has plentiful moisture reserves. Some wetter areas, such as drainageways and seeps, need drainage for dependable crop production. Surface drainage is needed to remove excess surface water rapidly. Tiles are used for internal drainage. There is a slight hazard of erosion in cultivated areas. Crop residue management, minimum tillage, contour stripcropping, grassed waterways, and winter cover crops help to control erosion. Regular additions of organic matter help to maintain fertility and good tilth.

If drained, this soil is suited to legumes and grasses for hay and pasture. In undrained areas, legume stands are difficult to maintain because of the seasonal high water table and frost heaving. Overgrazing of pasture destroys the plant cover and results in erosion. Grazing when the soil is wet compacts the surface, which results in poor tilth and increases runoff and the hazard of erosion. Fertilization, renovation, artificial drainage, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is suited to trees. Competing vegetation, however, interferes with natural regeneration and the establishment of plantings. It can be removed mechanically or controlled through the use of suitable herbicides.

This soil is poorly suited to septic tank absorption fields because of the seasonal perched water table and the slow permeability. The suitability can be improved by building a filtering mound of suitable material. The soil is poorly suited to dwellings with or without basements and to small commercial buildings because of the seasonal perched water table and the lack of sufficient strength and stability to adequately support building foundations. These limitations can be overcome by draining the soil to lower the water table and by replacing the soil with suitable base material. This soil is poorly suited to local roads and streets because of the high potential frost action and the lack of sufficient strength to adequately support building foundations. These limitations can be overcome by replacing this soil with suitable base material.

The capability unit is IIe-8. The woodland suitability subclass is 2o.

RhA—Richwood silt loam, 0 to 2 percent slopes. This nearly level, well drained soil is on broad loess-covered outwash plains and stream terraces. Most areas are irregular in shape and range from 3 to 35 acres. Most of the acreage, however, is in one area of 2,175 acres.

Typically, the surface layer is black silt loam about 9 inches thick. The subsurface layer is very dark grayish

brown silt loam about 3 inches thick. The subsoil is about 43 inches thick. It is brown and dark yellowish brown, friable silt loam in the upper part; dark yellowish brown, firm silty clay loam in the middle part; and dark yellowish brown, friable stratified silt loam, loam, and sandy loam in the lower part. The substratum to a depth of about 60 inches is brown, loose sand. In some areas the loess mantle is less than 40 inches thick, and in others it is more than 60 inches thick. In some areas this soil is more than 65 inches deep over sand. In some, the substratum is sand and gravel or gravelly sandy loam glacial till.

Included with this soil in mapping are small areas of Rowley and Toddville soils. Also included are small areas of gently sloping Richwood silt loam. The somewhat poorly drained Rowley soil and the moderately well drained Toddville soil are in drainageways and depressions. Included soils make up less than 5 percent of the unit.

In this Richwood soil permeability is moderate in the subsoil and rapid in the substratum. The available water capacity is high. Surface runoff is slow. Natural fertility is high. The surface layer is high in organic-matter content. It is friable and can be easily worked throughout a wide range in moisture content.

Most areas of this soil are used for cultivated crops, hay, and pasture. The potential is good for cultivated crops, hay, and pasture and poor for trees. It is good for openland and woodland wildlife habitat but very poor for wetland habitat. The potential is good for recreational development and fair for most engineering uses.

This soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture. Erosion is generally not a problem. Under proper management, the soil can be cropped intensively. Regular additions of organic matter help to maintain fertility and good tilth and increase water infiltration.

This soil is suited to pasture and hay. Overgrazing, however, destroys the plant cover and encourages undesirable species. Grazing when the soil is wet compacts the surface, which results in poor tilth. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is not naturally forested and generally is not managed for woodland.

This soil is suited to septic tank absorption fields. It is moderately suited to dwellings with or without basements and to small commercial buildings because it lacks sufficient stability to adequately support building foundations. This limitation can be overcome by replacing the soil with suitable base material. The soil is poorly suited to local roads and streets because of the high potential frost action. This limitation can be overcome by replacing the soil with suitable base material. This soil is a fair source of topsoil.

The capabiliy unit is I-3. The woodland suitability subclass is not assigned.

RhB—Richwood silt loam, 2 to 6 percent slopes. This gently sloping well drained soil is on convex side slopes on loess-covered outwash plains and stream terraces. Most areas are oblong and range from 3 to 75 acres.

Typically, the surface layer is black silt loam about 9 inches thick. The subsurface layer is very dark grayish brown silt loam about 2 inches thick. The subsoil is about 41 inches thick. It is brown and dark yellowish brown, friable silt loam in the upper part; dark yellowish brown, firm silty clay loam in the middle part; and dark yellowish brown, friable stratified silt loam in the middle part; and dark yellowish brown, friable stratified silt loam, loam, and sandy loam in the lower part. The substratum to a depth of about 60 inches is brown, loose sand. In some small areas this soil is eroded. In some, the loess mantle is less than 40 inches thick, and in others, it is more than 60 inches thick. In some areas this soil is more than 65 inches deep over sand. In some, the substratum is sand and gravel or gravelly sandy loam glacial till.

Included with this soil in mapping are small areas of Toddville soils. Also included are small areas of nearly level Richwood silt loam and small areas of this soil where slopes are more than 6 percent. The moderately well drained Toddville soil is in drainageways and depressions. Included soils make up less than 5 percent of the unit.

In this Richwood soil permeability is moderate in the subsoil and rapid in the substratum. The available water capacity is high. Surface runoff is medium. Natural fertility is high. The surface layer is high in organic-matter content. It is friable and can be easily worked throughout a wide range in moisture content.

Most areas of this soil are used for cultivated crops, hay, and pasture. The potential is good for cultivated crops, hay, and pasture and poor for trees. It is good for openland and woodland wildlife habitat but very poor for wetland habitat. The potential is good for recreational development and fair for most engineering uses.

This soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture. The hazard of erosion is slight in cultivated areas. Crop residue management, conservation tillage, contour stripcropping, grassed waterways, and winter cover crops help to control erosion. Regular additions of organic matter help to maintain fertility and good tilth and increase water infiltration.

Erosion is generally not a problem in areas where this soil is used for pasture and hay. Overgrazing, however, destroys the plant cover and results in erosion. Grazing when the soil is wet compacts the surface, which results in poor tilth and increases runoff and the hazard of erosion. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is not naturally forested and generally is not managed for woodland.

This soil is suited to septic tank absorption fields. It is moderately suited to dwellings with or without basements and to small commercial buildings because it lacks sufficient stability to adequately support building foundations. This limitation can be overcome by replacing the soil with suitable base material. The soil is poorly suited to local roads and streets because of the high potential frost action. This limitation can be overcome by replacing the soil with suitable base material. The soil is a fair source of topsoil.

The capability unit is IIe-1. The woodland suitability subclass is not assigned.

RmA—Rimer loamy sand, 0 to 3 percent slopes. This nearly level and gently sloping, somewhat poorly drained soil is on plane and concave slopes in drainageways and depressions of glacial lake basins. In some areas it is subject to flooding or ponding during wet periods and after heavy rains. Most areas are oblong or irregular in shape and range from 3 to 40 acres.

Typically, the surface layer is very dark grayish brown and dark grayish brown loamy sand about 12 inches thick. It is mottled with grayish brown and yellowish brown in the lower part. The subsoil is about 35 inches thick. It is brown and yellowish brown, very friable and loose loamy sand in the upper part; dark yellowish brown, friable sandy loam in the middle part; and reddish brown, firm silty clay loam in the lower part. It is mottled with light brownish gray, grayish brown, yellowish brown, strong brown, and brown. The substratum is brown, firm silty clay with strata of silt loam. It is mottled with yellowish brown and grayish brown. In some small areas the surface layer is sandy loam or sand. In some, the sandy mantle is more than 40 inches deep over the sandy loam subsoil.

Included with this soil in mapping are small areas of Mosel and Tustin soils. The somewhat poorly drained Mosel soil occupies landscape positions similar to those of this Rimer soil where the surface layer and subsoil are not sandy. The well drained Tustin soil occupies higher, better drained positions. Included soils make up about 5 to 10 percent of the unit.

In this Rimer soil permeability is rapid in the sandy layers and slow in the lower part of the subsoil and in the substratum. The available water capacity is moderate. Surface runoff is slow. This soil has a perched water table at a depth of 1 to 3 feet during wet periods. Root penetration is limited by the perched water table during wet periods of the growing season unless the soil is drained. Natural fertility is moderate. The surface layer is moderately low in organic-matter content. It is very friable and can be easily worked throughout a wide range in moisture content.

Drained areas of this soil are used for cultivated crops, hay, and pasture. Undrained areas provide wildlife habitat and some are used for unimproved pasture. A few small areas are wooded. The potential is fair for cultivated crops, hay, pasture, and trees. It is fair for openland wildlife habitat, good for woodland habitat, and fair for wetland habitat. The potential is fair for recreational development and poor for most engineering uses.

If drained, this soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture. Surface drainage is needed to remove excess surface water rapidly. Deep ditches and tiles are used for internal drainage. If tiles are placed in the upper, sandy part of this soil, loose sand will enter the tile lines unless precautions are taken. Drained and cultivated areas are subject to soil blowing. Crop residue management, minimum tillage, windbreaks, and winter cover crops help to control soil blowing.

The use of this soil as pastureland or hayland is effective in controlling soil blowing. Planting early in spring, before the surface has a chance to dry, is best. Later plantings are likely to have poor survival rate. Overgrazing destroys the plant cover and results in soil blowing. Fertilization, renovation, and controlled grazing help to maintain plant cover.

This soil is suited to trees. Competing vegetation, however, interferes with natural regeneration and the establishment of plantings. It can be removed mechanically or controlled through the use of suitable herbicides.

This soil is poorly suited to septic tank absorption fields because of the seasonal high water table and the occasional flooding in some areas. The suitability can be improved by building a filtering mound of suitable material and by using dikes and levees to prevent flooding. This soil is poorly suited to dwellings with or without basements and to small commercial buildings because of the seasonal high water table, the occasional flooding in some areas, and the lack of sufficient stability to adequately support building foundations. Draining the soil lowers the water table. Dikes and levees can be used to prevent flooding. The low stability limitation can be overcome by replacing the soil with suitable base material. This soil is poorly suited to local roads and streets because of the high potential frost action and the occasional flooding. The frost action limitation can be overcome by draining the soil to lower the water table. Dikes and levees can be used to protect the soil from flooding.

The capability unit is IIIw-6. The woodland suitability subclass is 2o.

RnB—Ringwood silt loam, 2 to 6 percent slopes. This gently sloping, well drained soil is on convex ridgetops and side slopes on loess-covered till plains and moraines. Most areas are irregular in shape and range from 3 to 690 acres.

Typically, the surface layer is black silt loam about 10 inches thick. The subsurface layer is very dark brown and very dark grayish brown silt loam about 6 inches thick. The subsoil is about 34 inches thick. It is dark yellowish brown, firm silty clay loam in the upper part; brown, firm clay loam and sandy clay loam in the middle part; and brown, firm sandy loam in the lower part. The substratum to a depth of about 60 inches is yellowish

brown, friable gravelly sandy loam. In some small areas this soil is eroded. In some, the surface layer is thinner and lighter in color than is typical, and in others, it is loam. In some small areas the loess mantle is more than 30 inches thick, and in others there is no loess mantle and the entire subsoil is loam, clay loam, or sandy clay loam. In some small areas this soil is underlain by outwash sand or sand and gravel.

Included with this soil in mapping are small sloping areas and small severely eroded areas of Ringwood silt loam and some small areas of this soil where slopes are less than 2 percent. Also included are some small areas in drainageways and depressions where this soil is saturated with water at a depth of 2.5 feet during wet seasons. Included soils make up less than 5 percent of the unit.

Permeability is moderate in this Ringwood soil. The available water capacity is high. Natural fertility is high. The surface layer is high in organic-matter content. It is friable and can be easily worked throughout a wide range in moisture content.

Most areas of this soil are used for cultivated crops, hay, and pasture. Some areas are in native grasses. The potential is good for cultivated crops, hay, and pasture and poor for trees. It is good for openland and woodland wildlife habitat but very poor for wetland habitat. The potential is good for most recreational development and fair for most engineering uses.

This soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture. The hazard of erosion is slight in cultivated areas. Crop residue management, minimum tillage, contour stripcropping, grassed waterways, and winter cover crops help to control erosion. Regular additions of organic matter help to maintain fertility and good tilth and increase water infiltration.

Erosion is generally not a problem in areas where this soil is used for pasture and hay. Overgrazing, however, destroys the plant cover and results in erosion. Grazing when the soil is wet compacts the surface, which results in poor tilth and increases runoff and the hazard of erosion. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is not naturally forested and generally is not managed for woodland.

This soil is suited to septic tank absorption fields. It is only moderately suited to dwellings with or without basements and to small commercial buildings because the subsoil lacks sufficient strength to support building foundations. The soil is poorly suited to local roads and streets because the subsoil lacks sufficient strength to support vehicular traffic. This limitation can be overcome for all these uses by replacing the subsoil with suitable base material. This soil is a fair source of topsoil.

The capability unit is IIe-1. The woodland suitability subclass is not assigned.

RnC2—Ringwood silt loam, 6 to 12 percent slopes, eroded. This sloping, well drained soil is on convex uneven side slopes of loess-covered till plains and moraines. Most areas are oblong or irregular in shape and range from 3 to 45 acres.

Typically, the surface layer is black silt loam about 8 inches thick. The subsurface layer is dark brown silt loam about 4 inches thick. The subsoil is about 32 inches thick. It is dark yellowish brown, firm silty clay loam in the upper part; brown, firm clay loam and sandy clay loam in the middle part; and brown, firm sandy loam in the lower part. The substratum to a depth of about 60 inches is yellowish brown, friable gravelly sandy loam. In some areas this soil is not eroded. In some small areas the surface layer is thinner and lighter colored than is typical, and in others, it is loam. In some small areas the loess mantle is more than 30 inches thick. In others there is no loess mantle and the entire subsoil is loam, clay loam, or sandy clay loam. In some small areas this soil is underlain by outwash sand or sand and gravel.

Included with this soil in mapping are small gently sloping areas and small severely eroded areas of Ringwood silt loam and some small areas of this soil where slopes are more than 12 percent. Included soils make up less than 5 percent of the unit.

Permeability is moderate in this Ringwood soil. The available water capacity is high. Surface runoff is medium. Natural fertility is high. The surface layer is high in organic-matter content. It is friable and can be easily worked throughout a wide range in moisture content.

Most areas of this soil are used for cultivated crops, hay, and pasture. Some small areas are in native grasses. The potential is fair for cultivated crops, good for hay and pasture, and poor for trees. The potential is good for openland and woodland wildlife habitat but very poor for wetland habitat. It is fair for most recreational development and most engineering uses.

This soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture. The hazard of further erosion is moderate in cultivated areas. Crop residue management, minimum tillage, contour stripcropping, grassed waterways, and winter cover crops help to control erosion. Regular additions of organic matter help to maintain fertility and good tilth and increase water infiltration.

Erosion is generally not a problem in areas where this soil is used for pasture and hay. Overgrazing, however, destroys the plant cover and results in erosion. Grazing when the soil is wet compacts the surface, which results in poor tilth and increases runoff and the hazard of erosion. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is not naturally forested and generally is not managed for woodland.

The soil is moderately suited to septic tank absorption fields because of the slope. This limitation can be overcome by reshaping the site or by installing the field on

the contour. The soil is moderately suited to dwellings with or without basements because of the slope and because the subsoil lacks sufficient strength to adequately support building foundations. These limitations can be overcome by reshaping the site and by replacing the soil with suitable base material. The soil is poorly suited to small commercial buildings because of the slope. This limitation can be overcome by reshaping the site or by selecting a less sloping site. The soil is poorly suited to local roads and streets because the subsoil lacks sufficient strength to support vehicular traffic. This limitation can be overcome by replacing this soil with suitable base material.

The capability unit is IIIe-1. The woodland suitability subclass is not assigned.

Rt—Rock outcrop, quartzite. This map unit consists of moderately steep to very steep areas on uplands where quartzite rock crops out. This unit is 90 percent or more bare quartzite bedrock. Slopes are complex. Most areas are oblong and range from 10 to 135 acres.

Rock outcrop is creviced. Soil material fills many of the crevices, and trees and other plants grow in these crevices. Some areas are vertical or near vertical bedrock escarpments. At the foot of most of the escarpments is an accumulation of quartzite stone and boulders.

Included in mapping are small areas of Baraboo soil, some small areas where the quartzite is covered with soil less than 20 inches thick, and some small areas where this unit is less than 90 percent bare bedrock. The Baraboo soil is commonly in less sloping areas of this unit where there is 20 to 40 inches of soil over the quartzite. Included soils make up about 10 percent of the unit.

This map unit is not suitable for crops. Trees grow in areas where some soil material is over the bedrock, but growth is generally very slow. This unit is not suitable for most engineering uses, but in some places the quartzite is quarried and crushed for use as fill in roads and railroads. The unit provides some wildlife habitat and is suited for esthetic or recreational purposes.

The capability unit is VIIIs-10. The woodland suitability subclass is not assigned.

Ry—Rowley silt loam. This nearly level, somewhat poorly drained soil is in drainageways and depressional areas of outwash plains and stream terraces. In some areas it is subject to flooding or ponding during wet periods and after heavy rains. Most areas are long or irregular in shape and range from 3 to 60 acres. One area is 110 acres.

Typically, the surface layer is black silt loam about 12 inches thick. The subsurface layer is dark brown silt loam about 4 inches thick. The subsoil is about 40 inches thick. It is brown, firm silt loam in the upper part; grayish brown and light brownish gray, firm silt loam in the middle part; and light brownish gray, friable stratified silt loam, loam, and sandy loam in the lower part. It is mottled with yellowish brown, grayish brown, light brownish gray, and strong brown. The substratum to a depth of about 60 inches is light yellowish brown, loose sand. It is mottled with light brownish gray. In some areas slopes are more than 1 percent. In some, the dark surface layer is less than 10 inches thick. In some, the silty mantle is less than 40 inches thick, and in others, it is more than 60 inches thick. In some small areas the substratum is stratified silty, loamy, and sandy sediments.

Included with this soil in mapping are small areas of Ettrick, Richwood, and Toddville soils. The well drained Richwood soils and the moderately well drained Toddville soils occupy slightly higher positions in the landscape. The poorly drained and very poorly drained Ettrick soil occupies slightly lower, wetter areas in drainageways and depressions. Included soils make up 5 to 10 percent of the unit.

In this Rowley soil permeability is moderate in the subsoil and rapid in the substratum. The available water capacity is high. Surface runoff is slow. This soil has a water table at a depth of 1 to 3 feet during wet periods. Root penetration is limited by the water table during wet periods of the growing season. Natural fertility is high. The surface layer is high in organic-matter content. It is friable and can be easily worked throughout a wide range in moisture content.

Drained areas of this soil are used for cultivated crops, hay, and pasture. Undrained areas provide wildlife habitat, and some are used for unimproved pasture. The potential is good for cultivated crops, hay, and pasture. It is poor for trees. The potential is good for openland and woodland wildlife habitat but poor for wetland habitat. It is fair or poor for most recreational development and poor for most engineering uses.

If drained, this soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture. Surface drainage is needed to remove excess surface water rapidly. Deep ditches and tiles are used for internal drainage. If tiles are placed in the underlying sand, however, loose sand will enter the tile lines unless precautions are taken. Regular additions of organic matter help to maintain fertility and good tilth.

If drained, this soil is suited to legumes and grasses for hay and pasture. Overgrazing destroys the plant cover and encourages undesirable plant species. Grazing when the soil is wet compacts the surface, which results in poor tilth and reduced water infiltration. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is poorly suited to trees. Tree growth and form are poor, seldom attaining more than minimum merchantability.

This soil is poorly suited to septic tank absorption fields because of the seasonal high water table and the occasional flooding in some areas. The suitability can be improved by building a filtering mound of suitable materi-

al and by constructing levees and dikes to prevent flooding. The soil is poorly suited to dwellings with or without basements and to small commercial buildings because it has a high water table and is occasionally flooded. Draining the soil to lower the seasonal high water table and constructing levees and dikes to prevent flooding overcome these hazards. This soil is poorly suited to local roads and streets because of the high potential frost action, the lack of sufficient strength to support vehicular traffic, and the occasional flooding. The frost action limitation can be overcome by draining the soil and by replacing the soil with suitable base material. Suitable base material also overcomes the low strength. Flooding can be prevented by constructing dikes and levees.

The capability unit is IIw-2. The woodland suitability subclass is 4o.

ScB—St. Charles silt loam, 2 to 6 percent slopes. This gently sloping, well drained soil is on convex ridgetops, concave foot slopes, and valley floors of loess-covered till plains and moraines. Most areas are oblong or irregular in shape and range from 3 to 200 acres.

Typically, the surface layer is dark grayish brown silt loam about 8 inches thick. The subsoil is about 52 inches thick. It is dark yellowish brown and brown, firm silty clay loam in the upper part; yellowish brown, firm silt loam in the middle part; and dark yellowish brown, friable gravelly sandy loam in the lower part. In some areas this soil is eroded. In some small areas the surface layer and upper part of the subsoil are loam or very fine sandy loam. In some areas the loess mantle is less than 40 inches thick, and in others it is more than 60 inches thick. In some areas this soil is underlain by outwash sand or sand and gravel, loamy sand or sand glacial till, or quartzite bedrock below a depth of 40 inches.

Included with this soil in mapping are small areas of Kendall soils, small sloping areas and small severely eroded areas of St. Charles silt loam, and some small areas of this soil where slopes are less than 2 percent. Also included are some areas of this soil where cobbles and stones are on the surface and throughout the soil. The somewhat poorly drained Kendall soil is in drainageways and depressions and along the margins of wet bottoms. Included soils make up about 5 to 10 percent of the unit.

Permeability is moderate in this St. Charles soil. The available water capacity is high. Surface runoff is medium. Natural fertility is high. The surface layer is moderately low or moderate in organic-matter content. It is friable and can be easily worked throughout a wide range in moisture content. It tends to crust, however, after heavy rains.

Most areas of this soil are used for cultivated crops, hay, and pasture. Some areas are native woodland. The potential is good for cultivated crops, hay, pasture, and trees. It is good for openland and woodland wildlife habitat but very poor for wetland habitat. The potential is good for recreational development and good or fair for most engineering uses.

This soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture. The hazard of erosion is slight in cultivated areas. Crop residue management, minimum tillage, contour stripcropping, grassed waterways, and winter cover crops help to control erosion. Regular additions of organic matter help to maintain fertility and good tilth and increase water infiltration.

Erosion is generally not a problem in areas where this soil is used for pasture and hay. Overgrazing, however, destroys the plant cover and results in erosion. Grazing when the soil is wet compacts the surface, which results in poor tilth and increases runoff and the hazard of erosion. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is suited to trees. Competing vegetation, however, interferes with natural regeneration and the establishment of plantings. It can be removed mechanically or controlled through the use of suitable herbicides.

This soil is suited to septic tank absorption fields. It is moderately suited to dwellings with or without basements and to small commercial buildings because it lacks sufficient strength and stability to adequately support building foundations. These limitations can be overcome by replacing the soil with suitable base material. The soil is poorly suited to local roads and streets because of the high potential frost action and the lack of sufficient strength to adequately support vehicular traffic. These limitations can be overcome by replacing this soil with suitable base material. The soil is a fair source of topsoil.

The capability unit is IIe-1. The woodland suitability subclass is 2o.

ScC2—St. Charles silt loam, 6 to 12 percent slopes, eroded. This sloping, well drained soil is on uneven convex and plane side slopes of loess-covered till plains and moraines. Most areas are oblong and range from 3 to 100 acres. A few areas are larger.

Typically, the surface is dark grayish brown silt loam about 7 inches thick. In most cultivated areas it contains some dark yellowish brown subsoil material that has been mixed in by plowing. The subsoil is about 48 inches thick. It is dark yellowish brown and brown, firm silty clay loam in the upper part; yellowish brown, firm silt loam in the middle part; and dark yellowish brown, friable sandy loam in the lower part. The substratum to a depth of about 60 inches is yellowish brown, very friable gravelly sandy loam. In some areas this soil is not eroded. In some small areas the surface layer and upper part of the subsoil are loam or very fine sandy loam. In some areas the loess mantle is less than 40 inches thick, and in others it is more than 60 inches thick. In some small areas this soil is underlain by outwash sand or sand and gravel, loamy sand or sand glacial till, or quartzite bedrock below a depth of 40 inches.

Included with this soil in mapping are small areas of Wyocena soil and small gently sloping areas, moderately steep areas, and severely eroded areas of St. Charles silt loam. Also included are small areas of this soil where cobbles and stones are on the surface and throughout the soil. The well drained Wyocena soil is in landscape positions similar to those of this St. Charles soil where the loess mantle is lacking and there is more sand and less silt and clay in the soil. Included soils make up about 5 to 10 percent of the unit.

Permeability is moderate in this St. Charles soil. The available water capacity is high. Surface runoff is medium. Natural fertility is high. The surface layer is moderately low or moderate in organic-matter content. It is friable and can be easily worked throughout a wide range in moisture content. It tends to crust, however, after heavy rains, especially in areas where the surface layer contains subsoil material.

Most areas of this soil are used for cultivated crops, hay, and pasture. Some areas are native woodland. The potential is fair for cultivated crops and good for hay, pasture, and trees. It is good for openland and woodland wildlife habitat but very poor for wetland habitat. The potential is fair for recreational development and for most engineering uses.

This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. The hazard of further erosion is moderate in areas where the soil is cultivated. Crop residue management, minimum tillage, contour stripcropping, grassed waterways, and winter cover crops help to control erosion. Regular additions of organic matter help to maintain fertility and good tilth and increase water infiltration.

Erosion is generally not a problem in areas where this soil is used for pasture or hay. Overgrazing, however, destroys the plant cover and results in erosion. Grazing when the soil is wet compacts the surface, which results in poor tilth and increases runoff and the hazard of further erosion. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is suited to trees. Competing vegetation, however, interferes with natural regeneration or the establishment of plantings. It can be removed mechanically or controlled through the use of suitable herbicides.

This soil is moderately suited to septic tank absorption fields because of the slope. This limitation can be overcome by reshaping the site or by installing the field on the contour. The soil is moderately suited to dwellings with or without basements because of the slope and the lack of sufficient strength and stability to adequately support building foundations. The slope limitation can be overcome by reshaping the site. Low strength and poor stability can be overcome by replacing the soil with suitable base material. The soil is poorly suited to small commercial buildings because of the slope. The limitation can be overcome by reshaping the site. The soil is poorly suited to local roads and streets because of the high potential frost action and the lack of sufficient strength to adequately support vehicular traffic. These limitations can be overcome by replacing the soil with suitable base material.

The capability unit is IIIe-1. The woodland suitability subclass is 2o.

ScD2—St. Charles silt loam, 12 to 20 percent slopes, eroded. This moderately steep, well drained soil is on uneven convex side slopes of loess-covered till plains and moraines. Most areas are oblong and range from 3 to 55 acres. A few areas are larger.

Typically, the surface layer is dark grayish brown silt loam about 7 inches thick. In most cultivated areas it contains some dark yellowish brown subsoil material that has been mixed in by plowing. The subsoil is about 45 inches thick. It is dark yellowish brown and brown, firm silty clay loam in the upper part; yellowish brown, firm silt loam in the middle part; and dark yellowish brown, friable sandy loam in the lower part. The substratum to a depth of about 60 inches is yellowish brown, very friable gravelly sandy loam. In some areas this soil is not eroded. In some small areas the surface layer is loam and the entire subsoil is loam, clay loam, sandy clay loam, and clay loam. In some areas the loess mantle is less than 40 inches thick, and in some small areas it is more than 40 inches thick. In some small areas this soil is underlain by outwash sand or sand and gravel, loamy sand glacial till, or quartzite bedrock below a depth of 40 inches.

Included with this soil in mapping are small areas of Wyocena soil, small sloping areas and severely eroded areas of St. Charles silt loam, and some small areas of this soil where slopes are more than 20 percent. Also included are small areas of this soil where cobbles and stones are on the surface and throughout the soil. The well drained Wyocena soil is in landscape positions similar to those of this St. Charles soil where the loess mantle is lacking and there is more sand and less silt and clay in the soil. Included soils make up about 5 to 10 percent of the unit.

Permeability is moderate in this St. Charles soil. The available water capacity is high. Surface runoff is rapid. Natural fertility is high. The surface layer is moderately low or moderate in organic-matter content. It is friable and can be easily worked throughout a wide range of moisture content. It tends to crust, however, after heavy rains, especially in areas where the surface layer contains subsoil material.

Some areas of this soil are used for cultivated crops, hay, and pasture, and some are native woodland. The potential is fair for cultivated crops and good for hay, pasture, and trees. The potential is fair for openland wildlife habitat, good for woodland habitat, and very poor for wetland habitat. It is poor for most recreation development and for all engineering uses.

This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay or pasture. The hazard of further erosion is severe in cultivated areas.

Crop residue management, minimum tillage, contour stripcropping, grassed waterways, and winter cover crops are necessary to minimize erosion. Regular additions of organic matter help to maintain fertility and good tilth and increase water infiltration.

Erosion is generally not a problem in areas where this soil is used for pasture or hay. Overgrazing, however, destroys the plant cover and results in erosion. Grazing when the soil is wet compacts the surface, which results in poor tilth and increases runoff and the hazard of further erosion. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is suited to trees. Soil related problems in forest management are associated with steepness of slope; mortality of seedlings on hot, dry sites; and brush encroachment following harvest. Planting trees on the contour and selecting the best location for skid roads during harvest minimize erosion and improve equipment trafficability. Seedling mortality on south- and west-facing slopes can be reduced by careful planting and by planting vigorous nursery stock. Vegetation that competes with planted seedlings and natural reproduction following harvest can be removed mechanically or controlled through use of suitable herbicides.

This soil is poorly suited to septic tank absorption fields because of the slope. This limitation can be overcome by reshaping the site or by selecting a less sloping site. The soil is poorly suited to dwellings with or without basements and to small commercial buildings because of the slope. This limitation can be overcome by reshaping the site or by selecting a less sloping site. The soil is poorly suited to local roads and streets because of the slope, the high potential frost action, and the lack of sufficient strength to support vehicular traffic. The slope limitation can be overcome by reshaping the site or by constructing roads on the contour. The frost action and low strength limitations can be overcome by replacing this soil with suitable base material.

The capability unit is IVe-1. The woodland suitability subclass is 2r.

Se—Saprists and Aquents. These nearly level, very poorly drained soils are on flood plains and in depressions. They are subject to frequent flooding, and some areas are ponded all or most of the year. Most areas are oblong or round and range from 3 to 580 acres. Mapped areas are as much as 45 percent Saprists and as much as 50 percent Aquents. These soils are similar enough in morphology and behavior characteristics that mapping them separately is not necessary.

Typically, Saprists have an organic layer that ranges from 16 inches to more than 50 inches in thickness. The substratum is sandy, loamy, or silty mineral soil. In some small areas, the organic layer is less than 16 inches thick.

Typically, Aquents soils have a wide range in soil characteristics. The surface layer ranges from silt loam to sand, and in some areas it is organic. The soil below the surface layer is stratified sandy and loamy material, and in some areas it is organic material. Many areas of these soils are dissected by old stream channels. In some areas, 20 to 40 inches of silt loam and silty clay loam is over the sand, and in other areas 24 to 40 inches of silt loam and silty clay loam is over stratified silty, loamy, and sandy sediments.

Permeability is moderately rapid in Saprists and ranges from moderate to rapid in Aquents. The available water capacity, natural fertility, and the organic-matter content of the surface layer range from high to low in both soils. Surface runoff is very slow or ponded. Unless these soils are drained, a water table is near or above the surface much of the year. Root penetration is limited by the water table.

Most areas are used for wildlife habitat or unimproved pasture. The potential is poor for cultivated crops, hay, pasture, and trees. It is very poor for openland and woodland wildlife habitat but good for wetland habitat. The potential is poor for recreational development and for most engineering uses.

These soils are generally not suitable for cultivated crops because of the high water table and frequent flooding. Some areas that are adequately drained and protected from flooding are suited to corn and small grain and to legumes and grasses for hay and pasture. Drainage is not feasible in many areas. Where feasible, deep ditches and tiles are used for internal drainage. In some areas, however, loose sand will enter the tile lines unless precautions are taken. Ditchbanks are easily eroded by flowing water, and vertical banks will cave and plug the ditch.

Because of the high water table and frequent flooding, these soils are not suitable for most forage species and are restricted to such species as reed canarygrass. If drained and protected from flooding, they are suited to such species as alfalfa and red clover. Overgrazing destroys the plant cover and encourages undesirable plants. Loss of plant cover can also result in erosion during periods of overflow. Grazing when the soil is wet compacts the surface in some areas, which results in poor tilth. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

These soils are not suited to woodland because they do not support trees of merchantable size and quality. Good land use may include management of woody cover for recreation use or for wildlife habitat.

These soils are generally not suitable for septic tank absorption fields or for building site development. Another site should be selected for these uses.

The capability unit is VIIIw-1. The woodland suitability subclass is not assigned.

SfA—Shiffer loam, 0 to 3 percent slopes. This nearly level and gently sloping, somewhat poorly drained soil is on concave and plane slopes in drainageways and

depressions of valley fills and stream terraces. In some areas it is subject to flooding or ponding during wet periods and after heavy rains. Most areas are oblong or irregular in shape and range from 3 to 40 acres.

Typically, the surface layer is very dark brown loam about 7 inches thick. The subsoil is about 25 inches thick. It is dark yellowish brown and yellowish brown, firm loam in the upper part; dark yellowish brown, friable sandy loam in the middle part; and dark yellowish brown, very friable loamy sand in the lower part. It is mottled with yellowish brown, dark grayish brown, light brownish gray, and grayish brown. The substratum to a depth of about 60 inches is yellowish brown, loose sand. It is mottled with yellowish brown. In some areas the surface layer is silt loam, sandy loam, or loamy sand. In some small areas the dark surface layer is 10 inches or more thick. In some, the substratum is stratified silty, loamy, and sandy sediments.

Included with this soil in mapping are small areas of Marshan and Shiffer variant soils. Also included are small areas of this soil where slopes are more than 3 percent. The poorly drained and very poorly drained Marshan soil is in slightly lower landscape positions in drainageways and depressions. The somewhat poorly drained Shiffer variant is in landscape positions similar to those of this Shiffer soil where there is more sand and less silt and clay in the soil. Included soils make up 5 to 10 percent of the unit.

In this Shiffer soil permeability is moderate in the subsoil and rapid in the substratum. The available water capacity is moderate. Surface runoff is slow. This soil has a water table at a depth of 1 to 3 feet during wet periods. Root penetration is limited by the water table during wet periods of the growing season or, in drained areas, by the underlying sand. Natural fertility is moderate. The surface layer is moderate in organic-matter content. It is friable and can be easily worked throughout a wide range in moisture content.

Drained areas of this soil are used for cultivated crops, hay, and pasture. Undrained areas provide wildlife habitat, and some are used for unimproved pasture. The potential is good for cultivated crops, hay, and pasture. It is fair for trees. The potential is good for openland and woodland wildlife habitat and fair for wetland habitat. It is fair or poor for most recreational development and poor for most engineering uses.

If drained, this soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture. Surface drainage is needed to remove excess surface water rapidly. Deep ditches and tiles are used for internal drainage. If tiles are placed in the underlying sand, loose sand will enter the tile line unless precautions are taken. Ditchbanks are easily eroded by flowing water, and vertical banks will cave and plug the ditch. Regular additions of organic matter help to maintain fertility and good tilth.

If drained, this soil is suited to legumes and grasses for hay and pasture. Overgrazing destroys the plant cover and encourages undesirable plants. Grazing when the soil is wet compacts the surface, which results in poor tilth and reduced water infiltration. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is suited to trees. Competing vegetation, however, interferes with natural regeneration or the establishment of plantings. It can be removed mechanically or controlled through the use of suitable herbicides.

This soil is poorly suited to septic tank absorption fields because of the seasonal high water table and the occasional flooding in some areas. The suitability can be improved by building a filtering mound of suitable material and by constructing levees and dikes to prevent flooding. The soil is poorly suited to dwellings with or without basements and to small commercial buildings because of the seasonal high water table and occasional flooding. Draining the soil to lower the water table and constructing levees and dikes to prevent flooding overcome these hazards. This soil is poorly suited to local roads and streets because of the lack of sufficient strength to support vehicular traffic, the high potential frost action, and the occasional flooding. The frost action limitation can be overcome by draining the soil and replacing the soil with suitable base material. Suitable base material also overcomes the low strength limitation. Dikes and levees can be used to protect the soil from flooding.

The capability unit is IIw-5. The woodland suitability subclass is 3o.

ShA—Shiffer Variant sandy loam, 0 to 3 percent slopes. This nearly level and gently sloping, somewhat poorly drained soil is on plane and concave slopes in drainageways and depressions of outwash plains and stream terraces. In some areas it is subject to flooding or ponding during wet periods and after heavy rains. Most areas are oblong and range from 3 to 90 acres.

Typically, the surface layer is very dark brown sandy loam about 9 inches thick. The subsoil is about 27 inches thick. It is dark grayish brown and brown, friable sandy loam in the upper part and brown, very friable loamy sand in the lower part. It is mottled with grayish brown, yellowish brown, and strong brown. The substratum to a depth of about 60 inches is yellowish brown, loose sand. It is mottled with yellowish brown and strong brown. In some small areas the surface layer is loam or loamy sand. In some, the dark surface layer is more than 10 inches thick. In some, the substratum is stratified sandy and loamy deposits. In some small areas this soil is less than 24 inches deep over underlying sand.

Included with this soil in mapping are small areas of Billett and Shiffer soils. Also included are some small areas where the entire subsoil is loamy sand. The well drained and moderately well drained Billett soil is in slightly higher, better drained positions than this Shiffer variant. The somewhat poorly drained Shiffer soil is in landscape positions similar to those of this Shiffer variant

where there is less sand and more silt and clay in the soil. Included soils make up about 5 to 10 percent of the unit.

Permeability is moderately rapid in this Shiffer variant. The available water capacity is low. Surface runoff is slow. This soil has a water table at a depth of 1 to 3 feet during wet periods. Root penetration is limited by the water table during wet periods of the growing season unless this soil is drained. Natural fertility is low. The surface layer is moderate in organic-matter content. It is friable and can be easily worked throughout a wide range in moisture content.

Drained areas of this soil are used for cultivated crops, hay, and pasture. Undrained areas provide wildlife habitat, and some are used for unimproved pasture. The potential is fair for cultivated crops, hay, and pasture. Under intensive management and irrigation, the potential is good for these uses. It is fair for trees. It is good for openland wildlife habitat and woodland wildlife habitat and fair for wetland habitat. The potential is fair or poor for recreational development and poor for most engineering uses.

If drained, this soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture. Surface drainage is needed to remove excess surface water rapidly. Deep ditches and tiles are used for internal drainage. If tiles are used, loose sand will enter the tile line unless precautions are taken. Ditchbanks are easily eroded by flowing water, and vertical banks will cave and plug the ditch. Drained and cultivated areas are subject to soil blowing. Minimum tillage, crop residue management, windbreaks, and winter cover crops help to prevent soil blowing. If the water table is lowered excessively, crop yields are limited during most seasons by the low available water capacity. This soil is suited to sprinkler irrigation. Fertilization, irrigation, and controlled drainage are needed for dependable crop production.

If drained, this soil is suited to legumes and grasses for forage yields. Unless the soil is irrigated, hay and pasture are limited during most seasons by the low available water capacity. Overgrazing destroys the plant cover, which results in soil blowing and encourages undesirable plants. Fertilization, irrigation, renovation, and controlled grazing help to maintain the plant cover and improve yields.

This soil is suited to trees. Competing vegetation, however, interferes with natural regeneration and the establishment of plantings. It can be removed mechanically or controlled through the use of suitable herbicides.

This soil is poorly suited to septic tank absorption fields because of the seasonal high water table and the occasional flooding in some areas. The suitability can be improved by building a filtering mound of suitable material and by constructing levees and dikes to prevent flooding. The soil is poorly suited to dwellings with or without basements and to small commercial buildings because of the seasonal high water table and the occasional flooding in some areas. Draining the soil to lower the water table and constructing levees and dikes to prevent flooding overcome these limitations. This soil is poorly suited to local roads and streets because of the high potential frost action and the occasional flooding. The frost action limitation can be overcome by draining the soil and replacing the soil with suitable base material. Dikes and levees can be used to protect this soil from flooding.

The capability unit is IIIw-6. The woodland suitability subclass is 3o.

SnB—Sisson loam, 2 to 6 percent slopes. This gently sloping, well drained soil is on plane slopes in glacial lake basins. Most areas are oblong and range from 3 to 142 acres.

Typically, the surface layer is dark grayish brown loam about 8 inches thick. The subsoil is about 31 inches thick. It is dark yellowish brown, firm loam in the upper part; brown and dark yellowish brown, firm clay loam in the middle part; and dark yellowish brown, friable silt loam in the lower part. The substratum to a depth of about 60 inches is calcareous stratified fine sand, very fine sand, and silt loam. In some areas this soil is eroded. In some small areas the surface layer is silt loam or sandy loam. In some, the entire subsoil is silt loam and silty clay loam. In some areas the substratum is stratified silt loam and silty clay loam. In some areas depth to the calcareous stratified lacustrine deposits is more than 42 inches, and in some it is more than 60 inches.

Included with this soil in mapping are small areas of Mosel and Billett soils, small areas of this soil where slopes are less than 2 percent or more than 6 percent, and small severely eroded areas of Sisson loam. Also included are some areas of this soil where most of the subsoil is sandy loam. The somewhat poorly drained Mosel soil is in drainageways and along the edges of wet bottoms. The well drained Billett soil is in landscape positions similar to those of this Sisson soil where there is more sand and less silt and clay in the soil. Included soils make up about 5 to 10 percent of the unit.

Permeability is moderate in this Sisson soil. The available water capacity is high. Surface runoff is medium. Natural fertility is high. The surface layer is moderately low or moderate in organic-matter content. It is friable and can be easily worked throughout a wide range in moisture content.

Most areas of this soil are used for cultivated crops, hay, and pasture. Some areas are native woodland. The potential is good for cultivated crops, hay, pasture, and trees. It is good for openland and woodland wildlife habitat but is very poor for wetland habitat. The potential is good for recreational development and good or fair for most engineering uses.

This soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture. The hazard of erosion is slight in cultivated areas. Crop residue management, minimum tillage, contour stripcropping,

grassed waterways, and winter cover crops help to control erosion. Regular additions of organic matter help to maintain fertility and good tilth and increase water infiltration.

Erosion is generally not a problem in areas where this soil is used for pasture and hay. Overgrazing, however, destroys the plant cover and results in erosion. Grazing when the soil is wet compacts the surface, which results in poor tilth and increases runoff and the hazard of erosion. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is suited to trees. Competing vegetation, however, interferes with natural regeneration and the establishment of plantings. It can be removed mechanically or controlled through the use of suitable herbicides.

This soil is suited to septic tank absorption fields. It is only moderately suited to dwellings with or without basements and to small commercial buildings because it lacks sufficient strength to adequately support building foundations. This limitation can be overcome by replacing the soil with suitable base material. This soil is poorly suited to local roads and streets because it lacks sufficient strength to adequately support vehicular traffic. This limitation can be overcome by replacing this soil with suitable base material.

The capability unit is IIe-1. The woodland suitability subclass is 2o.

SpB—Sparta loamy sand, 1 to 6 percent slopes. This nearly level to gently sloping, excessively drained soil is on relatively smooth flats on outwash plains and stream terraces. Most areas are irregular in shape and range from 3 to 400 acres. Some nearly level areas are as much as 700 acres.

Typically, the surface layer is very dark brown loamy sand about 9 inches thick. The subsurface layer is very dark brown and very dark grayish brown loamy sand about 7 inches thick. The subsoil is dark yellowish brown, very friable loamy sand about 14 inches thick. The substratum to a depth of about 60 inches is yellowish brown over light yellowish brown, loose sand. In some small areas this soil is eroded, mainly as a result of soil blowing. In some areas slopes are less than 1 percent. In some small areas the surface layer is sand.

Included with this soil in mapping are small areas of Plainfield, Sparta variant, and Watseka soils. Also included are small sloping areas and severely eroded areas of Sparta loamy sand. The severe erosion mainly is the result of soil blowing. The excessively drained Plainfield soil is in landscape positions similar to those of this Sparta soil and is commonly in blowouts or in wind-deposited sand dunes. The somewhat poorly drained Watseka soil is in shallow depressions and drainageways. The moderately well drained Sparta variant is in slightly lower landscape positions than this Sparta soil. Included soils make up about 5 percent of the unit.

Permeability is rapid in this Sparta soil. The available water capacity is low. Surface runoff is slow. Natural fertility is low. The surface layer is moderately low in organic-matter content. It is very friable and can be easily worked throughout a wide range in moisture content.

Most areas of this soil are used for cultivated crops, hay, and pasture. Some are used for such vegetable crops as sweet corn, potatoes, beets, and peas. Some small areas are native woodland, and some have been planted to pines. The potential is fair for cultivated crops and pasture. Under intensive management and irrigation, the potential is good for these uses. The potential is fair for trees. It is fair for openland and woodland wildlife habitat and very poor for wetland habitat. The potential is fair for recreational development and good for most engineering uses.

This soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture, but crop yields are limited during most seasons by the low available water capacity. The soil is suited to sprinkler irrigation, however. If the soil is irrigated, better and more consistent yields can be expected. Erosion is generally not a problem, but this soil is subject to blowing. Crop residue management, minimum tillage, windbreaks, and winter cover crops help to control soil blowing. Fertilization, irrigation, and protection from soil blowing are needed for dependable crop production. Because this soil is rapidly permeable, irrigation rates should be limited to prevent washing plant nutrients out of the root zone.

The use of this soil as pastureland or hayland is effective in controlling soil blowing. Forage yields, however, generally are low unless the soil is fertilized and irrigated. Planting early in spring before the soil has a chance to dry, is best. Later plantings are likely to have a poor survival rate. Overgrazing destroys the plant cover and results in soil blowing. Fertilization, renovation, and controlled grazing help to maintain the plant cover.

This soil is suited to trees. Poor seedling survival in dry years can be offset by careful planting and by planting vigorous nursery stock. Competing vegetation, which interferes with natural regeneration and the establishment of plantings, can be removed mechanically or controlled through the use of suitable herbicides.

This soil is suited to septic tank absorption fields. There is, however, a danger of ground water pollution as a result of the rapid permeability in the substratum. This soil is suited to building site development.

The capability unit is IVs-4. The woodland suitability subclass is 3s.

SpC—Sparta loamy sand, 6 to 12 percent slopes. This sloping, excessively drained soil is on convex side slopes of outwash plains and stream terraces. Most areas are oblong and range from 3 to 70 acres.

Typically, the surface layer is very dark brown loamy sand about 9 inches thick. The subsurface layer is very dark brown and very dark grayish brown loamy sand about 5 inches thick. The subsoil is dark yellowish

brown, very friable loamy sand about 14 inches thick. The substratum to a depth of 60 inches is yellowish brown over light yellowish brown, loose sand. In some areas this soil is eroded. In some areas the surface layer is thinner and lighter in color than is typical. In some small areas the surface layer is sand.

Included with this soil in mapping are small areas of Gotham soil. Also included are small gently sloping areas of Sparta loamy sand, small areas of this soil where slopes are more than 11 percent, and some small severely eroded areas of this soil. The erosion commonly is a result of soil blowing. The Gotham soil occupies landscape positions similar to those of this Sparta soil, but the Gotham soil has slightly more clay in the subsoil. Included soils make up about 5 percent of the unit.

Permeability is rapid in this Sparta soil. The available water capacity is low. Surface runoff is medium. Natural fertility is low. The surface layer is moderately low in organic-matter content. It is very friable and can be easily worked throughout a wide range in moisture content.

Most areas of this soil are used for cultivated crops, hay, and pasture. Some small areas are native woodland, and some have been planted to pines. The potential is poor for cultivated crops and fair for hay and pasture. Under intensive management and irrigation, the potential is fair for these uses. The potential is fair for trees. It is fair for openland and woodland wildlife habitat and very poor for wetland habitat. It is fair for recreational development and fair or poor for most engineering uses.

This soil generally is not suitable for crop production. Crop yields are limited during most seasons by the low available water capacity. The soil is suited to sprinkler irrigation, and if irrigated it is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture. In areas where this soil is cultivated, the hazard of erosion is moderate, and the soil is subject to blowing. Crop residue management, minimum tillage, windbreaks, contour stripcropping, grassed waterways, and winter cover crops help to control erosion and soil blowing. Fertilization, irrigation, and protection from soil blowing are needed for dependable crop production. Because the soil is rapidly permeable, irrigation rates should be limited to prevent washing plant nutrients out of the root zone.

The use of this soil as pastureland or hayland is effective in controlling erosion and soil blowing. Forage yields are generally low unless the soil is fertilized and irrigated. Planting early in spring, before the soil has a chance to dry, is best. Later plantings are likely to have a poor survival rate. Overgrazing destroys the plant cover and results in soil blowing. Fertilization, renovation, and controlled grazing help to maintain the plant cover.

This soil is suited to trees. Poor seedling survival in dry years can be offset by careful planting and by planting vigorous nursery stock. Competing vegetation, which interferes with natural regeneration and the establishment of plantings, can be removed mechanically or controlled through the use of suitable herbicides.

This soil is moderately suited to septic tank absorption fields because of the slope. This limitation can be overcome by reshaping the site or by installing the field on the contour. There is, however, a danger of ground water pollution as a result of the rapidly permeable substratum. This soil is moderately suited to dwellings with or without basements and to local roads and streets because of the slope. It is poorly suited to small commercial buildings because of the slope. The slope limitation for all these uses can be overcome by reshaping the site. Local roads and streets can also be constructed on the contour.

The capability unit is IVs-4. The woodland suitability subclass is 3s.

St—Sparta Variant loamy sand. This nearly level, moderately well drained soil is on concave and plane slopes on broad, smooth outwash plains and stream terraces. Most areas are oblong and range from 3 to 120 acres. One area is about 930 acres.

Typically, the surface layer is very dark brown loamy sand about 8 inches thick. The subsurface layer is very dark brown loamy sand about 6 inches thick. The subsoil is about 18 inches thick. It is dark yellowish brown and yellowish brown, very friable loamy sand. It is mottled with yellowish red. The substratum to a depth of about 60 inches is brownish yellow and strong brown over light yellowish brown, loose sand. It is mottled with yellowish red and strong brown. In some small areas this soil is eroded, mainly as a result of soil blowing. In some, slopes are more than 1 percent. In some, the surface layer is sand.

Included with this soil in mapping are small areas of Sparta and Watseka soils. Also included are some small severely eroded areas of Sparta variant loamy sand. The erosion is a result of soil blowing. The excessively drained Sparta soil is in slightly higher landscape positions. The somewhat poorly drained Watseka soil is in slightly lower, wetter landscape positions. Included soils make up about 5 to 10 percent of the unit.

Permeability is rapid in this Sparta variant. The available water capacity is low. Surface runoff is slow. This soil has a water table at a depth of 2-1/2 to 5 feet during wet periods. Natural fertility is low. The surface layer is moderately low in organic-matter content. It is very friable and can be easily worked throughout a wide range in moisture content.

Most areas of this soil are used for cultivated crops, hay, and pasture, and some are used for such vegetable crops as sweet corn, potatoes, beets, and peas. Some small areas are native woodland, and some have been planted to pines. The potential is fair for cultivated crops and pasture. Under intensive management and irrigation, the potential is good for these uses. It is fair for trees. The potential is fair for openland and woodland wildlife habitat and very poor for wetland habitat. It is fair for

recreational development and good or fair for most engineering uses.

This soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture, but crop yields are limited during most seasons by the low available water capacity. The soil is suited to sprinkler irrigation, and if it is irrigated, better and more consistent yields can be expected. Erosion is generally not a problem, but the soil is subject to blowing. Crop residue management, minimum tillage, windbreaks, and winter cover crops help to control soil blowing. Fertilization, irrigation, and protection from soil blowing are needed for dependable crop production. Because the soil is rapidly permeable, irrigation rates should be limited to prevent washing plant nutrients out of the root zone.

The use of this soil as pastureland or hayland is effective in controlling soil blowing. Forage yields, however, are generally low unless the soil is fertilized and irrigated. Planting early in spring, before the soil has dried, is best. Later plantings are likely to have a poor survival rate. Overgrazing destroys the plant cover and results in soil blowing. Fertilization, renovation, and controlled grazing help to maintain the plant cover.

This soil is suited to trees. Seedling mortality is a problem because the soil is sandy. Seedling survival can be improved by careful planting and by planting vigorous nursery stock. Competing vegetation interferes with the establishment of plantings. It can be controlled through the use of suitable herbicides or removed mechanically. If the soil is left bare of plant cover, soil blowing is a problem.

This soil is poorly suited to septic tank absorption fields because of the seasonal high water table. The suitability can be improved by building a filtering mound of suitable material. The soil is suited to dwellings without basements, to small commercial buildings, and to local roads and streets. It is only moderately suited to dwellings with basements, however, because of the seasonal high water table. This limitation can be overcome by draining the soil to lower the water table.

The capability unit is IVs-4. The woodland suitability subclass is 3s.

TaA—Tama silt loam, 0 to 2 percent slopes. This nearly level, well drained soil is on broad, flat ridgetops and benches on loess-covered unglaciated uplands. Most areas are irregular in shape. Most of the acreage is in one area of 410 acres. Smaller areas range from 3 to 50 acres.

Typically, the surface layer is very dark brown silt loam about 9 inches thick. The subsurface layer is very dark brown silt loam about 6 inches thick. The subsoil is about 35 inches thick. It is dark brown, friable silt loam in the upper part and dark yellowish brown, firm silty clay loam in the lower part. The substratum to a depth of about 60 inches is yellowish brown, friable silt loam. In some small areas the dark surface layer is less than 10 inches thick. In some, the lower part of the subsoil and the substratum are mottled. In some, the loess mantle is less than 60 inches deep over sand or sandstone.

Included with this soil in mapping are small areas of Rowley soil. Also included are small areas of gently sloping Tama silt loam. The somewhat poorly drained Rowley soil is in drainageways and depressions of benches. Included soils make up about 5 percent of the unit.

Permeability is moderate in this Tama soil. The available water capacity is very high. Surface runoff is slow. Natural fertility is high. The surface layer is high in organic-matter content. It is friable and can be easily worked throughout a wide range in moisture content.

Most areas of this soil are used for cultivated crops, hay, and pasture. The potential is good for cultivated crops, hay, and pasture, and poor for trees. It is good for openland and woodland wildlife habitat and very poor for wetland habitat. The potential is good for recreational development and good or fair for most engineering uses.

This soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture. Erosion is generally not a problem. Regular additions of organic matter help to maintain fertility and good tilth and to increase water infiltration. Under good management, the soil can be cropped intensively.

This soil is suited to pasture and hay. Overgrazing, however, destroys the plant cover and encourages undesirable species. Grazing when the soil is wet compacts the surface, which results in poor tilth. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and plant cover in good condition.

This soil is not naturally forested and generally is not managed for woodland.

This soil is suited to septic tank absorption fields. It is only moderately suited to dwellings with or without basements and to small commercial buildings because it lacks sufficient strength and stability to adequately support building foundations. This limitation can be overcome by replacing the soil with suitable base material. The soil is poorly suited to local roads and streets because of the high potential frost action and the lack of sufficient strength to adequately support building foundations. These limitations can be overcome by replacing this soil with suitable base material.

The capability unit is I-1. The woodland suitability subclass is not assigned.

TaB—Tama silt loam, 2 to 6 percent slopes. This gently sloping, well drained soil is on convex ridgetops, foot slopes, and benches on loess-covered glaciated uplands. Most areas are irregular in shape and range from 3 to 95 acres. A few areas are 200 to 300 acres.

Typically, the surface layer is very dark brown silt loam about 9 inches thick. The subsurface layer is very dark brown silt loam about 4 inches thick. The subsoil is about 35 inches thick. It is dark brown, friable silt loam in the upper part and brown and dark yellowish brown, firm

silty clay loam in the lower part. The substratum to a depth of about 60 inches is yellowish brown, friable silt loam. In some small areas the thickness of the dark surface and subsurface layer is less than 10 inches. In some, the lower part of the subsoil and the substratum are mottled. In some, the loess mantle is less than 60 inches deep over sand or sandstone.

Included with this soil in mapping are small nearly level areas, sloping areas, and severely eroded areas of Tama silt loam, and some small areas of this soil which are saturated with water at a depth of 2-1/2 feet during wet periods. The wet areas are in drainageways and depressions and on foot slopes along the margins of wet bottoms. Included soils make up about 5 to 10 percent of the unit.

Permeability is moderate in this Tama soil. The available water capacity is very high. Surface runoff is medium. Natural fertility is high. The surface layer is high in organic-matter content. It is friable and can be easily worked throughout a wide range in moisture content.

Most areas of this soil are used for cultivated crops, hay, and pasture. The potential is good for cultivated crops, hay, and pasture and poor for trees. It is good for openland and woodland wildlife habitat but very poor for wetland habitat. The potential is good for recreational development and good or fair for most engineering uses.

This soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture. The hazard of erosion is slight in cultivated areas. Crop residue management, minimum tillage, contour stripcropping, grassed waterways, and winter cover crops help to control erosion. Regular additions of organic matter help to maintain fertility and good tilth and increase water infiltration.

Erosion is generally not a problem in areas where this soil is used for pasture and hay. Overgrazing, however, destroys the plant cover and results in erosion. Grazing when the soil is wet compacts the surface, which results in poor tilth and increases runoff and the hazard of erosion. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is not naturally forested and generally is not managed for woodland.

This soil is suited to septic tank absorption fields. It is only moderately suited to dwellings with or without basements and to small commercial buildings because it lacks sufficient strength and stability to adequately support building foundations. This limitation can be overcome by replacing the soil with suitable base material. The soil is poorly suited to local roads and streets because of the high potential frost action and the lack of sufficient strength to support vehicular traffic. These limitations can be overcome by replacing this soil with suitable base material.

The capability unit is IIe-1. The woodland suitability subclass is not assigned.

TaC2—Tama silt loam, 6 to 12 percent slopes, eroded. This sloping, well drained soil is on convex ridgetops and on side slopes and benches of loess-covered unglaciated uplands. Most areas are oblong and range from 3 to 35 acres.

Typically, the surface layer is very dark brown silt loam about 8 inches thick. The subsurface layer is very dark brown silt loam about 2 inches thick. The subsoil is about 33 inches thick. It is dark brown, friable silt loam in the upper part and dark yellowish brown, firm silty clay loam in the lower part. The substratum to a depth of about 60 inches is yellowish brown, friable silt loam. In some small areas the dark colored surface layer is less than 10 inches thick. In some, the lower part of the subsoil and the substratum are mottled. In some small areas, the loess mantle is less than 60 inches thick over sand or sandstone.

Included with this soil in mapping are small gently sloping areas and severely eroded areas of Tama silt loam. Included soils make up about 5 percent of the unit.

Permeability is moderate in this Tama soil. The available water capacity is very high. Surface runoff is medium. Natural fertility is high. The surface layer is high in organic-matter content. It is friable and can be easily worked throughout a wide range in moisture content.

Most areas of this soil are used for cultivated crops, hay, and pasture. Some areas are native woodland. The potential is fair for cultivated crops. It is good for hay and pasture and poor for trees. It is good for openland and woodland wildlife habitat but very poor for wetland habitat. The potential is fair for recreational development and for most engineering uses.

This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. The hazard of further erosion is moderate in cultivated areas. Crop residue management, minimum tillage, contour stripcropping, grassed waterways, and winter cover crops help to control erosion. Regular additions of organic matter help to maintain fertility and good tilth and to increase water infiltration.

Erosion is generally not a problem in areas where this soil is used for pasture or hay. Overgrazing, however, destroys the plant cover and results in erosion. Grazing when the soil is wet compacts the surface, which results in poor tilth and increases runoff and the hazard of further erosion. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is not naturally forested and generally is not managed for woodland.

This soil is moderately suited to septic tank absorption fields because of the slope. This limitation can be overcome by reshaping the site or by installing the field on the contour. The soil is moderately suited to dwellings with or without basements because of the slope and the lack of sufficient strength and stability to adequately support building foundations. The slope limitation can be overcome by reshaping the site. Low strength and poor

stability can be overcome by replacing this soil with suitable base material. The soil is poorly suited to small commercial buildings because of the slope. This limitation can be overcome by reshaping the site. The soil is poorly suited to local roads and streets because of the high potential frost action and the lack of sufficient strength to adequately support vehicular traffic. These limitations can be overcome by replacing this soil with suitable base material.

The capability unit is IIIe-1. The woodland suitability subclass is not assigned.

TeA—Tell silt loam, 0 to 2 percent slopes. This nearly level, well drained soil is on outwash plains and stream terraces. Most areas are irregular in shape and range from 3 to 25 acres.

Typically, the surface layer is dark grayish brown silt loam about 10 inches thick. The subsoil is about 27 inches thick. It is brown and dark yellowish brown, firm silt loam in the upper part; dark yellowish brown, firm silty clay loam in the middle part; and yellowish brown, firm loam in the lower part. The substratum to a depth of about 60 inches is yellowish brown, loose sand with strata of dark yellowish brown, very friable loamy sand. In some small areas this soil is gently sloping. In some, the silty mantle is less than 20 inches thick, and in others it is more than 36 inches thick. In some small areas gravel is in the lower part of the subsoil and in the substratum. In some, the substratum is stratified silty, loamy, and sandy sediments.

Included with this soil in mapping are small areas of Dells soils. Also included are some small areas of this Tell soil, which are saturated with water at a depth of 2-1/2 feet during wet periods. The somewhat poorly drained Dells soil is in drainageways and depressions and along the edges of wet bottoms. Included soils make up about 5 percent of the unit.

In this Tell soil permeability is moderate in the subsoil and rapid in the substratum. The available water capacity is moderate. Surface runoff is slow. Root penetration is limited by the underlying sand. Natural fertility is moderate. The surface layer is moderately low or moderate in organic-matter content. It is friable and can be easily worked throughout a wide range in moisture content. It tends to crust, however, after heavy rains.

Most areas of this soil are used for cultivated crops, and some are used for hay and pasture. A few small areas are native woodland. The potential is good for cultivated crops, hay, pasture, and trees. It is good for openland and woodland wildlife habitat but very poor for wetland habitat. It is good for recreational developments and fair for most engineering uses.

This soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture. Erosion is generally not a problem. Regular additions of organic matter help to maintain fertility and good tilth and to increase water infiltration.

This soil is suited to pasture and hay. Overgrazing, however, destroys the plant cover and encourages undesirable species. Grazing when the soil is wet compacts the surface, which results in poor tilth. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is suited to trees. Competing vegetation, however, interferes with natural regeneration and the establishment of plantings. It can be removed mechanically or controlled through the use of suitable herbicides.

This soil is suited to septic tank absorption fields. There is a danger of ground water pollution, however, as a result of the rapidly permeable substratum. The soil is moderately suited to dwellings with or without basements and to small commercial buildings because the subsoil lacks sufficient strength and stability to support building foundations. These limitations can be overcome by replacing the soil with a suitable base material. The soil is poorly suited to local roads and streets because of the lack of sufficient strength to support vehicular traffic and the high potential frost action. These limitations can be overcome by replacing this soil with suitable base material. The soil is a fair source of topsoil.

The capability unit is IIs-1. The woodland suitability group is 2o.

TeB—Tell silt loam, 2 to 6 percent slopes. This gently sloping, well drained soil is on convex and plane slopes on outwash plains and stream terraces. Most areas are irregular in shape and range from 3 to 80 acres.

Typically, the surface layer is dark grayish brown silt loam about 9 inches thick. The subsoil is about 25 inches thick. It is brown and dark yellowish brown, firm silt loam in the upper part; dark yellowish brown, firm silty clay loam in the middle part; and yellowish brown, firm loam in the lower part. The substratum to a depth of about 60 inches is yellowish brown, loose sand with strata of dark yellowish brown, very friable loamy sand. In some small areas this soil is nearly level, and in some, it is eroded. In some small areas the silty mantle is less than 20 inches thick, and in others it is more than 36 inches thick. In some small areas gravel is in the lower part of the subsoil and the substratum. In some, the substratum is stratified silty, loamy, and sandy sediments.

Included with this soil in mapping are small areas of Billett and Dells soils and small sloping areas and severely eroded areas of Tell silt loam. Also included are some small areas of this soil, which are saturated with water at a depth as shallow as 2-1/2 feet during wet periods. The well drained and moderately well drained Billett soil is in landscape positions similar to those of this Tell soil where there is more sand and less silt and clay in the soil. The somewhat poorly drained Dells soil is in drainageways and depressions and along the edges of wet bottoms. Included soils make up about 5 to 10 percent of the unit.

In this Tell soil permeability is moderate in the subsoil and rapid in the substratum. The available water capacity

is moderate. Surface runoff is medium. Root penetration is limited by the underlying sand. Natural fertility is moderate. The surface layer is moderately low or moderate in organic-matter content. It is friable and can be easily worked throughout a wide range in moisture content. It tends to crust, however, after heavy rains.

Most areas of this soil are used for cultivated crops, and some are used for hay and pasture. A few small areas are native woodland. The potential is good for cultivated crops, hay, pasture, and trees. It is good for openland and woodland wildlife habitat but very poor for wetland habitat. The potential is good for recreational development and fair for most engineering uses.

This soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture. The hazard of erosion is slight in cultivated areas. Crop residue management, minimum tillage, contour stripcropping, grassed waterways, and winter cover crops help to control erosion. Regular additions of organic matter help to maintain fertility and good tilth and increase water infiltration.

Erosion is generally not a problem in areas where this soil is used for pasture and hay. Overgrazing, however, destroys the plant cover and results in erosion. Grazing when the soil is wet compacts the surface, which results in poor tilth and increases runoff and the hazard of erosion. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is suited to trees. Competing vegetation, however, interferes with natural regeneration or the establishment of plantings. It can be removed mechanically or controlled through the use of suitable herbicides.

This soil is suited to septic tank absorption fields. Ground water pollution is a hazard, however, because the substratum is rapidly permeable. The soil is moderately suited to dwellings with or without basements and to small commercial buildings because the subsoil lacks sufficient strength and stability to support building foundations. These limitations can be overcome by replacing the soil with a suitable base material. The soil is poorly suited to local roads and streets because it lacks sufficient strength to support vehicular traffic and has a high potential frost action. These limitations can be overcome by replacing the soil with suitable base material. This soil is a fair source of topsoil.

The capability unit is IIe-2. The woodland suitability group is 2o.

TeC2—Tell silt loam, 6 to 12 percent slopes, eroded. This sloping, well drained soil is on short, uneven convex side slopes on outwash plains and stream terraces. Most areas are long and narrow and range from 3 to 40 acres.

Typically, the surface layer is dark grayish brown silt loam about 8 inches thick. In most cultivated areas, it contains some brown subsoil material that has been mixed in by plowing. The subsoil is about 22 inches thick. It is brown and dark yellowish brown, firm silt loam in the upper part; dark yellowish brown, firm silty clay loam in the middle part; and yellowish brown, firm loam in the lower part. The substratum to a depth of about 60 inches is yellowish brown, loose sand with strata of dark yellowish brown, very friable loamy sand. In some small areas this soil is not eroded. In some, the silty mantle is less than 20 inches thick, and in some, the subsoil is dominantly loam. In some small areas gravel is in the lower part of the subsoil and in the substratum. In some, the substratum is stratified silty, loamy, and sandy sediments.

Included with this soil in mapping are small areas of Billett soil and small gently sloping, moderately steep, and severely eroded areas of Tell silt loam. The well drained Billett soil is in landscape positions similar to those of this Tell soil where there is more sand and less silt and clay in the soil. Included soils make up about 5 to 10 percent of the unit.

In this Tell soil permeability is moderate in the subsoil and rapid in the substratum. The available water capacity is moderate. Surface runoff is medium. Root penetration is limited by the underlying sand. Natural fertility is moderate. The surface layer is moderately low or moderate in organic-matter content. It is friable and can be easily worked throughout a wide range in moisture content. It tends to crust, however, after heavy rains, especially in areas where the plow layer contains subsoil material.

Most areas of this soil are used for cultivated crops, hay, and pasture. Some areas are native woodland. The potential is fair for cultivated crops. It is good for pasture and trees. The potential is good for openland and woodland wildlife habitat but very poor for wetland habitat. It is fair for most recreational development and most engineering uses.

This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. The hazard of further erosion is moderate in cultivated areas. Crop residue management, minimum tillage, contour stripcropping, grassed waterways, and winter cover crops help to control erosion. Regular additions of organic matter help to maintain fertility and good tilth and to increase water infiltration.

Erosion generally is not a problem in areas where this soil is used for pasture or hay. Overgrazing, however, destroys the plant cover and results in erosion. Grazing when the soil is wet compacts the surface, which results in poor tilth and increases runoff and the hazard of further erosion. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is suited to trees. Competing vegetation, however, interferes with natural regeneration or the establishment of plantings. It can be removed mechanically or controlled through the use of suitable herbicides.

This soil is moderately suited to septic tank absorption fields because of the slope. This limitation can be overcome by reshaping the site or by placing the field on the

contour. Ground water pollution is a hazard, however, as a result of the rapidly permeable substratum. This soil is only moderately suited to dwellings with or without basements because the subsoil lacks sufficient strength and stability to support building foundations and because of the slope. It is poorly suited to small commercial buildings because of the slope. Insufficient strength and stability can be overcome by replacing the soil with suitable base material. The slope limitation can be overcome by reshaping the site. The soil is poorly suited to local roads and streets because of the lack of sufficient strength to support vehicular traffic and because of the high potential frost heaving. These limitations can be overcome by replacing this soil with suitable base material.

The capability unit is IIIe-2. The woodland suitability subclass is 2o.

TeD2—Tell silt loam, 12 to 20 percent slopes, eroded. This moderately steep, well drained soil is on short, uneven convex side slopes on outwash plains and stream terraces. Most areas are long and narrow and range from 3 to 25 acres.

Typically, the surface layer is dark grayish brown silt loam about 7 inches thick. In most cultivated areas, it contains some brown subsoil material that has been mixed in by plowing. The subsoil is about 17 inches thick. It is brown and dark yellowish brown, firm silt loam in the upper part; dark yellowish brown, firm silty clay loam in the middle part; and yellowish brown, firm loam in the lower part. The substratum to a depth of about 60 inches is yellowish brown, loose sand with strata of dark yellowish brown, very friable loamy sand. In some small areas this soil is not eroded. In some, the silty mantle is less than 20 inches thick, and in some, the subsoil is dominantly loam. In some small areas gravel is in the lower part of the subsoil and in the substratum. In some, the substratum is stratified silty, loamy and sandy sediments.

Included with this soil in mapping are small areas of Billett and Gotham soils. Also included are small sloping areas and severely eroded areas of Tell silt loam and some small areas of this soil where slopes are more than 20 percent. The well drained Billett soil and the somewhat excessively drained Gotham soil are in landscape positions similar to those of this Tell soil where there is more sand and less silt and clay in the soil. Included soils make up 10 to 15 percent of the unit.

In this Tell soil permeability is moderate in the subsoil and rapid in the substratum. The available water capacity is moderate. Surface runoff is rapid. Root penetration is limited by the underlying sand. Natural fertility is moderate. The surface layer is moderately low or moderate in organic-matter content. It is friable and can be easily worked throughout a wide range in moisture content. It tends to crust, however, after heavy rains, especially in areas where the plow layer contains subsoil material.

Most areas of this soil are used for hay and pasture. Some areas are used for cultivated crops, and some are native woodland. The potential is fair for cultivated crops. It is good for pasture and trees. The potential is good for openland and woodland wildlife habitat but very poor for wetland habitat. It is poor for most recreational development and most engineering uses.

This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. The hazard of further erosion is severe in cultivated areas. Crop residue management, minimum tillage, contour stripcropping, grassed waterways, and winter cover crops help to control erosion. Regular additions of organic matter help to maintain fertility and good tilth and to increase water infiltration.

Erosion is generally not a problem in areas where this soil is used for pasture or hay. Overgrazing, however, destroys the plant cover and results in erosion. Grazing when the soil is wet compacts the surface, which results in poor tilth and increases runoff and the hazard of further erosion. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is suited to trees. Soil related problems in forest management are associated with steepness of slope; mortality of seedlings on hot, dry sites; and brush encroachment following harvest. Planting trees on the contour and selecting the best location for skid roads during harvest minimize erosion and improve equipment trafficability. Seedling mortality on south- and west-facing slopes can be reduced by careful planting and by planting vigorous nursery stock. Vegetation that competes with planted seedlings or natural reproduction following harvest can be removed mechanically or controlled through use of suitable herbicides.

This soil is poorly suited to septic tank absorption fields because of the slope. This limitation can be overcome by reshaping the site or by selecting a less sloping site. Ground water pollution is a hazard as a result of the rapidly permeable substratum. The soil is poorly suited to dwellings with or without basements and to small commercial buildings because of the slope. This limitation can be overcome by reshaping the site or by selecting a less sloping site. The soil is poorly suited to local roads and streets because of the slope, the high potential frost action, and the insufficient strength to support vehicular traffic. The slope limitation can be overcome by reshaping the site and by constructing roads on the contour if possible. The potential frost action and low strength can be overcome by replacing this soil with suitable base material.

The capability unit is IVe-2. The woodland suitability subclass is 2r.

TvA—Toddville silt loam, 0 to 2 percent slopes. This nearly level, moderately well drained soil is on broad, flat outwash plains and stream terraces. Most areas are irregular in shape and range from 3 to 155 acres. One area is 310 acres.

Typically, the surface layer is black silt loam about 9 inches thick and very dark brown silt loam about 2

inches thick. The subsoil is about 47 inches thick. It is dark brown, friable silt loam in the upper part; brown, firm silty clay loam in the middle part; and brown and yellowish brown, friable stratified loam, sandy loam, and loamy sand in the lower part. The middle part of the subsoil is mottled with yellowish brown, yellowish red, and grayish brown; and the lower part is mottled with grayish brown. The substratum to a depth of about 60 inches is brown, loose sand. It is mottled with yellowish brown. In some small areas the surface layer is thinner or lighter in color than is typical. In some, the silty mantle is less than 40 inches thick, and in others it is more than 60 inches thick. In some small areas this soil is underlain by soft sandstone or stratified sandy and loamy deposits.

Included with this soil in mapping are small areas of Richwood and Rowley soils. Also included are small areas of gently sloping Toddville silt loam. The well drained Richwood soil is in landscape positions similar to those of this Toddville soil where depth to the water table is more than 6 feet. The somewhat poorly drained Rowley soil is in drainageways and depressions and along the edges of wet bottoms. Included soils make up about 5 to 10 percent of the unit.

In this Toddville soil permeability is moderate in the subsoil and rapid in the substratum. The available water capacity is high. Surface runoff is slow. This soil has a water table at a depth of 2-1/2 to 5 feet during wet periods. Natural fertility is high. The surface layer is high in organic-matter content. It is friable and can be easily worked throughout a wide range in moisture content.

Most areas of this soil are used for cultivated crops, hay, and pasture. The potential is good for cultivated crops, hay, and pasture and poor for trees. It is good for openland wildlife habitat, poor for woodland habitat, and very poor for wetland habitat. The potential is good for recreational development and fair or poor for most engineering uses.

This soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture. Erosion is generally not a problem, and under proper management the soil can be cropped intensively. Regular additions of organic matter help to maintain fertility and good tilth and increase water infiltration.

This soil is suited to pasture and hay. Overgrazing, however, destroys the plant cover and encourages undesirable plants. Grazing when the soil is wet compacts the surface, which results in poor tilth. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is not naturally forested and is not generally managed for woodland.

This soil is poorly suited to septic tank absorption fields because of the seasonal high water table. The suitability can be improved by building a filtering mound of suitable material. The soil is moderately suited to dwellings with or without basements and to small commercial buildings because it lacks sufficient strength and stability to support building foundations. These limitations can be overcome by replacing the soil with suitable base material. The soil is moderately suited to dwellings with basements because of the seasonal high water table. This limitation can be overcome by draining the soil to lower the water table. This soil is poorly suited to local roads and streets because of the high potential frost action and the lack of sufficient strength to support vehicular traffic. These limitations can be overcome by replacing this soil with suitable base material.

The capability unit is I-1. The woodland suitability subclass is not assigned.

TvB—Toddville silt loam, 2 to 6 percent slopes. This gently sloping, moderately well drained soil is on convex side slopes and in undulating areas of outwash plains and stream terraces. Most areas are irregular in shape and range from 3 to 140 acres.

Typically, the surface layer is black silt loam about 9 inches thick and very dark brown silt loam about 2 inches thick. The subsoil is about 47 inches thick. It is dark brown, friable silt loam in the upper part; brown, firm silty clay loam in the middle part; and brown and yellowish brown, friable stratified loam, sandy loam, and loamy sand in the lower part. The middle part is mottled with yellowish brown, yellowish red, and grayish brown, and the lower part is mottled with grayish brown. The substratum to a depth of about 60 inches is brown, loose sand. It is mottled with yellowish brown. In some small areas this soil is eroded. In some, the surface layer is thinner or lighter in color than is typical. In some, the silty mantle is less than 40 inches thick, and in others it is more than 60 inches thick. In some small areas this soil is underlain by soft sandstone or stratified sandy and loamy deposits.

Included with this soil in mapping are small areas of Richwood soils. Also included are small areas of nearly level Toddville silt loam and some small areas where slopes are more than 6 percent. The well drained Richwood soil is in landscape positions similar to those of this Toddville soil where the depth to the water table is more than 6 feet. Included soils make up about 5 to 10 percent of the unit.

In this Toddville soil permeability is moderate in the subsoil and rapid in the substratum. The available water capacity is high. Surface runoff is slow. This soil has a water table at a depth of 2-1/2 to 5 feet during wet periods. Natural fertility is high. The surface layer is high in organic-matter content. It is friable and can be easily worked throughout a wide range in moisture content.

Most areas of this soil are used for cultivated crops, hay, and pasture. The potential is good for cultivated crops, hay, pasture, and trees. It is good for openland wildlife habitat, poor for woodland habitat, and very poor for wetland wildlife habitat. The potential is good for most recreational development and fair or poor for most engineering uses.

This soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture. The

hazard of erosion is slight in cultivated areas. Crop residue management, minimum tillage, contour stripcropping, grassed waterways, and winter cover crops help to control erosion. Regular additions of organic matter help to maintain fertility and good tilth and to increase water infiltration.

Erosion is generally not a problem in areas where this soil is used for pasture and hay. Overgrazing, however, destroys the plant cover and results in erosion. Grazing when the soil is wet compacts the surface, which results in poor tilth and increases runoff and the hazard of erosion. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is not naturally forested and is not generally managed for woodland.

This soil is poorly suited to septic tank absorption fields as a result of the seasonal high water table. The suitability can be improved by building a filtering mound of suitable material. The soil is moderately suited to dwellings with or without basements and to small commercial buildings because it lacks sufficient strength and stability to support building foundations. These limitations can be overcome by replacing the soil with suitable base material. The soil is moderately suited to dwellings with basements because of the seasonal high water table. This limitation can be overcome by draining the soil to lower the water table. The soil is poorly suited to local roads and streets because of the high potential frost action and the lack of sufficient strength to support vehicular traffic. These limitations can be overcome by replacing this soil with suitable base material.

The capability unit is IIe-1. The woodland suitability subclass is not assigned.

TwB—Tustin loamy sand, 1 to 6 percent slopes. This nearly level and gently sloping, well drained soil is on concave and plane slopes in glacial lake basins. Most areas are irregular in shape and range from 3 to 50 acres.

Typically, the surface layer is dark grayish brown loamy sand about 10 inches thick. The subsoil is about 32 inches thick. It is dark yellowish brown and yellowish brown, very friable and loose sand in the upper part; dark yellowish brown, friable sandy loam in the middle part; and reddish brown and brown, firm silty clay and silty clay loam in the lower part. The substratum to a depth of about 60 inches is brown, firm silty clay loam. In some areas the surface layer is sand. In some small areas the soil is eroded, mainly as a result of blowing. In some small areas the sandy mantle is less than 20 inches thick, and in others it is more than 40 inches thick over the clayey subsoil. In some small areas this soil is more than 50 inches deep over calcareous, stratified lacustrine deposits.

Included with this soil is mapping are small areas of Briggsville and Rimer soils. Also included are some small areas of severely eroded Tustin loamy sand and some small areas of this soil where slopes are more than 6 percent. The well drained Briggsville soil is in landscape positions similar to those of this Tustin soil where there is no 20- to 40-inch sandy mantle. The somewhat poorly drained Rimer soil is in slightly lower, wetter landscape positions than this Tustin soil. Included soils make up 5 to 10 percent of the unit.

In this Tustin soil permeability is rapid in the sandy upper part of the subsoil and slow in the clayey lower part of the subsoil and the substratum. The available water capacity is moderate. Surface runoff is medium. Natural fertility is moderate. The surface layer is low in organic-matter content. It is friable and can be easily worked throughout a wide range in moisture content.

Most areas of this soil are used for cultivated crops, hay, and pasture. Some areas are native woodland, and some have been planted to pines. The potential is fair for cultivated crops, hay, and pasture. If the soil is irrigated, the potential for these uses is good. It is fair for trees. The potential is fair for openland wildlife habitat, good for woodland habitat, and very poor for wetland habitat. It is fair for recreational development and poor for most engineering uses.

This soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture. It is suited to sprinkler irrigation, and if it is irrigated, better and more consistent yields can be expected. Erosion is generally not a problem, but the soil is subject to blowing. Crop residue management, minimum tillage, windbreaks, and winter cover crops help to control soil blowing. Fertilization, irrigation, and protection from soil blowing are needed for dependable crop production.

The use of this soil as pastureland or hayland is effective in controlling soil blowing. Forage yields are generally somewhat limited unless the soil is irrigated. Planting early in spring, before the soil has a chance to dry, is best. Later plantings are likely to have a poor survival rate. Overgrazing destroys the plant cover and results in soil blowing. Fertilization, renovation, and controlled grazing help to maintain the plant cover.

This soil is suited to trees. Competing vegetation, however, interferes with natural regeneration and the establishment of plantings. It can be removed mechanically or controlled through the use of suitable herbicides.

This soil is poorly suited to septic tank absorption fields because the lower part is slowly permeable. The suitability can be improved by building a filtering mound of suitable material or possibly by increasing the size of the field. The soil is poorly suited to dwellings with or without basements and to small commercial buildings because it lacks sufficient strength to adequately support building foundations. This limitation can be overcome by replacing the soil with suitable base material. This soil is moderately suited to local roads and streets because of the moderate potential frost action. This limitation can be overcome by replacing the soil with suitable base material.

The capability unit is IIIe-4. The woodland suitability subclass is 3o.

UfB—Urne fine sandy loam, 2 to 6 percent slopes. This gently sloping, somewhat excessively drained soil is on convex ridgetops and concave foot slopes and valley floors of unglaciated sandstone uplands. Most areas are oblong or irregular in shape and range from 3 to 125 acres.

Typically, the surface layer is very dark grayish brown fine sandy loam about 8 inches thick. The subsoil is friable fine sandy loam about 19 inches thick. It is dark yellowish brown in the upper part, brown in the middle part, and yellowish brown in the lower part. Soft sandstone bedrock begins at a depth of about 27 inches and extends to 60 inches or more. The upper part is yellowish brown, glauconitic sandstone; and the lower part is interbedded reddish brown siltstone and yellowish brown and dark yellowish brown, very fine grained sandstone. The lower part of the subsoil and the substratum contain many flecks of grayish green glauconite. In some areas this soil is eroded. In some small areas, it is sloping, and in others, slopes are less than 2 percent. In some small areas the surface layer is loam or loamy fine sand. In some, this soil is less than 20 inches deep over glauconitic sandstone, and in others it is more than 40 inches deep. In some small areas the underlying sandstone contains no glauconite.

Included with this soil in mapping are small areas of Boone, Eleva variant, and Norden soils. The excessively drained Boone soil is in landscape positions similar to those of this Urne soil where there is more sand and less silt and clay in the soil. The somewhat poorly drained Eleva variant is in drainageways and depressions. The well drained Norden soil is in landscape positions similar to those of the Urne soil where there is more silt and clay and less sand in the soil. Included soils make up about 5 to 10 percent of the unit.

Permeability is moderately rapid in this Urne soil. The available water capacity is low. Surface runoff is medium. Root penetration is limited by the underlying sandstone. Natural fertility is low. The surface layer is low in organic-matter content. It is very friable and can be easily worked throughout a wide range in moisture content.

Most areas of this soil are used for cultivated crops, hay, and pasture. Some areas are native woodland, and some have been planted to pines. The potential is fair for cultivated crops, hay, and pasture. Under intensive management and irrigation, the potential is good for these uses. It is fair for trees. The potential is fair for openland and woodland wildlife habitat but very poor for wetland habitat. It is good for most recreational development and fair or poor for most engineering uses.

This soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture, but crop yields are limited during most seasons by the low available water capacity. The soil is suited to sprinkler irrigation. If it is irrigated and intensely managed, better and more consistent yields can be expected. In areas where this soil is cultivated, the hazard of erosion is slight and the soil is subject to blowing. Crop residue management, minimum tillage, windbreaks, contour stripcropping, and winter cover crops help to control erosion and soil blowing. Fertilization, irrigation, and protection from soil blowing are needed for dependable crop production.

This soil is suited to hay and pasture, but forage yields are generally somewhat limited unless the soil is fertilized and irrigated. Erosion and soil blowing are generally not hazards. Overgrazing, however, destroys the plant cover and results in erosion and soil blowing. Fertilization, renovation, and controlled grazing help to maintain the plant cover.

This soil is suited to trees. Competing vegetation, however, interferes with natural regeneration and the establishment of plantings. It can be removed mechanically or controlled through the use of suitable herbicides.

This soil is poorly suited to septic tank absorption fields because of the depth to bedrock. The suitability can be improved by building a filtering mound of suitable material. The soil is suited to dwellings without basements and to small commercial buildings. It is moderately suited to dwellings with basements because of the depth to rock. This limitation can be overcome by adding fill to the building site to increase the thickness of the base material. The soil is moderately suited to local roads and streets because of the potential frost action. This limitation can be overcome by replacing this soil with suitable base material.

The capability unit is IIIe-4. The woodland suitability subclass is 3o.

UfC2—Urne fine sandy loam, 6 to 12 percent slopes, eroded. This sloping, somewhat excessively drained soil is on convex ridgetops and concave side slopes and valley floors of unglaciated sandstone uplands. Most areas are oblong or irregular in shape and range from 3 to 35 acres.

Typically, the surface layer is very dark grayish brown fine sandy loam about 7 inches thick. In most cultivated areas it contains some dark yellowish brown subsoil material that has been mixed in by plowing. The subsoil is friable fine sandy loam about 17 inches thick. It is dark yellowish brown in the upper part, brown in the middle part, and yellowish brown in the lower part. Bedrock begins at a depth of about 24 inches and extends to 60 inches or more. The upper part is yellowish brown, soft glauconitic sandstone; and the lower part is interbedded, reddish brown soft siltstone and yellowish brown and dark yellowish brown, very fine grained soft sandstone. The lower part of the subsoil and the substratum contain many flecks of grayish green glauconite. In some small areas this soil is not eroded. In some, it is gently sloping. In some small areas the surface layer is loam or loamy fine sand. In some, this soil is less than 20 inches deep over sandstone, and in others it is more than 40 inches deep. In some small areas the underlying sandstone contains no glauconite.

Included with this soil in mapping are small areas of Boone and Norden soils. Also included are some small

severely eroded areas and moderately steep areas of Urne sandy loam. The excessively drained Boone soil is in landscape positions similar to those of this Urne soil where there is more sand and less silt and clay in the soil. The well drained Norden soil is in landscape positions similar to those of the Urne soil where there is less sand and more silt and clay in the soil. Included soils make up about 5 to 10 percent of the unit.

Permeability is moderately rapid in this Urne soil. The available water capacity is low. Surface runoff is medium. Root penetration is limited by the underlying sandstone. Natural fertility is low. The surface layer is low in organic-matter content. It is very friable and can be easily worked throughout a wide range in moisture content.

Most areas of this soil are used for cultivated crops, hay, and pasture. Some areas are native woodland, and some have been planted to pines. The potential is fair for cultivated crops, hay, and pasture. It is fair for trees. The potential is fair for openland and woodland wildlife habitat and very poor for wetland habitat. It is fair for recreational development and fair or poor for most engineering uses.

This soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture, but crop yields are limited during most seasons by the low available water capacity. The soil is suited to sprinkler irrigation. If it is irrigated, better and more consistent yields can be expected. In areas where this soil is cultivated, the hazard of further erosion is moderate and the soil is subject to blowing. Crop residue management, minimum tillage, contour stripcropping, grassed waterways, windbreaks, and winter cover crops help to control erosion and soil blowing. Fertilization, irrigation, and protection from soil blowing are needed for dependable crop production.

The use of this soil as pastureland or hayland is effective in controlling erosion and soil blowing, but forage yields are generally limited unless the soil is fertilized and irrigated. Overgrazing destroys the plant cover and results in erosion and soil blowing. Fertilization, renovation, and controlled grazing help to maintain the plant cover.

This soil is suited to trees. Competing vegetation, however, interferes with natural regeneration and the establishment of plantings. It can be removed mechanically or controlled through the use of suitable herbicides.

This soil is poorly suited to septic tank absorption fields because of the depth to rock. The suitability can be improved by building a filtering mound of suitable material. The soil is moderately suited to dwellings without basements and poorly suited to small commercial buildings because of the slope. This limitation can be overcome by reshaping the site. The soil is moderately suited to dwellings with basements because of slope and depth to rock. Adding fill to increase the thickness of the base material and shaping to a more suitable slope will overcome these limitations. This soil is moderately suited to local roads and streets because of slope and the potential frost action. The slope limitation can be overcome by cutting and shaping and by constructing roads on the contour. The potential frost action can be overcome by replacing the soil with suitable base material.

The capability unit is IVe-4. The woodland suitability subclass is 3o.

UfD2—Urne fine sandy loam, 12 to 20 percent slopes, eroded. This moderately steep, somewhat excessively drained soil is on convex side slopes of unglaciated sandstone uplands. Most areas are oblong and range from 3 to 35 acres. One area is 170 acres.

Typically, the surface layer is very dark grayish brown fine sandy loam about 6 inches thick. In most cultivated areas, it contains some dark yellowish brown subsoil material that has been mixed in by plowing. The subsoil is friable fine sandy loam about 17 inches thick. It is dark yellowish brown in the upper part, brown in the middle part, and yellowish brown in the lower part. Soft bedrock begins at a depth of about 23 inches and extends to 60 inches or more. The upper part is yellowish brown, glauconitic sandstone; and the lower part is interbedded, reddish brown siltstone and yellowish brown and dark yellowish brown, very fine grained sandstone. The lower part of the subsoil and the substratum contains many flecks of grayish green glauconite. In some small areas this soil is not eroded. In some, the surface layer is loam or loamy fine sand. In some, this soil is less than 20 inches deep over glauconitic sandstone, and in others it is more than 40 inches deep. In some small areas the underlying sandstone contains no glauconite.

Included with this soil in mapping are small areas of Boone and Norden soils. Also included are some small severely eroded areas, sloping areas, and steep areas of Urne sandy loam. The excessively drained Boone soil is in landscape positions similar to those of this Urne soil where there is more sand and less silt and clay in the soil. The well drained Norden soil is in landscape positions similar to those of the Urne soil where there is less sand and more silt and clay in the soil. Included soils make up about 5 to 10 percent of the unit.

Permeability is moderately rapid in this Urne soil. The available water capacity is low. Surface runoff is rapid. Root penetration is limited by the underlying sandstone. Natural fertility is low. The surface layer is low in organic-matter content. It is very friable and can be easily worked throughout a wide range in moisture content.

Most areas of this soil are used for hay and pasture. Some areas are native woodland, and some have been planted to pines. The potential is poor for cultivated crops and fair for hay and pasture. It is fair for trees. The potential is fair for openland and woodland wildlife habitat but very poor for wetland habitat. It is poor for most recreational development and most engineering uses.

This soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture. Crop yields are limited during most seasons by the low available water capacity. In areas where this soil is cultivated,

the hazard of further erosion is severe and the soil is subject to blowing. Crop residue management, minimum tillage, contour stripcropping, grassed waterways, and winter cover crops help to control erosion and soil blowing.

The use of this soil as pastureland or hayland is effective in controlling erosion and soil blowing, but forage yields are generally limited by the low available water capacity. Overgrazing destroys the plant cover and results in erosion and soil blowing. Fertilization, renovation, and controlled grazing help to maintain the plant cover.

This soil is suited to trees. Soil related problems in forest management are associated with steepness of slope; mortality of seedlings on hot, dry sites; and brush encroachment following harvest. Planting trees on the contour and selecting the best location for skid roads during harvest minimize erosion and improve equipment trafficability. Seedling mortality on south- and west-facing slopes can be reduced by careful planting and by planting vigorous nursery stock. Vegetation that competes with planted seedlings or natural reproduction following harvest can be removed mechanically or controlled through use of suitable herbicides.

This soil is poorly suited to septic tank absorption fields because of the depth to rock and the slope. In places the suitability can be improved by building a filtering mound of suitable material and reshaping the site. Generally, however, a less sloping site where the soil is thicker over bedrock should be selected. The slope also makes this soil poorly suited to building site development. Unless the limitation can be overcome by reshaping the site, a less sloping site should be selected.

The capability unit is VIe-4. The woodland suitability subclass is 3r.

UfE—Urne fine sandy loam, 20 to 30 percent slopes. This steep, somewhat excessively drained soil is on convex side slopes on unglaciated sandstone uplands. Most areas are long and narrow and range from 3 to 130 acres.

Typically, the surface layer is very dark gray fine sandy loam about 3 inches thick. The subsurface layer is dark grayish brown fine sandy loam about 3 inches thick. The subsoil is friable fine sandy loam about 17 inches thick. It is dark yellowish brown in the upper part, brown in the middle part, and yellowish brown in the lower part. Soft bedrock begins at a depth of 23 inches and extends to 60 inches or more. The upper part is yellowish brown, glauconitic sandstone; and the lower part is interbedded, reddish brown siltstone and yellowish brown and dark brown, very fine grained sandstone. The lower part of the subsoil and the substratum contain many flecks of grayish green glauconite. In some small areas this soil is eroded. In some, the surface layer is loam or loamy fine sand. In some small areas this soil is less than 20 inches deep over glauconitic sandstone, and in others it is more than 40 inches deep. In some small areas the underlying sandstone contains no glauconite.

Included with this soil in mapping are small areas of Boone and Norden soils, some small severely eroded areas and moderately steep areas of Urne sandy loam, and some small areas of this soil where slopes are more than 30 percent. Also included are some small areas of sandstone Rock outcrop. The excessively drained Boone soil is in landscape positions similar to those of this Urne soil where there is more sand and less silt and clay in the soil. The well drained Norden soil is in landscape positions similar to those of the Urne soil where there is less sand and more silt and clay in the soil. Included soils make up about 10 to 15 percent of the unit.

Permeability is moderately rapid in this Urne soil. The available water capacity is low. Surface runoff is very rapid. Root penetration is limited by the underlying sandstone. Natural fertility is low. Organic-matter content of the surface layer is low.

Most areas of this soil are native woodland, and some areas have been planted to pines. Some areas are used for cultivated crops, hay, and pasture. The potential is poor for cultivated crops and fair for hay, pasture, and trees. It is poor for openland wildlife habitat, fair for woodland habitat, and very poor for wetland habitat. The potential is poor for recreational development and for most engineering uses.

This soil generally is not suitable for cultivated crops because of the low available water capacity and the very severe hazards of erosion and soil blowing.

This soil is suitable for hay and pasture. These crops control erosion and soil blowing, but forage yields generally are limited by the low available water capacity. Overgrazing destroys the plant cover and results in erosion and soil blowing. Fertilization, renovation, and controlled grazing help to maintain the plant cover.

This soil is suited to trees. Soil related problems in forest management are associated with steepness of slope; mortality of seedlings on hot, dry sites; and brush encroachment following harvest. Planting trees on the contour and selecting the best location for skid roads during harvest minimize erosion and improve equipment trafficability. Seedling mortality on south- and west-facing slopes can be reduced by careful planting and by planting vigorous nursery stock. Vegetation that competes with planted seedlings or natural reproduction following harvest can be removed mechanically or controlled through use of suitable herbicides.

This soil is poorly suited to septic tank absorption fields because of the depth to rock and the slope. Generally, a less sloping site where the soil is thicker over bedrock should be selected. The slope also makes this soil poorly suited to building site development. Unless this limitation can be overcome by reshaping the site, a less sloping site should be selected.

The capability unit is VIIe-4. The woodland suitability subclass is 3r.

VaB—Valton silt loam, 2 to 6 percent slopes. This gently sloping, well drained soil is on broad, convex

ridgetops on unglaciated uplands covered with loess over clayey material. Most areas are long and narrow and range from 3 to 205 acres. One area is about 400 acres.

Typically, the surface layer is dark grayish brown silt loam about 9 inches thick. The subsoil to a depth of about 60 inches is dark yellowish brown, friable silt loam in the upper part; brown, firm silty clay loam in the middle part; and reddish brown and yellowish red, very firm cherty clay in the lower part. In some small areas this soil is eroded. In some, the surface layer and silty subsoil are more than 15 percent chert fragments. In some small areas the loess mantle is less than 15 inches thick, and in others it is more than 40 inches thick. In some areas the lower part of the subsoil is mottled. In some, the clayey subsoil is less than 15 percent chert fragments, and in others it is more than 35 percent chert fragments. In some areas the clayey subsoil has lenses or pockets of sandy loam, sandy clay loam, or sandy clay. In some small areas this soil is less than 60 inches deep over dolomite; in others the underlying dolomite has completely weathered away, and the clayey subsoil is underlain by sandstone.

Included with this soil in mapping are small areas of Reedsburg soil, small sloping areas and severely eroded areas of Valton silt loam, and some small areas of this soil where slopes are less than 2 percent. The somewhat poorly drained Reedsburg soil is on the broader ridgetops where a perched water table is above the cherty clay at a depth as shallow as 1 foot during wet periods. Included soils make up 5 to 10 percent of the unit.

In this Valton soil permeability is moderate in the loess mantle and slow in the cherty clay. The available water capacity is moderate. Surface runoff is medium. Natural fertility is moderate. The surface layer is moderate in organic-matter content. It is friable and can be easily worked throughout a wide range in moisture content. It tends to crust, however, after hard rains.

Most areas of this soil are used for cultivated crops, hay, and pasture. Some areas are native woodland. The potential is good for cultivated crops, hay, pasture, and trees. It is good for openland and woodland wildlife habitat but very poor for wetland habitat. The potential is good or fair for recreational development and poor for most engineering uses.

This soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture. The hazard of erosion is slight in cultivated areas. Crop residue management, minimum tillage, contour stripcropping, grassed waterways, and winter cover crops help to control erosion. Regular additions of organic matter help to maintain fertility and good tilth and increase water infiltration.

Erosion is generally not a problem in areas where this soil is used for pasture and hay. Overgrazing, however, destroys the plant cover and results in erosion. Grazing when the soil is wet compacts the surface, which results in poor tilth and increases runoff and the hazard of erosion. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is suited to trees. Competing vegetation, however, interferes with natural regeneration and the establishment of plantings. It can be removed mechanically or controlled through the use of suitable herbicides.

This soil is poorly suited to septic tank absorption fields because of the slow permeability. The suitability can be improved by building a filtering mound of suitable material or possibly by increasing the size of the field. The soil is poorly suited to dwellings with or without basements and to small commercial buildings because it lacks sufficient strength and stability to adequately support building foundations. These limitations can be overcome by replacing the soil with suitable base material. This soil is poorly suited to local roads and streets because of the high potential frost action and the lack of sufficient strength and stability to adequately support vehicular traffic. These limitations can be overcome by replacing the soil with suitable base material.

The capability unit is IIe-1. The woodland suitability subclass is 2o.

VaC2—Valton silt loam, 6 to 12 percent slopes, eroded. This sloping, well drained soil is on convex ridgetops and the upper part of side slopes on unglaciated uplands covered with loess over clayey material. Most areas are long and narrow and range from 3 to 315 acres. One area is 480 acres.

Typically, the surface layer is very dark grayish brown silt loam about 8 inches thick (fig. 11). In most cultivated areas, it contains some dark yellowish brown subsoil material that has been mixed in by plowing. The subsoil to a depth of about 60 inches is dark yellowish brown, friable silt loam in the upper part; brown, firm silty clay loam in the middle part; and reddish brown and yellowish red, very firm cherty clay in the lower part. In some areas the surface layer and silty subsoil are more than 15 percent chert fragments. In some areas the clayey subsoil is less than 15 percent chert fragments, and in others it is more than 35 percent chert fragments. In some small areas the loess mantle is less than 15 inches thick, and in others it is more than 40 inches thick. In some small areas this soil is less than 60 inches deep over dolomite; in others the underlying dolomite has completely weathered away, and the clayey subsoil is underlain by sandstone.

Included with this soil in mapping are small gently sloping areas, moderately steep areas, and severely eroded areas of Valton silt loam. In many of the severely eroded areas the surface layer is silt loam with a high content of clay or it is silty clay loam. Included soils make up about 10 to 15 percent of the unit.

In this Valton soil permeability is moderate in the loess mantle and slow in the cherty clay. The available water capacity is moderate. Surface runoff is medium. Natural fertility is moderate. The surface layer is moderate in

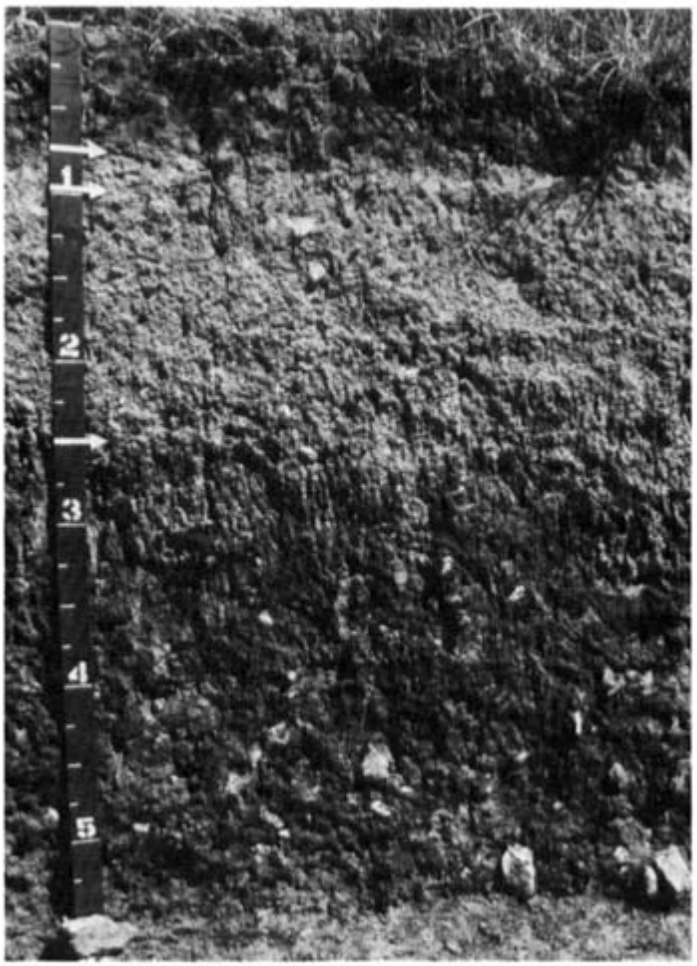


Figure 11.—Profile of Valton silt loam. This soil formed in loess and the cherty clay residuum from dolomite.

organic-matter content. It is friable and can be easily worked throughout a wide range in moisture content. It tends to crust, however, after hard rains, especially in areas where the surface layer contains subsoil material.

Most areas of this soil are used for cultivated crops, hay, and pasture. Some areas are native woodland. The potential is fair for cultivated crops and good for hay, pasture, and trees. It is good for openland and woodland wildlife habitat but very poor for wetland habitat. The potential is fair for most recreational development and poor for most engineering uses.

This soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture. The hazard of further erosion is moderate in cultivated areas. Crop residue management, minimum tillage, contour stripcropping, grassed waterways, and winter cover crops help to control erosion. Regular additions of organic matter help to maintain fertility and good tilth and increase water infiltration.

Erosion is generally not a problem in areas where this soil is used for pasture and hay. Overgrazing, however, destroys the plant cover and results in erosion. Grazing when the soil is wet compacts the surface, which results in poor tilth and increases runoff and the hazard of erosion. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is suited to trees. Competing vegetation, however, interferes with natural regeneration and the establishment of plantings. It can be removed mechanically or controlled through the use of suitable herbicides.

This soil is poorly suited to septic tank absorption fields because of the slow permeability. The suitability can be improved by building a filtering mound or possibly by increasing the size of the field. The soil is poorly suited to dwellings with or without basements and to small commercial buildings because it lacks sufficient strength and stability to adequately support building foundations. These limitations can be overcome by replacing the soil with suitable base material. The soil is also poorly suited to small commercial buildings because of the slope. This limitation can be overcome by reshaping the site. This soil is poorly suited to local roads and streets because of the high potential frost action and the lack of sufficient strength and stability to adequately support vehicular traffic. These limitations can be overcome by replacing the soil with suitable base material.

The capability unit is IIIe-1. The woodland suitability subclass is 2o.

VaD2—Valton silt loam, 12 to 20 percent slopes, eroded. This moderately steep, well drained soil is on convex ridgetops and the upper part of side slopes on unglaciated uplands covered with loess over clayey material. Most areas are long and narrow and range from 3 to 270 acres.

Typically, the surface layer is dark grayish brown silt loam about 7 inches thick. In most cultivated areas, it contains some dark yellowish brown subsoil material than has been mixed in by plowing. The subsoil to a depth of about 60 inches is dark yellowish brown, friable silt loam in the upper part; brown, firm silty clay loam in the middle part; and reddish brown and yellowish red, very firm cherty clay in the lower part. In some small areas this soil is not eroded. In some areas the surface layer and silty subsoil are more than 15 percent chert fragments. In some small areas the loess mantle is less than 15 inches thick, and in others it is more than 40 inches thick. In some areas the lower part of the subsoil is mottled. In some, the clayey subsoil is less than 15 percent chert fragments and in others it is more than 35 percent chert fragments. In some areas the clayey subsoil has lenses or pockets of sandy loam, sandy clay loam, or sandy clay. In some, this soil is less than 60 inches deep over dolomite; in others the underlying dolomite has completely weathered away, and the clayey subsoil is underlain by sandstone.

Included with this soil in mapping are small sloping areas, steep areas, and severely eroded areas of Valton

silt loam. In many of the severely eroded areas the surface layer is silt loam with a high content of clay or it is silty clay loam. Included soils make up about 10 to 15 percent of the unit.

In this Valton soil permeability is moderate in the loess mantle and slow in the cherty clay. The available water capacity is moderate. Surface runoff is rapid. Natural fertility is moderate. The surface layer is moderate in organic-matter content. It is friable and can be easily worked throughout a wide range in moisture content. It tends to crust, however, after hard rains, especially in areas where the surface layer contains subsoil material.

Most areas of this soil are used for cultivated crops, hay, and pasture. Some areas are native woodland. The potential is fair for cultivated crops but is good for hay, pasture, and trees. It is fair for openland wildlife habitat, good for woodland habitat, and very poor for wetland habitat. The potential is poor for most recreational development and most engineering uses.

This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay or pasture. The hazard of further erosion is severe in cultivated areas. Crop residue management, minimum tillage, contour stripcropping, grassed waterways, and winter cover crops are needed to minimize erosion. Regular additions of organic matter help to maintain fertility and good tilth and increase water infiltration.

Erosion is generally not a problem in areas where this soil is used for pasture or hay. Overgrazing, however, destroys the plant cover and results in erosion. Grazing when the soil is wet compacts the surface, which results in poor tilth and increases runoff and the hazard of further erosion. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is suited to trees. Soil related problems in forest management are associated with steepness of slope; mortality of seedlings on hot, dry sites; and brush encroachment following harvest. Planting trees on the contour and selecting the best location for skid roads during harvest will minimize erosion and improve equipment trafficability. Seedling mortality on south- and west-facing slopes can be reduced by careful planting and by planting vigorous nursery stock. Vegetation that competes with planted seedlings and natural reproduction following harvest can be removed mechanically or controlled through use of suitable herbicides.

This soil is poorly suited to septic tank absorption fields because of the slope and the slow permeability. In places the suitability can be improved by building a filtering mound of suitable material and reshaping. Generally, however, a less sloping site should be selected. The soil is poorly suited to dwellings with or without basements and to small commercial buildings because of the slope and the lack of sufficient strength and stability to adequately support building foundations. The slope limitation can be overcome by reshaping the site. The low strength and stability limitations can be overcome by replacing the soil with suitable base material. This soil is poorly suited to local roads and streets because of the slope, the high potential frost action, and the lack of sufficient strength to adequately support vehicular traffic. The slope limitation can be overcome by reshaping the site and constructing the roads on the contour. The potential frost action and low strength can be overcome by replacing the soil with suitable base material.

The capability unit is IVe-1. The woodland suitability subclass is 2r.

VaE—Valton silt loam, 20 to 30 percent slopes. This steep, well drained soil is on the upper part of side slopes on unglaciated uplands covered with loess over clayey material. Most areas are long and narrow and range from 3 to 70 acres.

Typically, the surface layer is very dark gray silt loam about 3 inches thick. The subsurface layer is dark grayish brown silt loam about 4 inches thick. The subsoil to a depth of about 60 inches is dark yellowish brown, friable silt loam in the upper part; brown, firm silty clay loam in the middle part; and reddish brown and yellowish red, very firm cherty clay in the lower part. In some small areas this soil is eroded. In some areas the surface layer and silty subsoil are more than 15 percent chert fragments. In some small areas the loess mantle is less than 15 inches thick, and in others it is more than 40 inches thick. In some areas the lower part of the subsoil is mottled. In some, the clayey subsoil is less than 15 percent chert fragments, and in others it is more than 35 percent chert fragments. In some areas the clayey subsoil has lenses or pockets of sandy loam, sandy clay loam, or sandy clay. In some small areas this soil is less than 60 inches deep over dolomite; in others the underlying dolomite has completely weathered away, and the clayey subsoil is underlain by sandstone.

Included with this soil in mapping are small moderately steep areas and severely eroded areas of Valton silt loam and some small areas of this soil where slopes are more than 30 percent. In many severely eroded areas the surface layer is silt loam with a high content of clay or it is silty clay loam. Included soils make up about 10 to 15 percent of the unit.

In this Valton soil permeability is moderate in the loess mantle and slow in the cherty clay. The available water capacity is moderate. Surface runoff is very rapid. Natural fertility is moderate. Organic-matter content of the surface layer is moderate.

Most areas of this soil are native woodland. Some areas are used for hay and pasture, and some are used for cultivated crops. The potential is poor for cultivated crops. It is good for hay, pasture, and trees. The potential is fair for openland wildlife habitat, good for woodland habitat, and very poor for wetland habitat. It is poor for recreational development and for all engineering uses.

This soil generally is not suitable for cultivated crops. The hazard of erosion is very severe in cultivated areas.

This soil is suited to hay and pasture, and erosion is generally not a problem in areas where it is used for

these crops. Overgrazing, however, destroys the plant cover and results in erosion. Grazing when the soil is wet compacts the surface, which results in poor tilth and increases runoff and the hazard of erosion. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is suited to trees. Soil related problems in forest management are associated with steepness of slope; mortality of seedlings on hot, dry sites; and brush encroachment following harvest. Planting trees on the contour and selecting the best location for skid roads during harvest minimize erosion and improve equipment trafficability. Seedling mortality on south- and west-facing slopes can be reduced by careful planting and by planting vigorous nursery stock. Vegetation that competes with planted seedlings and natural reproduction following harvest can be removed mechanically or controlled through the use of suitable herbicides.

This soil is poorly suited to septic tank absorption fields because of the slope and the slow permeability. Generally, a less sloping site should be selected. The soil is poorly suited to dwellings with or without basements and to small commercial buildings because of the slope and the lack of sufficient strength and stability to adequately support building foundations. The slope limitation can be overcome by reshaping the site. Low strength and poor stability limitation can be overcome by replacing the soil with suitable base material. The soil is poorly suited to local roads and streets because of the slope, the high potential frost action, and the lack of sufficient strength to adequately support building foundations. The slope limitation can be overcome by reshaping the site and constructing roads on the contour. The potential frost action hazard and low strength limitation can be overcome by replacing this soil with suitable base material.

The capability unit is VIe-1. The woodland suitability subclass is 2r.

Wt—Watseka loamy sand. This nearly level, somewhat poorly drained soil is on broad outwash plains and stream terraces. Most areas are oblong or irregular in shape and range from 3 to 75 acres.

Typically, the surface layer is very dark gray loamy sand about 8 inches thick. The subsurface layer is very dark gray loamy sand about 4 inches thick. The subsoil is very friable loamy sand. It is dark grayish brown in the upper part and grayish brown in the lower part. Yellowish brown mottles are in the lower part of the subsoil. The substratum to a depth of about 60 inches is pale brown and brown, loose sand. It is mottled with yellowish brown and yellowish red. In some small areas the surface layer is sandy loam or sand, and in some, it is less than 10 inches thick. In some small areas this soil is eroded as a result of soil blowing.

Included with this soil in mapping are small areas of Sparta and Sparta variant soils. Also included are small areas of this soil where pockets or thin discontinuous lenses of sandy loam, sandy clay loam, or clay loam are in the subsoil or substratum. The moderately well drained Sparta variant and the excessively drained Sparta soil are in slightly higher, better drained positions than the Watseka soil. Included soils make up about 5 percent of the unit.

Permeability is rapid in this Watseka soil. The available water capacity is low. Surface runoff is slow. This soil has a water table at a depth of 1 to 3 feet during wet periods. Root penetration is limited by the water table during wet periods of the growing season. Natural fertility is low. The surface layer is moderately low in organic-matter content. It is very friable and can be easily worked throughout a wide range in moisture content.

Most areas of this soil are used for cultivated crops, and a few are used for hay and pasture. Some areas are used for such vegetable crops as sweet corn, potatoes, beets, and peas. Some small areas have been planted to pines. The potential is poor for cultivated crops, hay, and pasture. Under intensive management and irrigation, it is fair for these uses. The potential is fair for trees. It is fair for openland wildlife habitat, good for woodland habitat, and poor for wetland habitat. It is fair or poor for recreational development and poor for most engineering uses.

This soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture. Most areas of the soil do not need drainage for crop production because the water table is not high enough late in spring to affect tillage and planting. The soil is suited to sprinkler irrigation. When the water table drops, crop yields are limited by the low available water capacity if the soil is not irrigated. Erosion is generally not a problem, but cultivated areas are subject to soil blowing. Crop residue management, minimum tillage, windbreaks, and winter cover crops help to control soil blowing. Fertilization, irrigation, and protection from soil blowing are needed for dependable crop production. Because the soil is rapidly permeable, irrigation rates should be limited to prevent washing plant nutrients out of the root zone and into the water table.

The use of this soil as pastureland or hayland is effective in controlling soil blowing. Forage yields, however, are generally low unless the soil is fertilized and irrigated. Planting early in spring, before the soil has dried, is best. Later plantings are likely to have poor survival rates. Overgrazing destroys the plant cover and results in soil blowing. Fertilization, renovation, and controlled grazing help to maintain the plant cover.

This soil is suited to trees. Poor seedling survival in dry years can be offset by careful planting and by planting vigorous nursery stock. Competing vegetation that interferes with natural regeneration and the establishment of plantings can be removed mechanically or controlled through the use of suitable herbicides.

This soil is poorly suited to septic tank absorption fields because of the seasonal high water table. The

suitability can be improved by building a filtering mound of suitable material. The soil is poorly suited to dwellings with or without basements and to small commercial buildings because of the seasonal high water table. This limitation can be overcome by draining the soil to lower the water table. This soil is moderately suited to local roads and streets because of the seasonal water table and the moderate potential frost action. Soil drainage to lower the water table overcomes these limitations.

The capability unit is IVw-5. The woodland suitability subclass is 3s.

WwB—Wildale silt loam, 2 to 6 percent slopes. This gently sloping, well drained soil is on broad, convex ridgetops of unglaciated uplands covered with loess over clayey material. Most areas of this unit are long and narrow and range from 3 to 35 acres. One area is about 150 acres.

Typically, the surface layer is very dark grayish brown silt loam about 7 inches thick. The subsoil to a depth of about 60 inches is dominantly reddish brown and yellowish red, very firm cherty clay. In some small areas this soil is eroded. In some, slopes are less than 2 percent. In places the loess mantle is more than 15 inches thick. In places this soil is less than 60 inches deep over dolomite; and in other areas the underlying dolomite has completely weathered away, and the clayey subsoil is underlain by sandstone.

Included with this soil in mapping are small areas of Reedsburg soils. Also included are small sloping areas and small severely eroded areas of Wildale soils where the surface layer is silty clay loam or silty clay. The somewhat poorly drained Reedsburg soil is in drainageways and on broader ridgetops where a perched water table is above the clayey subsoil at a depth as shallow as 1 foot during wet periods. Included soils make up 5 to 10 percent of the unit.

Permeability is slow in this Wildale soil. The available water capacity is moderate. Surface runoff is medium. Natural fertility is moderate. The surface layer is moderate in organic-matter content. It is friable and can be easily worked throughout a wide range in moisture content. It tends to crust, however, after hard rains.

Most areas of this soil are used for cultivated crops, hay, and pasture. Some areas are native woodland. The potential is good for cultivated crops, hay, pasture, and trees. It is good for openland and woodland wildlife habitat but very poor for wetland wildlife habitat. The potential is fair or poor for recreational development and poor for most engineering uses.

This soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture. The hazard of erosion is slight in cultivated areas. Crop residue management, minimum tillage, contour stripcropping, grassed waterways, and winter cover crops help to control erosion. Regular additions of organic matter help to maintain fertility and good tilth and increase water infiltration.

Erosion is generally not a problem in areas where this soil is used for pasture and hay. Overgrazing, however, destroys the plant cover and results in erosion. Grazing when the soil is wet compacts the surface, which results in poor tilth and increases runoff and the hazard of erosion. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is suited to trees. Competing vegetation, however, interferes with natural regeneration and the establishment of plantings. It can be removed mechanically or controlled through the use of suitable herbicides.

This soil is poorly suited to septic tank absorption fields because the subsoil is slowly permeable and clayey. The suitability can be improved by building a filtering mound. The soil is poorly suited to building site development because it lacks sufficient strength and stability to adequately support building foundations and vehicular traffic. These limitations can be overcome by replacing this soil with suitable base material.

The capability unit is IIe-6. The woodland suitability subclass is 3o.

WwC2—Wildale silt loam, 6 to 12 percent slopes, eroded. This sloping, well drained soil is on convex ridgetops and side slopes of unglaciated uplands covered with loess over clayey material. Most areas of this unit are long and narrow and range from 3 to 50 acres.

Typically, the surface layer is very dark grayish brown silt loam about 7 inches thick. In most cultivated areas, it contains some brown subsoil material that has been mixed in by plowing. The subsoil to a depth of about 60 inches is dominantly reddish brown and yellowish red, very firm, cherty clay. In some small areas this soil is not eroded. In some, the loess mantle is more than 15 inches thick. In some small areas this soil is less than 60 inches deep over dolomite; in others the underlying dolomite has completely weathered away, and the clayey subsoil is underlain by sandstone.

Included with this soil in mapping are small gently sloping, moderately steep, and severely eroded areas of Wildale soils where the surface layer is silty clay loam or silty clay. Included soils make up about 5 to 10 percent of the unit.

Permeability is slow in this Wildale soil. The available water capacity is moderate. Surface runoff is medium. Natural fertility is moderate. The surface layer is moderate in organic-matter content. It is friable and can be easily worked throughout a wide range in moisture content. It tends to crust, however, after hard rains, especially in areas where the surface layer contains subsoil material.

Most areas of this soil are used for cultivated crops, hay, and pasture. Some areas are native woodland. The potential is fair for cultivated crops and good for hay, pasture, and trees. It is good for openland and woodland wildlife habitat but very poor for wetland habitat. The potential is fair or poor for most recreational development and poor for most engineering uses.

This soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture. The hazard of further erosion is moderate in cultivated areas. Crop residue management, minimum tillage, contour stripcropping, grassed waterways, and winter cover crops help to control erosion. Regular additions of organic matter help to maintain fertility and good tilth and increase water infiltration.

Erosion is generally not a problem in areas where this soil is used for pasture and hay. Overgrazing, however, destroys the plant cover and results in erosion. Grazing when the soil is wet compacts the surface, which results in poor tilth and increases runoff and the hazard of erosion. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is suited to trees. Competing vegetation, however, interferes with natural regeneration and the establishment of plantings. It can be removed mechanically or controlled through the use of suitable herbicides.

This soil is poorly suited to septic tank absorption fields because the subsoil is slowly permeable and clayey. The suitability can be improved by building a filtering mound. The soil is poorly suited to building site development because the subsoil lacks sufficient strength and stability to support building foundations or vehicular traffic. These limitations can be overcome by replacing the soil with suitable base material. This soil is also poorly suited to small commercial buildings because of the slope. This limitation can be overcome by reshaping the site or by selecting a less sloping site.

The capability unit is IIIe-6. The woodland suitability subclass is 3o.

WwD2—Wildale silt loam, 12 to 20 percent slopes, eroded. This moderately steep, well drained soil is on convex ridgetops and the upper part of side slopes on unglaciated uplands covered with loess over clayey material. Most areas are long and narrow and range from 3 to 30 acres.

Typically, the surface layer is very dark grayish brown silt loam about 7 inches thick. In most cultivated areas, it contains some reddish brown subsoil material that has been mixed in by plowing. The subsoil to a depth of about 60 inches is dominantly reddish brown and yellowish red, very firm cherty clay. In some small areas this soil is not eroded. In some, the loess mantle is more than 15 inches thick. In some small areas this soil is less than 60 inches deep over dolomite; in others the underlying dolomite has completely weathered away, and the clayey subsoil is underlain by sandstone.

Included with this soil in mapping are small sloping areas and severely eroded areas of Wildale soils where the surface layer is silty clay loam or silty clay. Also included are some areas of this soil where slopes are more than 20 percent. Included soils make up 5 to 10 percent of the unit.

Permeability is slow in this Wildale soil. The available water capacity is moderate. Surface runoff is rapid. Natural fertility is moderate. The surface layer is moderate in organic-matter content. It is friable and can be easily worked throughout a wide range in moisture content. It tends to crust, however, after hard rains, especially in areas where the surface layer contains subsoil material.

Most areas of this soil are used for cultivated crops, hay, and pasture. Some areas are native woodland. The potential is fair for cultivated crops and good for hay, pasture, and trees. It is fair for openland wildlife habitat, good for woodland wildlife habitat, and very poor for wetland habitat. The potential is poor for most recreational development and for most engineering uses.

This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay or pasture. The hazard of further erosion is severe in cultivated areas. Crop residue management, minimum tillage, contour stripcropping, grassed waterways, and winter cover crops are needed to minimize erosion. Regular additions of organic matter help to maintain fertility and good tilth and increase water infiltration.

Erosion is generally not a problem in areas where this soil is used for pasture or hay. Overgrazing, however, destroys the plant cover and results in erosion. Grazing when the soil is wet compacts the surface, which results in poor tilth and increases runoff and the hazard of further erosion. Fertilization, renovation, controlled grazing, and restricted use during wet periods help to keep the soil and the plant cover in good condition.

This soil is suited to trees. Soil related problems in forest management are associated with steepness of slope; mortality of seedlings on hot, dry sites; and brush encroachment following harvest. Planting trees on the contour and selecting the best location for skid roads during harvest will minimize erosion and improve equipment trafficability. Seedling mortality on south- and west-facing slopes can be reduced by careful planting and by planting vigorous nursery stock. Vegetation that competes with planted seedlings and natural reproduction following harvest can be removed mechanically or controlled through the use of suitable herbicides.

This soil is poorly suited to septic tank absorption fields because of the slope and the slow permeability in the clayey subsoil. In places the suitability can be improved by building a filtering mound and reshaping to a suitable slope. Generally, however, a less sloping site where the soil is more permeable should be selected. This soil is poorly suited to building site development because of the slope and the lack of sufficient strength and stability to support building foundations or vehicular traffic. These limitations can be overcome by replacing the soil with suitable base material and reshaping the site.

The capability unit is IVe-6. The woodland suitability subclass is 3r.

WxB—Wyocena sandy loam, 2 to 6 percent slopes. This gently sloping, well drained soil occupies ridgetops and uneven convex and concave side slopes of till plains

and moraines on uplands. Most areas are irregular in shape and range from 3 to 160 acres. A few areas are larger.

Typically, the surface layer is dark grayish brown sandy loam about 8 inches thick. The subsoil is about 27 inches thick. It is brown, friable sandy loam in the upper part and brown, very friable loamy sand in the lower part. The substratum to a depth of about 60 inches is dark yellowish brown, very friable loamy sand over yellowish brown, loose sand. In some areas this soil is eroded. In some small areas slopes are less than 2 percent. In some, the surface layer is silt loam, loam, or loamy sand. In places this soil is more than 44 inches deep over sandy glacial till.

Included with this soil in mapping are small areas of Fox, Gotham, and McHenry soils. Also included are small sloping areas and severely eroded areas of Wyocena sandy loam, some areas of this soil where stones are on the surface and throughout the soil, and some areas where this soil is underlain by sandstone or quartzite bedrock at a depth of 40 inches. The well drained Fox and McHenry soils are in landscape positions similar to those of this Wyocena soil where there is more silt and clay and less sand in the soil. The somewhat excessively drained Gotham soil is in landscape positions similar to those of this Wyocena soil where there is more sand and less silt and clay in the soil. Included soils make up 10 to 15 percent of the unit.

Permeability is moderately rapid in this Wyocena soil. The available water capacity is moderate. Surface runoff is medium. Natural fertility is low. The surface layer is low in organic-matter content. It is friable and can be easily worked throughout a wide range in moisture content.

Many areas of this soil are used for cultivated crops, hay, and pasture. Some areas are native woodland, and some have been planted to pines. The potential is fair for cultivated crops, hay, and pasture. It is good for these uses if the soil is irrigated. The potential is fair for trees. It is good for openland and woodland wildlife habitat but very poor for wetland habitat. The potential is good or fair for recreational development and for most engineering uses.

This soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture. It is suited to sprinkler irrigation, and if it is irrigated, better and more consistent yields can be expected. In cultivated areas, the hazard of erosion is slight, and soil is subject to blowing. Crop residue management, minimum tillage, contour stripcropping, windbreaks, and winter cover crops help to control erosion and soil blowing. Fertilization, irrigation, and protection from soil blowing are needed for dependable crop production.

This soil is suited to hay and pasture, but forage yields are generally somewhat limited unless the soil is fertilized and irrigated. Erosion and soil blowing are generally not hazards. Overgrazing, however, destroys the plant cover and results in erosion and soil blowing. Fertilization, renovation, and controlled grazing help to maintain the plant cover.

This soil is suited to trees. Competing vegetation can slow natural regeneration and the establishment of plantings. It can be removed mechanically or controlled through the use of suitable herbicides.

This soil is suited to septic tank absorption fields. Ground water pollution is a hazard, however, as a result of the rapidly permeable substratum. The soil is suited to building site development. It is only moderately suited to local roads and streets because of the potential frost action. This limitation can be overcome by replacing the soil with suitable base material. This soil is a good source of topsoil.

The capability unit is IIIe-4. The woodland suitability subclass is 3o.

WxC2—Wyocena sandy loam, 6 to 12 percent slopes, eroded. This sloping, well drained soil occupies convex ridgetops and uneven side slopes of till plains and moraines on uplands. Most areas are irregular in shape and range from 3 to 200 acres. One area is 515 acres.

Typically, the surface layer is dark grayish brown sandy loam about 8 inches thick. In most cultivated areas it contains some brown subsoil material that has been mixed in by plowing. The subsoil is about 27 inches thick. It is brown, friable sandy loam in the upper part and brown, very friable loamy sand in the lower part. The substratum to a depth of about 60 inches is dark yellowish brown, very friable loamy sand over yellowish brown, loose sand. In some areas this soil is not eroded. In some small areas the surface layer is silt loam, loam, or loamy sand. In some, this soil is more than 44 inches deep over sandy glacial till.

Included with this soil in mapping are small areas of Fox, Gotham, and McHenry soils. Also included are small gently sloping, moderately steep, and severely eroded areas of Wyocena sandy loam; small areas of this soil where stones are on the surface and throughout the soil, and some small areas where this soil is underlain by sandstone or quartzite bedrock at a depth of 40 inches. The well drained Fox and McHenry soils are in landscape positions similar to those of this Wyocena soil where there is more silt and clay and less sand in the soil. The somewhat excessively drained Gotham soil is in landscape positions similar to those of this Wyocena soil where there is more sand and less silt and clay in the soil. Included soils make up 10 to 15 percent of the unit.

Permeability is moderately rapid in this Wyocena soil. The available water capacity is moderate. Surface runoff is medium. Natural fertility is low. The surface layer is low in organic-matter content. It is friable and can be easily worked throughout a wide range in moisture content.

Many areas of this soil are used for cultivated crops, hay, and pasture. Some areas are native woodland, and some have been planted to pines. The potential is fair

for cultivated crops, hay, and pasture. It is good for these uses if the soil is irrigated. The potential is fair for trees. It is good for openland and woodland wildlife habitat but very poor for wetland habitat. The potential is good or fair for most recreational development and fair for most engineering uses.

This soil is suited to corn, soybeans, and small grain and to legumes and grasses for hay and pasture. This soil is suited to sprinkler irrigation. If it is irrigated, better and more consistent yields can be expected. If the soil is cultivated, the hazard of further erosion is moderate, and the soil is subject to blowing. Crop residue management, minimum tillage, contour stripcropping, windbreaks, and winter cover crops help to control erosion and soil blowing. Fertilization, irrigation, and protection from soil blowing are needed for dependable crop production.

This soil is suited to hay and pasture, but forage yields are generally somewhat limited unless the soil is fertilized and irrigated. Erosion and soil blowing are generally not hazards. Overgrazing, however, destroys the plant cover and results in erosion and soil blowing. Fertilization, renovation, and controlled grazing help to maintain the plant cover.

This soil is suited to trees. Competing vegetation can slow natural regeneration and establishment of plantings. It can be removed mechanically or controlled through the use of suitable herbicides.

This soil is only moderately suited to septic tank absorption fields because of the slope. This limitation can be overcome by reshaping the site or by installing the field on the contour. Ground water pollution is a hazard, however, as a result of the rapidly permeable substratum. The soil is moderately suited to dwellings with or without basements and is poorly suited to small commercial buildings because of the slope. This limitation can be overcome by reshaping the site or by selecting a less sloping site. This soil is moderately suited to local roads and streets because of the slope and the potential frost action. The slope limitation can be minimized by reshaping or by constructing roads on the contour. The potential frost action can be overcome by replacing the soil with suitable base material. This soil is a fair source of topsoil.

The capability unit is IVe-4. The woodland suitability subclass is 3o.

WxD2—Wyocena sandy loam, 12 to 20 percent slopes, eroded. This moderately steep, well drained soil occupies uneven convex side slopes of till plains and moraines on uplands. Most areas are irregular in shape and range from 3 to 100 acres.

Typically, the surface layer is dark grayish brown sandy loam about 7 inches thick. In most cultivated areas, it contains some brown subsoil material that has been mixed in by plowing. The subsoil is about 24 inches thick. It is brown, friable sandy loam in the upper part and brown, very friable loamy sand in the lower part. The substratum to a depth of about 60 inches is dark yellowish brown, very friable loamy sand over yellowish brown, loose sand. In some areas this soil is not eroded. In some small areas the surface layer is silt loam, loam, or loamy sand. In some, this soil is more than 44 inches deep over sandy till.

Included with this soil in mapping are small areas of Fox, Gotham, and McHenry soils. Also included are small sloping, steep, and severely eroded areas of Wyocena sandy loam; small areas of this soil where stones are on the surface and throughout the soil; and some small areas where this soil is underlain by sandstone or quartzite bedrock at a depth of 40 inches. The well drained Fox and McHenry soils are in landscape positions similar to those of this Wyocena soil where there is more silt and clay and less sand in the soil. The somewhat excessively drained Gotham soil is in landscape positions similar to those of this Wyocena soil where there is more sand and less silt and clay in the soil. Included soils make up 10 to 15 percent of the unit.

Permeability is moderately rapid in this Wyocena soil. The available water capacity is moderate. Surface runoff is rapid. Natural fertility is low. The surface layer is low in organic-matter content. It is friable and can be easily worked throughout a wide range in moisture content.

Some areas of this soil are used for cultivated crops, hay, and pasture. Some areas are native woodland, and some have been planted to pines. The potential is poor for cultivated crops and fair for hay, pasture, and trees. It is fair for openland wildlife habitat, good for woodland habitat, and very poor for wetland habitat. The potential is poor for most recreational development and for most engineering uses.

This soil generally is not suited to row crops because of the severe hazard of further erosion and droughtiness.

This soil is suited to hay and pasture, but forage yields are generally somewhat limited. Overgrazing, however, destroys the plant cover and results in erosion and soil blowing. Fertilization, renovation, and controlled grazing help to maintain the plant cover.

This soil is suited to trees. Soil related problems in forest management are associated with steepness of slope; mortality of seedlings on hot, dry sites; and brush encroachment following harvest. Planting trees on the contour and selecting the best location for skid roads during harvest minimize erosion and improve equipment trafficability. Seedling mortality on south- and west-facing slopes can be reduced by careful planting and by planting vigorous nursery stock. Vegetation that competes with planted seedlings and natural reproduction following harvest can be removed mechanically or controlled through use of suitable herbicides.

This soil is poorly suited to septic tank absorption fields because of the slope. This limitation can be overcome by reshaping the site or by selecting a less sloping site. Ground water pollution is a hazard, however, as a result of the rapidly permeable substratum. This soil is poorly suited to building site development because of the slope. This limitation can be overcome by reshaping the site or by selecting a less sloping site.

The capability unit is VIe-7. The woodland suitability subclass is 3r.

WxE—Wyocena sandy loam, 20 to 30 percent slopes. This steep, well drained soil occupies convex side slopes of till plains and moraines on uplands. Most areas are oblong and range from 3 to 80 acres. One area is 150 acres.

Typically, the surface layer is very dark gray sandy loam about 3 inches thick. The subsurface layer is dark grayish brown sandy loam about 3 inches thick. The subsoil is about 23 inches thick. It is brown, friable sandy loam in the upper part and brown, very friable loamy sand in the lower part. The substratum to a depth of about 60 inches is dark yellowish brown, very friable loamy sand over yellowish brown, loose sand. In some small areas this soil is eroded. In some small areas the surface layer is silt loam, loam, or loamy sand. In some, this soil is more than 44 inches deep over sandy glacial till.

Included with this soil in mapping are small areas of Gotham and McHenry soils. Also included are small moderately steep areas and severely eroded areas of Wyocena sandy loam, some small areas of this soil where stones are on the surface and throughout the soil, and some small areas where this soil is underlain by sandstone or quartzite bedrock at a depth of 40 inches. The well drained McHenry soil is in landscape positions similar to those of this Wyocena soil where there is more silt and clay and less sand in the soil. The somewhat excessively drained Gotham soil is in landscape positions similar to those of this Wyocena soil where there is more sand and less silt and clay in the soil. Included soils make up about 10 to 15 percent of the unit.

Permeability is moderately rapid in this Wyocena soil. The available water capacity is moderate. Surface runoff is very rapid. Natural fertility is low. Organic-matter content of the surface layer is low.

Many areas of this soil are native woodland, and some have been planted to pines. Some areas are used for hay and pasture. The potential is poor for cultivated crops and fair for hay, pasture, and trees. It is fair for openland wildlife habitat, good for woodland habitat, and very poor for wetland habitat. The potential is poor for recreational development and for most engineering uses.

This soil is not suitable for cultivated crops because of the very severe erosion hazard. It is suited to hay and pasture, but forage yields generally are somewhat limited by droughtiness. Overgrazing destroys the plant cover and results in erosion and soil blowing. Fertilization, renovation, and controlled grazing help to maintain the plant cover.

The soil is suited to trees. Soil related problems in forest management are associated with steepness of slope; mortality of seedlings on hot, dry sites; and brush encroachment following harvest. Planting trees on the contour and selecting the best location for skid roads during harvest minimize erosion and improve equipment trafficability. Seedling mortality on south- and west-facing slopes can be reduced by careful planting and by planting nursery stock. Vegetation that competes with planted seedlings or natural reproduction following harvest can be removed mechanically or controlled through use of suitable herbicides.

This soil is poorly suited to septic tank absorption fields because of the slope. Generally, a less sloping site should be selected. Ground water pollution is a hazard, as a result of the rapidly permeable substratum. This soil is poorly suited to building site development because of the slope. In places this limitation can be overcome by reshaping the site. Local roads and streets should be constructed on the contour.

The capability unit is VIIe-4. The woodland suitability subclass is 3r.

Use and management of the soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help avoid 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 behavior 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 for crops and pasture; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreation facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and pasture

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under "Soil maps for detailed planning." Specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

About 309,000 acres in Sauk County was used for crops and pasture in 1967, according to the Wisconsin Conservation Needs Inventory. Of this total, about 65,000 acres was used for permanent pasture; 87,000 acres for cultivated crops, mainly corn; 43,000 acres for small grain, mainly oats; and 91,000 acres for rotational hay and pasture. The rest was idle cropland.

The potential of the soils in Sauk County is good for increased production of food. About 18,000 acres of potentially good cropland is currently used as woodland and about 23,000 acres as pasture. In addition to the reserve productive capacity represented by these acreages, food production could be increased considerably by extending the latest crop production technology to all cropland in the county.

Soil erosion is the major soil problem on about 70 percent of the cropland and pasture in Sauk County. If the slope is more than 2 percent, erosion is a hazard.

Loss of the surface layer through erosion is damaging for two reasons. First, productivity is reduced as the surface layer is lost and part of the subsoil is incorporated into the plowed layer. Loss of the surface layer is especially damaging on soils that have a clayey subsoil, such as Wildale soils, and on soils, such as Elkmound, which are shallow over bedrock. Erosion also reduces productivity on soils that tend to be droughty, such as Billett, Eleva, and Dickinson soils. Second, soil erosion results in sediment entering streams. Control of erosion minimizes the pollution of streams by sediment and improves the quality of water for municipal use, for recreation, and for fish and wildlife.

Erosion control provides a protective surface cover, reduces runoff, and increases infiltration. A cropping system that keeps plant cover on the soil for extended periods can hold soil erosion losses to amounts that will not reduce the productive capacity of the soil. On dairy farms, which require pasture and hay, the legume and grass forage crops in the cropping system reduce erosion on sloping land and also provide nitrogen and improve tilth for other crops grown in rotation.

Minimum tillage and crop residue on the surface help to increase infiltration and reduce the hazards of runoff and erosion. These practices can be adapted to most soils in the survey area but are more difficult to use successfully on eroded soils.

Terraces and diversions reduce the length of slopes and reduce runoff and the hazard of erosion. Contouring and contour stripcropping also shorten the slope and reduce runoff and erosion (fig. 12). Most of the soils in Sauk County have smooth uniform slopes and are well suited to these practices.

Soil blowing is a hazard on the sandy Boone, Brems, Gotham, Granby, Plainfield, Sparta, and Watseka soils and on the organic Adrian, Houghton, and Palms soils. It is also a hazard on the Billett, Dickinson, Eleva, Elkmound, Urne, and Wyocena soils. Soil blowing can damage these soils in a few hours if winds are strong and the soils are dry and bare of vegetation or surface mulch. Maintaining a plant cover, a surface mulch, and field windbreaks minimizes soil blowing on these soils.

Information on the design of erosion control practices for each kind of soil is contained in the Technical Guide at the local offices of the Soil Conservation Service.

Soil drainage is a major management need on about 13 percent of the acreage used for crops and pasture in the survey area. Unless drained, some soils are naturally so wet that the production of crops common to the area is generally not possible. Examples are the poorly drained and very poorly drained Colwood, Ettrick, Granby, Marshan, and Ossian soils. Also in this category are the organic soils, such as Adrian, Houghton, and Palms.

Unless artificially drained, the somewhat poorly drained soils are so wet that crops are damaged in most years. In this category are the Atterberry, Baraboo variant, Curran, Eleva variant, Kendall, Mosel, Orion, Reedsburg, Rimer, Rowley, Shiffer, Shiffer variant, and Watseka soils.

The design of both surface and subsurface drainage systems varies with the kind of soil and the site condition. A combination of surface drainage and subsurface drainage is needed in most areas of the poorly drained and very poorly drained soils that are intensively row cropped. Diversions are needed in some areas to divert runoff from adjacent slopes.

If organic soils are drained and used for cropland, special management is needed. Organic soils oxidize and subside when the pore space is filled with air. Therefore, special drainage systems are needed to control the depth and the period of drainage. Keeping the water table at the level required by crops during the growing season and raising it to the surface during other parts of the year minimize the risk of oxidation and subsidence of organic soils.

Because the poorly drained and very poorly drained soils are in low positions on the landscape, crops grown on these soils are subject to frost damage. Because of cold air drainage, there are fewer frost-free growing days per season than on the adjacent uplands.

Information on drainage design for each kind of soil is

Figure 12.—Contour strips of corn and oats on sloping Fayette soils. Contour stripcropping reduces runoff and helps to reduce the risk of erosion.

contained in the Technical Guide at the local offices of the Soil Conservation Service.

Soil fertility varies in the soils of Sauk County, depending on the parent material and past cropping history.

Nearly all of the soils are naturally acid in the surface layer and upper part of the subsoil. If they have never been limed, they require applications of ground limestone to raise the pH level sufficiently for good growth of alfalfa and other crops that grow best at near neutral reaction. In general, coarse textured and moderately coarse textured soils require less lime than medium textured soils. The available potash levels are naturally low in many soils of the survey area. On all soils, additions of lime and fertilizer should be based on the results of soil tests, on the need of the crop, and on the expected level of yield. The Cooperative Extension Service can help in determining the kinds and amounts of fertilizer and lime to be applied.

Soil tilth is an important factor in the germination of seeds and in the infiltration of water into the soil. Soils with good tilth are granular and porous. Tilling or grazing when the soil is too wet can cause poor soil tilth especially if the surface layer is loam or silt loam. Intense rainfall on bare soil can cause formation of a crust on the surface that reduces infiltration and increases runoff and erosion. Good soil tilth is more difficult to maintain on eroded soils because they have a lower content of organic matter. Returning crop residue and regularly adding manure or other organic material improve soil structure and tilth.

Field crops suited to the soils and climate of the survey area include many that are not commonly grown. Corn is the common row crop, but the acreage of soybeans is increasing. Some potatoes are grown. Sunflowers and sugar beets can be grown if economic conditions are favorable. Oats is the common close-grown crop. Wheat, rye, barley, and buckwheat could be grown. Grass seed could be produced from bromegrass, fescue, and bluegrass.

Special crops grown commercially in the survey area are vegetables and apples. The most commonly grown vegetables are sweet corn and peas. A small acreage throughout the county is used for tomatoes, melons, strawberries, raspberries, squash, and many other vegetables. Some mint is grown in the one large area of organic soils.

Many of the soils in the survey area that have good natural drainage and warm up early in spring are suited to a wide variety of vegetables and small fruits. Information and suggestions on growing special crops can be obtained from local offices of the Cooperative Extension Service and the Soil Conservation Service.

Yields per acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 4. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green-manure crops; and harvesting that insures the smallest possible loss.

For yields of irrigated crops, it is assumed that the irrigation system is adapted to the soils and to the crops grown, that good quality irrigation water is uniformly applied as needed, and that tillage is kept to a minimum.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 4 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils.

Land capability classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops (*8*). 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 grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor does it consider 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 woodland and for engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit. These levels are defined in the following paragraphs.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have slight limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main limitation is 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 I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w, s,* or *c* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, rangeland, woodland, wildlife habitat, or recreation.

Capability units are soil groups within a subclass. The soils in a capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe-2 or IIIe-4.

The acreage of soils in each capability class and subclass is shown in table 5. The capability classification of each map unit is given in the section "Soil maps for detailed planning."

Woodland management and productivity

George W. Alley, forester, Soil Conservation Service, helped prepare this section.

Before settlement, Sauk County was forested except for two small grassland areas—the Spring Green Prairie in the southwest corner and the Sauk Prairie in the southeast corner. More than half the land area of the county was covered with an open stand of white and red oaks intermingled with prairie vegetation. Forests in the central and northwestern parts of the county were of the southern hardwood type.

At present 29 percent, or 156,500 acres, of the land area is forested. Of this acreage, 152,100 acres is classified as commercial forest. Forest types and percentages are oak-hickory 58 percent, maple-beech-birch 23 percent, aspen-birch 6 percent, elm-ash-cottonwood 6 percent, conifers 4 percent, and nonstocked 3 percent.

Harvest and sale of wood products is of considerable economic importance to the county. Harvest of oak for sawlogs, veneer logs, and railroad ties is of primary importance. Other hardwood logs and pine pulpwood from plantation thinnings are of lesser importance.

Sandy soils of the Sparta and related series on the Sauk and Spring Green Prairies are susceptible to soil blowing. Some red pine and white pine windbreaks, planted to reduce the hazard of soil blowing, have been removed because these areas are now under irrigation.

The forests of Sauk County enhance the beauty and add to the recreational value of the countryside, particularly in the Devils Lake area in the hills of the Baraboo Range.

Table 6 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed. The table lists the ordination (woodland suitability) symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for important trees. The number 1 indicates very high productivity; 2, high; 3, moderately high; 4, moderate; and 5, low. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *x* indicates stoniness or rockiness; *w*, excessive water in or on the soil; *t*, toxic substances in the soil; *d*, restricted root depth; *c*, clay in the upper part of the soil; *s*, sandy texture; *f*, high content of coarse fragments in the soil profile; and *r*, steep slopes. The letter *o* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: x, w, t, d, c, s, f, and r.

In table 6, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Ratings of the *erosion hazard* indicate the risk of loss of soil in well managed woodland. The risk is *slight* if the expected soil loss is small, *moderate* if measures are needed to control erosion during logging and road construction, and *severe* if intensive management or special equipment and methods are needed to prevent excessive loss of soil.

Ratings of *equipment limitation* reflect the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. A rating of *slight* indicates that use of equipment is not limited to a particular kind of equipment or time of year; *moderate* indicates a short seasonal limitation or a need for some modification in management or in equipment; and *severe* indicates a seasonal limitation, a need for special equipment or management, or a hazard in the use of equipment.

Seedling mortality ratings indicate the degree to which the soil affects the mortality of tree seedlings. Plant competition is not considered in the ratings. The ratings apply to seedlings from good stock that are properly planted during a period of sufficient rainfall. A rating of *slight* indicates that the expected mortality is less than 25 percent; *moderate*, 25 to 50 percent; and *severe*, more than 50 percent.

Ratings of *windthrow hazard* are based on soil characteristics that affect the development of tree roots and the ability of the soil to hold trees firmly. A rating of *slight* indicates that a few trees may be blown down by normal winds; *moderate*, that some trees will be blown down during periods of excessive soil wetness and strong winds; and *severe*, that many trees are blow down during periods of excessive soil wetness and moderate or strong winds.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index*. This index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

Trees to plant are those that are suited to the soils and to commercial wood production.

Additional information on woodland management and productivity can be obtained from the Wisconsin Department of Natural Resources, the local office of the Soil Conservation Service, or the Cooperative Extension Service.

Windbreaks and environmental plantings

Windbreaks protect livestock, buildings, and yards from wind and snow. They also protect fruit trees and gardens, and they furnish habitat for wildlife. Several rows of low- and high-growing broadleaf and coniferous trees and shrubs provide the most protection.

Field windbreaks are narrow plantings made at right angles to the prevailing wind and at specific intervals across the field. The interval depends on the erodibility of the soil (fig. 13). Field windbreaks protect cropland and crops from wind, hold snow on the fields, and provide food and cover for wildlife.

Figure 13.—Red pine windbreak protects cornfield on Dickinson and Gotham soils.

Environmental plantings help to beautify and screen houses and other buildings and to abate noise. The plants, mostly evergreen shrubs and trees, are closely spaced. To insure plant survival, a healthy planting stock of suitable species should be planted properly on a well prepared site and maintained in good condition.

Table 7 shows the height that locally grown trees and shrubs are expected to reach in 20 years on various soils. The estimates in table 7 are based on measurements and observation of established plantings that have been given adequate care. They can be used as a guide in planning windbreaks and screens. Additional information on planning windbreaks and screens and planting and caring for trees and shrubs can be obtained from local offices of the Soil Conservation Service or the Cooperative Extension Service, from a nursery, or from the Wisconsin Department of Natural Resources.

Engineering

Peg S. Whiteside, soil mechanics engineer, Soil Conservation Service, helped prepare this section.

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. The ratings are given in the following tables: Building site development, 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 within a depth of 5 or 6 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 need to be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 feet of the surface, soil wetness, depth to a seasonal high water table, 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 kind 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 (1) evaluate the potential of areas for residential, commercial, industrial, and recreation uses; (2) make preliminary estimates of construction conditions; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; (5) plan detailed onsite investigations of soils and geology; (6) locate potential sources of gravel, sand, earthfill, and topsoil; (7) plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and (8) predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building site development

Table 8 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging,

filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and the depth to the water table.

Dwellings and small commercial buildings are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrink-swell potential, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 to 6 feet are not considered.

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 stabilized soil material, and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock or to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary facilities

Table 9 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 9 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

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 18 and 60 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to effectively filter the effluent. Many local ordinances require that this material be of a certain thickness. It may be possible to build filtering mounds over wet or impervious soil or soil underlain by bedrock. However, the use of these special systems is controlled by local or state ordinances.

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. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water

Table 9 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2

feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage due to rapid permeability of the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive 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.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground water pollution. Ease of excavation and revegetation needs to be considered.

The ratings in table 9 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 5 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction materials

Table 10 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill, sand, gravel, and topsoil. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of about 5 feet.

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 soil material below the surface layer to a depth of 5 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering properties provides detailed information about each soil layer. This information can help determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high 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 engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of

more than 25 percent. They are wet, and the depth to the water table is less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and *gravel* are used in great quantities in many kinds of construction. The ratings in table 12 provide guidance as to where to look for probable sources and are based on the probability that soils in a given area contain sizable quantities of sand or gravel. A soil rated *good* or *fair* has a layer of suitable material at least 3 feet thick, the top of which is within a depth of 6 feet. Coarse fragments of soft bedrock material, such as shale and siltstone, are not considered to be sand and gravel. Fine-grained soils are not suitable sources of sand and gravel.

The ratings do not take into account depth to the water table or other factors that affect excavation of the material. Descriptions of grain size, kinds of minerals, reaction, and stratification are given in the soil series descriptions and in table 14.

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.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are naturally fertile or respond well to fertilizer and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel or stones, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal water table at or near the surface.

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.

Water management

Table 11 gives information on the soil properties and site features that affect water management. The kind of soil limitations are given for pond reservoir areas and embankments, dikes, and levees.

This table also gives for each soil the restrictive features that affect drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment (fig. 14). Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and potential frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, or sulfur. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding,

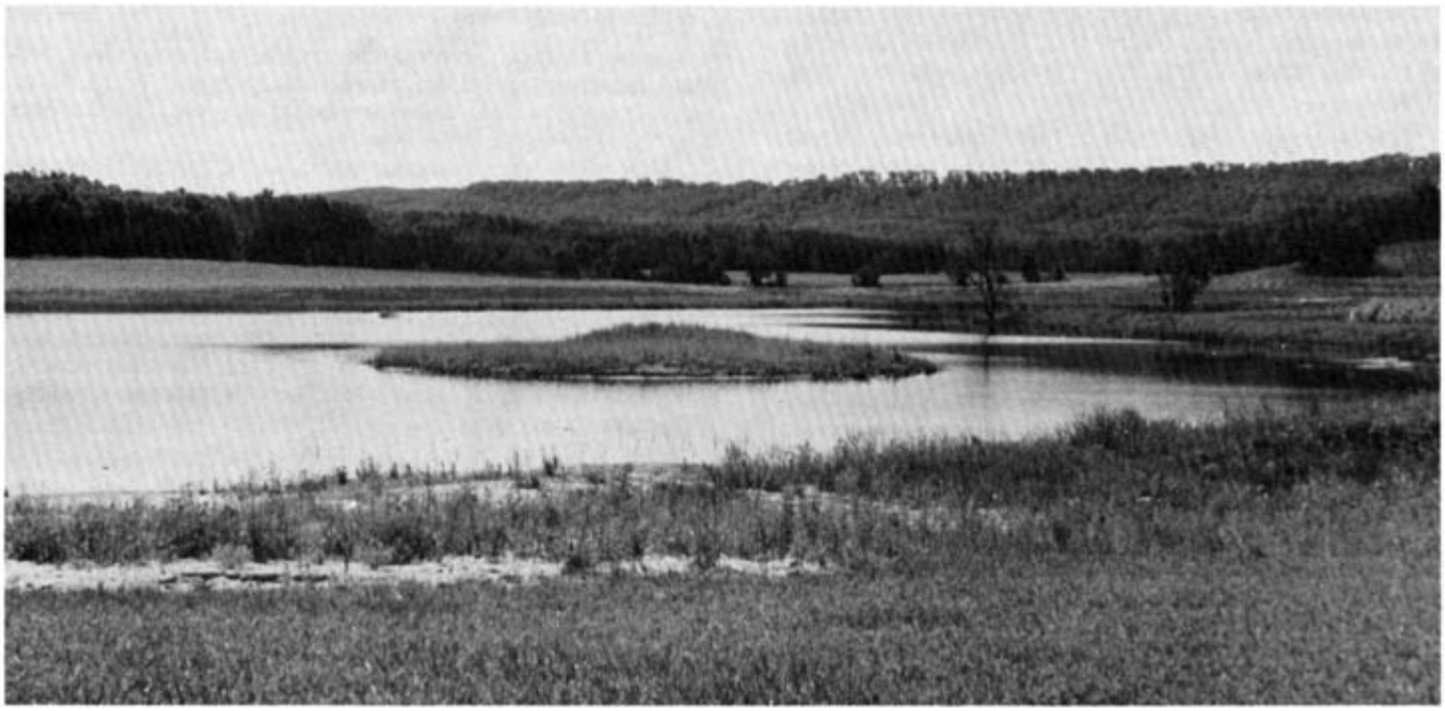


Figure 14.—Pond for wildlife and recreation in area of Granby variant and Rimer soils.

available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or to a cemented pan. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to reduce erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances such as salts or sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Recreation

The soils of the survey area are rated in table 12 according to limitations that affect their suitability for recreation. The ratings 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 sewerlines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreation use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 12, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 12 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 9 and

interpretations for dwellings without basements and for local roads and streets in table 8.

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 best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking, horseback riding, and bicycling should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife habitat

Steve F. Baima, biologist, Soil Conservation Service, helped prepare this section.

The essential habitat elements of a selected species of wildlife generally depend on several kinds of soil and commonly on a combination of land uses. For this reason, the map units described under "General soil map for broad land use planning", are grouped into four wildlife areas. These areas are described in the following paragraphs. They differ in wildlife species and in potential for habitat development. The true value of each area depends on its interspersion with the other areas. The diversity of wildlife depends on the diversity of soils, land uses, and management.

Wildlife area 1

Wildlife area 1 consists of the Valton, La Farge-Norden-Gale, Eleva-Boone-Plainfield, Baraboo-Rock outcrop, and McHenry-St. Charles units. These soils are mostly well drained.

Seventy percent of the county is within this area. Diversity in land use and vegetation is high. Row crops, hay and pasture, and woodland characterize the generally rugged ridgeland topography. Upland hardwood forest, primarily oak, is the dominant cover type.

Upland wildlife are predominant in wildlife area 1. Major game species are deer, ruffed grouse, cottontail, and gray and fox squirrels.

Wildlife area 2

Three map units are in this wildlife area: Wyocena-Gotham-Plainfield, Dickinson-Gotham-Dakota, and Sparta-Plainfield-Sparta variant. These sandy and loamy soils are mostly well drained to excessively drained.

Twelve percent of the county is within this area. There is some native jack pine and scrub oak woodland, but the native vegetation is mostly prairie grasses and forbs. Currently these soils are mostly used for cultivated crops. Some are in pine plantations and pastures.

Wildlife is much less abundant in this area than in wildlife area 1. Deer and cottontail are probably the most abundant game species. The diversity and abundance of wildlife is likely to be greatest along the margins of the area where wildlife inhabiting adjoining areas have access to pine plantations and other habitat edges. The intensively cultivated areas, particularly those under irrigation, offer little vegetation diversity and consequently do not meet the habitat demands of most game and nongame wildlife.

Wildlife area 3

Wildlife area 3 consists of the Ettrick-Fluvaquents, wet-Curran and the Briggsville-Mosel-Colwood map units. These soils range from well drained to very poorly drained. Most are poorly drained.

Sixteen percent of the county is within this wildlife area. The landscape is one of long, irregularly shaped, narrow, finger-like projections along major drainageways that dissect the county. Most of the area is cropped, but numerous areas not drained still exist as wet meadows, which are pastured, and wet woodlands. Some large tracts of woodland are considered type 7 wooded swamps (*6*). The wet meadows are considered type 2 wetlands. Other less extensive scattered wetlands that have significent wildlife value include type 3 shallow marshes, type 4 deep marshes, type 5 open water wetlands, and type 6 shrub swamps.

Deer, ruffed grouse, cottontail, gray and fox squirrels and other furbearers, and limited numbers of waterfowl inhabit this area. As was described for wildlife area 1, the diversity in land use and vegetation is high. Consequently, so too is the diversity of wildlife, both game and nongame species.

Wildlife area 4

Wildlife area 4 consists of the Fluvaquents, wet-Fluvaquents map unit. These soils are moderately well to very poorly drained. Fluvaquents also occur in wildlife area 3, but they are distinguished here as a specific wildlife area that occurs as a narrow band of frequently flooded land along the Wisconsin River.

Only 2 percent of the county is within this wildlife area. The area is mostly wooded and is subject to frequent overflow. It is considered mostly type 1 and type 7 wetlands, described as seasonally flooded basins and flats, and wooded swamps, respectively. Deer and gray and fox squirrels are the most common game species. This area is of minor importance to the overall wildlife population of the county. It is limited in size and in diversity of vegetation.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 13, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, timothy, bromegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established dryland grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggarweed, indiangrass, and switchgrass.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, the available water capacity, and wetness. Examples of these plants are oak, poplar, cherry, sweetgum, apple, hawthorn, dogwood, hickory, blackberry, and alder. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are Russian-olive, autumn-olive, and crabapple.

Coniferous plants furnish browse, seeds, and cones. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, fir, cedar, and juniper.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, wildrice, cordgrass, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The wildlife attracted to these areas

include bobwhite quail, pheasant, meadowlark, field sparrow, cottontail, and red fox.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, and deer.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, mink, and beaver.

Soil properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics. These results are reported in table 17.

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 characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classifications, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering properties and classifications

Table 14 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil series and morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If a soil contains particles coarser than sand, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (*2*) and the system adopted by the American Association of State Highway and Transportation Officials (*1*).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as Pt. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. 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. The AASHTO classification for soils tested, with group index numbers in parentheses, is given in table 17.

Rock fragments larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an oven-dry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points)

across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and chemical properties

Table 15 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

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 major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. 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.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

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 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 change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) 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 (up to 4 percent) and on soil structure and permeability. Values of K range from 0.05 to 0.69. The higher the value the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to soil blowing in cultivated areas. The groups indicate the susceptibility of soil to wind erosion and the amount of soil lost. Soils are grouped according to the following distinctions:

1. Sands, coarse sands, fine sands, and very fine sands. These soils are generally not suitable for crops. They are extremely erodible, and vegetation is difficult to establish.
2. Loamy sands, loamy fine sands, and loamy very fine sands. These soils are very highly erodible. Crops can be grown if intensive measures to control wind erosion are used.
3. Sandy loams, coarse sandy loams, fine sandy loams, and very fine sandy loams. These soils are highly erodible. Crops can be grown if intensive measures to control wind erosion are used.

4L. Calcareous loamy soils that are less than 35 percent clay and more than 5 percent finely divided calcium carbonate. These soils are erodible. Crops can be grown if intensive measures to control wind erosion are used.

4. Clays, silty clays, clay loams, and silty clay loams that are more than 35 percent clay. These soils are moderately erodible. Crops can be grown if measures to control wind erosion are used.
5. Loamy soils that are less than 18 percent clay and less than 5 percent finely divided calcium carbonate and sandy clay loams and sandy clays that are less than 5 percent finely divided calcium carbonate. These soils are slightly erodible. Crops can be grown if measures to control wind erosion are used.
6. Loamy soils that are 18 to 35 percent clay and less than 5 percent finely divided calcium carbonate, except silty clay loams. These soils are very slightly erodible. Crops can easily be grown.
7. Silty clay loams that are less than 35 percent clay and less than 5 percent finely divided calcium carbonate. These soils are very slightly erodible. Crops can easily be grown.

8. Stony or gravelly soils and other soils not subject to wind erosion.

Soil and water features

Table 16 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the intake of water when the soils 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 permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding, the temporary inundation of an area, is caused by overflowing streams or by runoff from adjacent slopes. Water standing for short periods after rainfall or snowmelt and water in swamps and marshes is not considered flooding.

Table 16 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, common, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *common* that it is likely under normal conditions; *occasional* that it occurs on an average of once or less in 2 years; and *frequent* that it occurs on an average of more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; November-May, for example, means that flooding can occur during the period November through May.

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 absence of distinctive horizons that form in soils that are not subject to flooding.

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.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 16 are the depth to the seasonal high water table; the kind of water table—that is, perched or apparent; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 16.

An apparent water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A perched water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Only saturated zones within a depth of about 6 feet are indicated. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. The first numeral in the range indicates how high the water rises above the surface. The second numeral indicates the depth below the surface.

Depth to bedrock is shown for all soils that are underlain by bedrock at a depth of 5 to 6 feet or less. For many soils, the limited depth to bedrock is a part of the definition of the soil series. The depths shown are based on measurements made in many soil borings and on other observations during the mapping of the soils. The kind of bedrock and its hardness as related to ease of excavation is also shown. Rippable bedrock can be excavated with a single-tooth ripping attachment on a 200-horsepower tractor, but hard bedrock generally requires blasting.

Potential frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, 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 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 mainly to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severe corrosion environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low, moderate,* or *high,* is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Engineering test data

Table 17 shows laboratory test data for several pedons sampled at carefully selected sites in the survey area. The pedons are typical of the series and are described in the section "Soil series and morphology." The soil samples were tested by the Wisconsin Department of Transportation, Division of Highways.

The testing methods generally are those of the American Association of State Highway and Transportation Officials (AASHTO) or the American Society for Testing and Materials (ASTM).

The tests and methods are: AASHTO classification—M 145 66; Unified classification—D 2487 66T; Mechanical analysis—T88 57; Liquid limit—T 89 60; Plasticity index—T 90 56; Moisture density, Method A—T 99 57.

Classification of the soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (*9*). 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. In table 18, the soils of the survey area are classified according to the system. The categories are defined in the following paragraphs.

ORDER. Ten soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Mollisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aquoll (*Aqu*, meaning water, plus *oll*, from Mollisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Haplaquolls (*Hapl*, meaning minimal horizonation, plus *aquoll*, the suborder of the Mollisols that have an aquic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. 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 Haplaquolls.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-silty, mixed, mesic Typic Haplaquolls.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

Soil series and morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. The soil is compared with similar soils and with nearby soils of other series. A pedon, a small three-dimensional area of soil,

that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the Soil Survey Manual (*7*). Many of the technical terms used in the descriptions are defined in Soil Taxonomy (*9*). Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Soil maps for detailed planning."

Adrian series

The Adrian series consists of very poorly drained, moderately rapidly permeable soils in glacial lake basins, in depressions, and along drainageways. These soils formed in organic deposits over outwash sand. The slope is 0 to 2 percent.

Adrian soils are near Granby, Houghton, and Palms soils. Palms soils have a finer textured substratum than Adrian soils. Houghton soils have a thicker organic layer. Granby soils do not have the 16- to 50-inch organic layer that is typical of Adrian soils.

Typical pedon of Adrian muck in a cultivated field approximately 1,200 feet west and 800 feet north of the southeast corner of sec. 16, T. 12 N., R. 7 E.

Oap—0 to 10 inches; black (N 2/0) broken face and rubbed sapric material; about 5 percent fiber, less than 2 percent rubbed; weak fine granular structure; primarily herbaceous fibers; few clean sand grains; medium acid; abrupt smooth boundary.

Oa2—10 to 22 inches; black (N 2/0) broken face and rubbed sapric material; about 20 percent fiber, less than 2 percent rubbed; weak coarse subangular blocky structure; primarily herbaceous fibers; medium acid; clear smooth boundary.

Oa3—22 to 26 inches; black (N 2/0) broken face, (10YR 2/1) rubbed sapric material; about 50 percent fiber, 5 percent rubbed; weak fine platy structure; primarily herbaceous fibers; few wood fragments; medium acid; clear smooth boundary.

Oa4—26 to 30 inches; black (N 2/0) broken face and rubbed sapric material; about 25 percent fiber, less than 5 percent rubbed; massive; primarily herbaceous fibers; medium acid; abrupt smooth boundary.

IIC1—30 to 48 inches; light brownish gray (10YR 6/2) fine sand; common fine and medium prominent yellowish brown (10YR 5/6) mottles; single grained; loose; few organic fibers; slightly acid; clear wavy boundary.

IIC2—48 to 60 inches; light brownish gray (10YR 6/2) fine sand; single grained; loose; neutral.

Thickness of the organic layer and depth to underlying sand range from 16 to 50 inches. The organic layer is primarily from herbaceous plants, but a few woody fragments, ranging from 1/8 inch to several inches in diameter, are in the organic part of the control section in some pedons. Reaction ranges from medium acid to mildly alkaline in the organic layers and from neutral to moderately alkaline in the substratum.

The organic layer has hue of 10YR and chroma of 1 or 2 or is neutral. Some uncultivated pedons have a thin mat of undecomposed plant remains on the surface. Some pedons have thin layers of hemic material in the lower part of the organic layer. Total thickness is less than 10 inches. Some pedons have thin layers of fibric material in the lower part of the organic layer. Total thickness is less than 5 inches. Directly above the sandy mineral contact in some pedons, the organic layer is as much as 50 percent by volume mineral material. The IIC horizon has value of 4 to 6 and chroma of 1 or 2. In some pedons it is sand, loamy sand, or loamy fine sand.

Arenzville series

The Arenzville series consists of moderately well drained, moderately permeable soils on flood plains and in drainageways. These soils formed in recent silty alluvium over older, darker colored, silty alluvium. The slope is 0 to 3 percent.

Arenzville soils are similar to Chaseburg and Orion soils and are near Chaseburg, Fluvaquents, and Orion soils. Chaseburg soils do not have the buried A horizon that is typical of Arenzville soils. Orion soils are somewhat poorly drained. Fluvaquents are moderately well drained and somewhat poorly drained and have a wide range in texture.

Typical pedon of Arenzville silt loam, 0 to 3 percent slopes, in a pasture approximately 1,250 feet west and 500 feet north of the center sec. 14, T. 11 N., R. 3 E.

A1—0 to 7 inches; dark grayish brown (10YR 4/2) silt loam; moderate medium granular structure; friable; common roots; common pores; neutral; clear boundary.

C1—7 to 24 inches; dark grayish brown (10YR 4/2) silt loam; weak medium platy structure; friable; few roots; common pores; few bands of very dark grayish brown (10YR 3/2) silt loam; few thin lenses of brown (10YR 5/3) very fine sand; neutral; clear wavy boundary.

C2—24 to 35 inches; dark grayish brown (10YR 4/2) silt loam; common fine prominent yellowish red (5YR 5/8) mottles; moderate thin and very thin platy structure; friable; common pores; few thin bands of very dark grayish brown (10YR 3/2) silt loam; few thin lenses of brown (10YR 5/3) very fine sand; slightly acid; abrupt smooth boundary.

Ab—35 to 46 inches; very dark gray (10YR 3/1) silt loam; weak thin platy structure; friable; common pores; some dark grayish brown (10YR 4/2) soil in worm channels; slightly acid; clear wavy boundary.

C3—46 to 49 inches; dark gray (10YR 4/1) silt loam; common fine prominent yellowish brown (10YR 5/6)

mottles; weak medium platy structure; friable; common pores; some very dark gray (10YR 3/1) soil in worm channels; slightly acid; clear wavy boundary.

C4—49 to 60 inches; grayish brown (10YR 5/2) silt loam; many medium prominent strong brown (7.5YR 5/8) mottles; weak medium platy structure parting to weak fine subangular blocky; friable; slightly acid.

Thickness of the recent alluvium over the Ab horizon ranges from 20 to 40 inches. Reaction ranges from slightly acid to mildly alkaline throughout the solum.

The A1 horizon ranges from 7 to 15 inches in thickness. Typically it is 10YR 4/2, but in some pedons it is 10YR 5/3. Some pedons have thin strata with value of 3 and chroma of 1 to 3. In some pedons, the C horizon between the A horizon and the Ab horizon is 10YR 5/3. In some pedons, it has thin strata with value of 3 and chroma of 2 or 3. The Ab horizon ranges from 10 to 30 inches in thickness. It has value of 2 or 3 and chroma of 1 or 2. The IIC horizon has value of 4 to 6 and chroma of 1 or 2.

Atterberry series

The Atterberry series consists of somewhat poorly drained, moderately slowly permeable soils in drainageways and depressions in the uplands and on outwash plains and terraces. These soils formed in deep loess deposits. The slope is 0 to 6 percent.

Atterberry soils are similar to Fayette soils and are near Baraboo and Reedsburg soils. Fayette and Baraboo soils do not have a mollic intergrade surface layer. In addition, Fayette soils are well drained and Baraboo soils are moderately well drained. Reedsburg soils have a cherty clay IIB2t horizon at a depth of 15 to 40 inches.

Typical pedon of Atterberry silt loam, 2 to 6 percent slopes, in a cultivated field approximately 100 feet north and 1,180 feet west of the southeast corner NE1/4 sec. 5, T. 10 N., R. 6 E.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine subangular blocky structure; friable; few roots; few pores; neutral; abrupt smooth boundary.

A2—9 to 12 inches; grayish brown (10YR 5/2) silt loam; common fine prominent yellowish brown (10YR 5/6) and few fine faint light gray (10YR 6/1) mottles; moderate thick platy structure; friable; few roots; many pores; some very dark grayish brown (10YR 3/2) soil in worm and root channels; slightly acid; clear smooth boundary.

B1t—12 to 18 inches; brown (10YR 5/3) silt loam; common fine faint grayish brown (10YR 5/2) and prominent yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; clean light gray (10YR 7/2 dry) silt grains coating faces of some peds; few soft dark nodules (iron and manganese oxides); medium acid; gradual wavy boundary.

B21tg—18 to 32 inches; grayish brown (10YR 5/2) silty clay loam; many fine and medium prominent yellowish brown (10YR 5/8) mottles; moderate very fine subangular blocky structure; firm; few roots; common pores; thin patchy brown (10YR 4/3) clay films on faces of peds and in pores and channels; clean light gray (10YR 7/2 dry) silt grains coating faces of some peds; few soft dark nodules (iron and manganese oxides); medium acid; gradual wavy boundary.

B22tg—32 to 42 inches; light brownish gray (10YR 6/2) silty clay loam; many fine and medium prominent yellowish brown (10YR 5/8) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; few roots; common pores; thin patchy clay films, some of which are brown (10YR 4/3), on faces of peds and in pores and channels; clean light gray (10YR 7/2 dry) silt grains coating faces of some peds; common soft dark nodules (iron and manganese oxides); strongly acid; gradual wavy boundary.

B3t—42 to 55 inches; mixed light brownish gray (10YR 6/2) and yellowish brown (10YR 5/6) silt loam; common fine prominent yellowish brown (10YR 5/8) mottles; weak coarse subangular blocky structure; friable; common pores; thin patchy clay films, some of which are dark brown (10YR 3/3), on faces of peds and in pores and channels; clean light gray (10YR 7/2 dry) silt grains coating faces of some peds; many soft dark nodules (iron and manganese oxides); medium acid; gradual irregular boundary.

C—55 to 60 inches; mixed light brownish gray (10YR 6/2) and yellowish brown (10YR 5/6) silt loam; common fine prominent yellowish brown (10YR 5/8) mottles; massive; friable; few pores; slightly acid.

Solum thickness typically is 42 to 50 inches but ranges to more than 60 inches in some pedons. Reaction is strongly acid or medium acid in the subsoil and medium acid to neutral in the substratum.

The A1 or Ap horizon ranges from 6 to 9 inches in thickness. It has value of 2 or 3 and chroma of 1 or 2. The B2 horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 to 6, and chroma of 2 to 4. The IIC horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 to 4.

Baraboo series

The Baraboo series consists of moderately well drained, moderately permeable soils on loess covered, quartzite uplands. These soils formed in loess underlain by quartzite bedrock. The slope ranges from 2 to 60 percent.

Baraboo soils are near Atterberry and Baraboo variant soils and areas of Rock outcrop, quartzite. Atterberry

and Baraboo variant soils are somewhat poorly drained. In addition, Atterberry soils do not have the underlying quartzite bedrock that is typical of Baraboo soils. Rock outcrop, quartzite, is bare quartzite bedrock.

Typical pedon of Baraboo silt loam, 2 to 6 percent slopes, in a cultivated field, now idle, approximately 330 feet north and 165 feet east of the southwest corner NW1/4 sec. 13, T. 11 N., R. 5 E.

Ap—0 to 5 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; moderate medium granular structure; friable; many roots; few pores; neutral; abrupt smooth boundary.

B1t—5 to 14 inches; brown (10YR 4/3) silt loam; weak fine and medium subangular blocky structure; firm; common roots; common pores; few thin clay films on faces of peds and in pores; slightly acid; clear wavy boundary.

B21t—14 to 19 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate fine and medium subangular blocky structure; firm; common roots; common pores; few thin clay films and coatings on faces of peds and in pores; strongly acid; clear wavy boundary.

B22t—19 to 28 inches; dark yellowish brown (10YR 4/4) silty clay loam; few fine distinct yellowish brown (10YR 5/6) mottles; moderate fine angular and subangular blocky structure; firm; common roots; common pores; few thin clay films and stains on faces of peds and in pores; about 5 percent by volume angular quartzite pebbles and cobblestones; strongly acid; clear wavy boundary.

B3t—28 to 34 inches; brown (10YR 5/3) silty clay loam; common medium prominent yellowish brown (10YR 5/6) mottles; weak thick platy structure parting to moderate fine subangular blocky; firm; few roots; common pores; few thin clay films on faces of peds and in pores; about 5 percent by volume angular quartzite pebbles and 9 percent cobblestones; strongly acid; abrupt wavy boundary.

R—34 inches; pale red (10R 6/3) and weak red (10R 5/4 and 4/2) quartzite bedrock.

Solum thickness and depth to underlying quartzite bedrock range from 20 to 40 inches. Cobbles and stones are on the surface and throughout the solum in most pedons but some are relatively free of cobbles and stones, at least in the surface layer. Reaction ranges from strongly acid to slightly acid in the subsoil.

The A1 horizon ranges from 2 to 4 inches in thickness and has value of 2 or 3 and chroma 1 to 3. Some pedons have an A2 horizon. The B2t horizon has value and chroma of 3 or 4. In some pedons it is silt loam. Some pedons do not have a B3 horizon. The underlying quartzite bedrock has hue of 10R, 2.5YR, 5YR, 7.5YR, or 10YR; value of 3 to 6; and chroma of 1 to 4.

Baraboo variant

The Baraboo variant consists of somewhat poorly drained, moderately permeable soils on loess covered, quartzite uplands. These soils formed in loess underlain by quartzite bedrock. The slope is 1 to 6 percent.

Baraboo variant soils are similar to and are near Baraboo soils. Baraboo soils are moderately well drained.

Typical pedon of Baraboo Variant stony silt loam, 1 to 6 percent slopes, approximately 450 feet south and 250 feet east of the center of sec. 25, T. 11 N., R. 5 E.

A1—0 to 6 inches; very dark grayish brown (10YR 3/2) stony silt loam, grayish brown (10YR 5/2) dry; moderate very fine subangular blocky structure; friable; many roots; common pores; some brown (10YR 4/3) soil in worm channels; neutral; clear smooth boundary.

B1—6 to 11 inches; brown (10YR 4/3) silt loam; moderate very fine subangular blocky structure; friable; common roots; common pores; some very dark grayish brown (10YR 3/2) soil coating faces of peds and in worm and root channels; few stones; slightly acid; clear smooth boundary.

B21t—11 to 16 inches; brown (10YR 4/3) silty clay loam; moderate very fine subangular blocky structure; firm; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; few quartzite stones and pebbles; strongly acid; clear wavy boundary.

B22t—16 to 23 inches; brown (10YR 5/3) silty clay loam; common medium faint grayish brown (10YR 5/2) and common fine and medium prominent yellowish brown (10YR 5/6) mottles; moderate very fine subangular blocky structure; firm; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; few quartzite stones and pebbles; very strongly acid; gradual wavy boundary.

B23t—23 to 26 inches; grayish brown (2.5Y 5/2) silty clay loam; many fine and medium prominent yellowish brown (10YR 5/8) mottles; moderate very fine subangular blocky structure; firm; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; about 5 percent by volume quartzite pebbles and few stones; very strongly acid; abrupt wavy boundary.

R—26 inches; weak red (10R 4/3 and 5/3) quartzite bedrock.

Solum thickness and depth to underlying quartzite bedrock range from 20 to 40 inches. Cobbles and stones are on the surface and throughout the solum in most pedons, but some are relatively free of cobbles and stones, at least in the surface layer. Reaction ranges from very strongly acid to slightly acid in the subsoil.

The A1 or Ap horizon ranges from 6 to 9 inches in thickness and has value of 3 and chroma of 1 to 3. Some pedons have an A2 horizon. In some pedons the

B2t horizon is silt loam. It has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 1 to 4. Some pedons have a B3 horizon. The underlying quartzite bedrock has hue of 10R, 2.5YR, 5YR, 7.5YR, or 10YR; value of 3 to 6; and chroma of 1 to 4.

Bertrand series

The Bertrand series consists of well drained, moderately permeable soils on outwash plains and stream terraces. These soils formed in silty and loamy sediments underlain by outwash sand. The slope ranges from 2 to 12 percent.

Bertrand soils are similar to Curran and Jackson soils and are near Curran, Jackson, and Tell soils. Curran soils have a mollic intergrade surface layer and are somewhat poorly drained. Jackson soils are moderately well drained. Tell soils have a silty mantle and a solum less than 40 inches thick.

Typical pedon of Bertrand silt loam, 2 to 6 percent slopes, in a cultivated field approximately 850 feet south and 1,240 feet west of the northeast corner of sec. 8, T. 11 N., R. 4 E.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam; weak fine subangular blocky structure; friable; few roots; few pores; some brown (10YR 4/3) soil in worm channels; mildly alkaline; abrupt smooth boundary.

B1t—8 to 13 inches; brown (10YR 4/3) silt loam; moderate very fine subangular blocky structure; firm; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; clean white (10YR 8/2 dry) silt grains coating faces of some peds; neutral; clear wavy boundary.

B21t—13 to 21 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate very fine subangular blocky structure; firm; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; clean white (10YR 8/1 dry) silt grains coating faces of many peds; neutral; gradual wavy boundary.

B22t—21 to 37 inches; brown (10YR 4/3) silty clay loam; moderate medium prismatic structure parting to moderate fine subangular blocky; firm; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; clean white (10YR 8/1 dry) silt grains coating faces of some peds; medium acid; gradual wavy boundary.

B31t—37 to 46 inches; dark yellowish brown (10YR 4/4) silt loam; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; clean very pale brown (10YR 8/3 dry) silt grains coating faces of peds; medium acid; clear smooth boundary.

IIB32t—46 to 56 inches; dark yellowish brown (10YR 4/4) stratified loam and silt loam; weak medium subangular blocky structure; friable; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; clean very pale brown (10YR 8/3 dry) silt grains coating faces of peds; few very thin lenses of sandy loam; medium acid; clear smooth boundary.

IIB33—56 to 60 inches; dark yellowish brown (10YR 4/4) stratified sandy loam and loamy sand; weak coarse subangular blocky structure; very friable; few roots; many pores; medium acid; clear wavy boundary.

Solum thickness and depth to underlying sand range from 45 to 65 inches. Thickness of the silty sediment ranges from 40 to 59 inches. Reaction is medium acid to neutral in the upper part of the subsoil and ranges from strongly acid to slightly acid in the lower part and in the substratum.

The A1 horizon is 3 to 5 inches thick and has value of 2 or 3 and chroma of 1 to 3. Some pedons have an A2 horizon. The B2t horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4. In some pedons it is silt loam. Some pedons do not have a B3 horizon. The IIB horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4. The IIC horizon has hue of 10YR or 7.5YR, value of 4 to 8, and chroma of 2 to 6. In some pedons it is sand or fine sand.

Billett series

The Billett series consists of well drained and moderately well drained, moderately rapidly permeable soils on outwash plains and stream terraces. These soils formed in loamy and sandy outwash sediments over outwash sand. The slope ranges from 0 to 20 percent.

Billett soils are similar to and are near Dickinson and Shiffer variant soils. Dickinson soils have a mollic epipedon. Shiffer variant soils are somewhat poorly drained.

Typical pedon of Billett sandy loam, 1 to 6 percent slopes, in a cultivated field approximately 1,000 feet south and 1,150 feet east of the northeast corner NE1/2 sec. 17, T. 12 N., R. 7 E.

Ap—0 to 9 inches; dark brown (10YR 3/3) sandy loam, brown (10YR 5/3) dry; weak medium subangular blocky structure; very friable; common roots; common pores; slightly acid; abrupt smooth boundary.

B1—9 to 15 inches; brown (7.5YR 4/4) sandy loam; weak medium subangular blocky structure; friable; common roots; common pores; medium acid; gradual wavy boundary.

B21t—15 to 23 inches; brown (7.5YR 4/4) sandy loam; weak and moderate medium subangular blocky structure; friable; common roots; common pores; thin patchy clay films on faces of peds; medium acid; clear wavy boundary.

B22t—23 to 30 inches; brown (7.5YR 4/4) sandy loam; weak medium subangular blocky structure; very friable; common roots; common pores; thin patchy

clay films on faces of peds; medium acid; clear wavy boundary.

B3t—30 to 37 inches; strong brown (7.5YR 5/6) loamy sand; weak fine subangular blocky structure; very friable; few roots; clay bridging between sand grains; few thin clay films on pebbles; medium acid; clear wavy boundary.

C—37 to 60 inches; yellowish brown (10YR 5/6) sand; single grained; loose; few thin lenses of strong brown (7.5YR 5/6) loamy sand; neutral.

Solum thickness and depth to underlying sand range from 30 to 50 inches. In some pedons the lower part of the subsoil and the substratum are mottled. Reaction ranges from strongly acid to neutral in the subsoil and from slightly acid to moderately alkaline in the substratum.

The A1 or Ap horizon ranges from 6 to 9 inches in thickness. It is sandy loam or fine sandy loam. It has value of 2 or 3 and chroma of 1 to 3. The B2t horizon has hue of 10YR or 7.5YR and value and chroma of 4 to 6. In some pedons it has thin subhorizons of sandy clay loam. In some pedons the C horizon is loamy sand or sand and gravel, and in some it has free carbonates at a depth of more than 60 inches.

Boone series

The Boone series consists of excessively drained, rapidly permeable soils on sandstone uplands and benches. These soils formed in sandy residuum from underlying sandstone bedrock. The slope ranges from 2 to 30 percent.

Boone soils are near Eleva, Elkmound, and Plainfield soils. Eleva and Elkmound soils have more silt and clay and less sand in the solum than Boone soils. Elkmound soils are thinner over sandstone. Plainfield soils do not have the underlying sandstone that is typical of Boone soils, and they are less than 95 percent quartz sand.

Typical pedon of Boone sand, 2 to 6 percent slopes, approximately 530 feet east and 900 feet south of the center of sec. 16, T. 13 N., R. 5 E.

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) sand; weak coarse granular structure; very friable; many roots; strongly acid; abrupt smooth boundary.

C1—7 to 19 inches; dark yellowish brown (10YR 4/4) sand; single grained; loose; few roots; common sandstone fragments; strongly acid; gradual wavy boundary.

C2—19 to 28 inches; yellowish brown (10YR 5/4) sand; single grained; loose; few roots; common sandstone fragments; medium acid; gradual wavy boundary.

Cr1—28 to 48 inches; yellowish brown (10YR 5/4 and 5/6) soft platy sandstone; very weakly cemented; abrupt smooth boundary.

Cr2—48 to 60 inches; very pale brown (10YR 8/3) and strong brown (7.5YR 5/6) soft platy sandstone; very weakly cemented.

Depth to underlying sandstone bedrock ranges from 20 to 40 inches. The sandy residuum and the underlying sandstone are 95 percent or more quartz sand. Reaction ranges from strongly acid to slightly acid in the sandy residuum.

The Ap horizon has value of 3 or 4 and chroma of 1 to 3. The A1 horizon ranges from 3 to 5 inches in thickness. It has chroma of 1 to 3. Some pedons have an A2 horizon, and some have a weak B horizon. The C horizon has hue of 10YR or 7.5YR, value of 4 to 8, and chroma of 1 to 6. The Cr horizon has hue of 10YR or 7.5YR, value of 5 to 8, and chroma of 1 to 6. In some pedons it contains strongly indurated layers.

Brems series

The Brems series consists of moderately well drained, rapidly permeable soils on outwash plains, on stream terraces, and in lake basins. These soils formed in outwash sand deposits. The slope is 0 to 3 percent.

Brems soils are similar to Plainfield soils and are near Gotham, Granby, and Plainfield soils. Gotham soils are somewhat excessively drained and have an argillic horizon. Granby soils are poorly drained and very poorly drained and have a mollic epipedon. Plainfield soils are excessively drained.

Typical pedon of Brems loamy sand, 0 to 3 percent slopes, in a cultivated field, now idle, approximately 40 feet west and 930 feet south of the northeast corner SE1/4 sec. 23, T. 13 N., R. 5 E.

Ap—0 to 10 inches; very dark grayish brown (10YR 3/2) loamy sand; weak fine subangular blocky structure; very friable; few roots; slightly acid; abrupt smooth boundary.

B21—10 to 17 inches; brown (7.5YR 4/4) sand; weak medium subangular blocky structure; very friable; few roots; strongly acid; gradual wavy boundary.

B22—17 to 27 inches; dark yellowish brown (10YR 4/4) sand; weak medium subangular blocky structure; very friable; few roots; strongly acid; gradual wavy boundary.

B31—27 to 34 inches; yellowish brown (10YR 5/4) sand; common fine distinct yellowish brown (10YR 5/6) and few fine prominent yellowish brown (10YR 5/8) mottles; weak coarse subangular blocky structure; very friable; strongly acid; clear smooth boundary.

B32—34 to 38 inches; yellowish brown (10YR 5/4) sand; common fine and medium prominent yellowish red (5YR 4/8) and distinct yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; loose; medium acid; clear wavy boundary.

C—38 to 60 inches; brown (10YR 5/3) sand; common fine and medium faint grayish brown (10YR 5/2) and common medium and coarse prominent yellowish red (5YR 4/8) mottles; single grained; loose; some dark reddish brown (5YR 2/2) iron stains; slightly acid.

Solum thickness ranges from 35 to 50 inches. Reaction ranges from very strongly acid to medium acid in the subsoil and from slightly acid to mildly alkaline in the substratum.

The Ap horizon has value of 3 or 4 and chroma of 2 or 3. The A1 horizon ranges from 3 to 5 inches in thickness. It has value of 2 or 3 and chroma of 1 to 3. Some pedons have an A2 horizon. The B2 horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 3 to 8. In some pedons it is loamy sand. The C horizon has colors similar to those of the B2 horizon. In some pedons the C horizon has low chroma mottles, and in some it is loamy sand.

Briggsville series

The Briggsville series consists of well drained, moderately slowly permeable soils in glacial lake basins. These soils formed in lake-laid sediments over calcareous silty lacustrine sediments. The slope is 2 to 6 percent.

Briggsville soils are near Mosel, Rimer, and Tustin soils. Mosel and Rimer soils are somewhat poorly drained. Rimer and Tustin soils have a 20- to 40-inch sandy mantle that Briggsville soils do not have.

Typical pedon of Briggsville silt loam, 2 to 6 percent slopes, in a cultivated field approximately 400 feet west and 660 feet north of the center of sec. 6, T. 12 N., R. 6 E.

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) silt loam; weak very fine subangular blocky structure; friable; few roots; few pores; neutral; abrupt smooth boundary.

B1t—7 to 9 inches; reddish brown (5YR 4/4) silty clay loam; moderate fine and very fine subangular blocky structure; firm; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; some dark grayish brown (10YR 4/2) soil in worm and root channels; neutral; abrupt smooth boundary.

B21t—9 to 17 inches; reddish brown (5YR 4/3) silty clay; moderate very fine subangular blocky structure; firm; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; neutral; gradual wavy boundary.

B22t—17 to 24 inches; reddish brown (5YR 4/3) silty clay; moderate fine prismatic structure parting to strong fine angular blocky; very firm; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; slightly acid; gradual wavy boundary.

B23t—24 to 33 inches; reddish brown (5YR 4/3) silty clay loam; moderate medium prismatic structure parting to strong fine and medium subangular blocky; firm; few roots; few pores; thin patchy clay films on faces of peds and in pores and channels; slightly acid; gradual wavy boundary.

B3t—33 to 39 inches; brown (7.5YR 5/4) silty clay loam; moderate medium platy structure parting to weak very fine subangular blocky; firm; few roots; few pores; thin patchy clay films on faces of some peds; thick patchy reddish brown (5YR 4/3) clay films on faces of some peds; few thin lenses of silt loam and fine sand; slight effervescence; moderately alkaline; gradual wavy boundary.

C—39 to 60 inches; light brown (7.5YR 6/4) silty clay loam; moderate medium platy structure; friable; few roots; few pores; few very thin lenses of silt and silt loam; some vertical cleavage; violent effervescence; moderately alkaline.

Solum thickness and depth to free carbonates range from 24 to 40 inches but do not necessarily coincide. Reaction ranges from medium acid to neutral in the upper part of the subsoil and from neutral to moderately alkaline in the lower part. The substratum is mildly alkaline or moderately alkaline.

The A1 horizon ranges from 3 to 5 inches in thickness and has value of 2 or 3 and chroma of 1 to 3. Some pedons have an A2 horizon. The B2t horizon has hue of 10YR, 7.5YR, or 5YR hue; value of 4 or 5; and chroma of 3 or 4. The C horizon has value of 4 to 6 and chroma of 3 or 4. In some pedons it is stratified with silty clay, fine sandy loam, or loam.

Chaseburg series

The Chaseburg series consists of moderately well drained, moderately permeable soils and in drainageways and depressions on flood plains. These soils formed in stratified silty alluvial sediments of relatively recent deposition. The slope is 0 to 3 percent.

Chaseburg soils are similar to Arenzville and Orion soils and are near Arenzville and Fluvaquents and Orion soils. Chaseburg soils do not have the buried A horizon of Arenzville and Orion soils. In addition, Orion soils are somewhat poorly drained. Fluvaquents are moderately well drained and somewhat poorly drained and have a wide range in texture.

Typical pedon of Chaseburg silt loam, 0 to 3 percent slopes, in a cultivated field approximately 800 feet west and 400 feet north of the southeast corner of sec. 18, T. 9 N., R. 6 E.

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) silt loam; weak fine and very fine subangular blocky structure; friable; few roots; few pores; neutral; abrupt smooth boundary.

C1—7 to 36 inches; brown (10YR 4/3) silt loam with thin strata of brown (10YR 5/3) silt loam; weak thin platy structure; friable; few roots; common pores; slightly acid; gradual smooth boundary.

C2—36 to 60 inches; brown (10YR 5/3) silt loam; few fine prominent yellowish brown (10YR 5/6) mottles; weak thin platy structure; friable; few roots; common pores; few thin strata of fine sand or very fine sand; slightly acid.

The silty alluvium is more than 60 inches thick. Reaction is slightly acid or neutral in the upper part of the control section and ranges from medium acid to neutral in the lower part.

In some pedons the Ap horizon is 10YR 5/3. The A1 horizon ranges from 3 to 5 inches in thickness. It has hue of 10YR, value of 3, and chroma of 2 or 3. The C horizon has value of 4 to 6 and chroma of 2 to 4.

Colwood series

The Colwood series consists of poorly drained and very poorly drained, moderately permeable soils in glacial lake basins. These soils formed in loamy alluvium or glacial drift over stratified lacustrine sediments. The slope is 0 to 2 percent.

Colwood soils are similar to and are near Mosel and Sisson soils. Mosel soils are somewhat poorly drained, and Sisson soils are well drained.

Typical pedon of Colwood loam in a cultivated field approximately 400 feet south and 1,250 feet east of the northwest corner SW1/4 sec. 20, T. 12 N., R. 7 E.

Ap—0 to 8 inches; black (10YR 2/1) loam, very dark gray (10YR 4/1) dry; weak medium subangular blocky structure; friable; few roots; few pores; mildly alkaline; abrupt smooth boundary.

A12—8 to 12 inches; black (10YR 2/1) loam, very dark gray (10YR 4/1) dry; many fine prominent yellowish brown (10YR 5/8) mottles; weak fine subangular blocky structure; friable; few roots; common pores; mildly alkaline; clear wavy boundary.

B1g—12 to 16 inches; grayish brown (2.5Y 5/2) sandy loam; many medium prominent yellowish brown (10YR 5/6) mottles; weak fine subangular blocky structure; friable; few roots; common pores; mildly alkaline; clear wavy boundary.

B2—16 to 24 inches; mixed grayish brown (2.5Y 5/2) and yellowish brown (10YR 5/8) loam; moderate fine subangular blocky structure; firm; few roots; common pores; mildly alkaline; clear smooth boundary.

IIB3—24 to 30 inches; mixed grayish brown (10YR 5/2) and yellowish brown (10YR 5/8) silty clay loam; few fine faint gray (10YR 6/1) mottles; moderate very fine subangular blocky structure; firm; common pores; slight effervescence; mildly alkaline; gradual wavy boundary.

IIC1—30 to 37 inches; mixed brown (10YR 5/3) and yellowish brown (10YR 5/8) silt loam; common fine faint grayish brown (10YR 5/2) and few fine faint light gray (5Y 7/2) mottles; weak coarse subangular blocky structure; friable; few pores; strong effervescence; moderately alkaline; gradual wavy boundary.

IIC2—37 to 60 inches; light yellowish brown (10YR 6/4) silt loam with thin lenses of very fine sand; common coarse distinct pinkish gray (7.5YR 7/2) and few fine prominent gray (10YR 6/1) mottles; massive; very friable; violent effervescence; moderately alkaline.

Solum thickness ranges from 24 to 50 inches. Reaction is neutral or mildly alkaline in the subsoil and mildly alkaline or moderately alkaline in the substratum.

The A horizon ranges from 10 to 20 inches in thickness. It has value of 2 or 3 and chroma of 1 or 2. The B2 horizon has hue of 10YR, 7.5YR, 2.5Y, or 5Y; value of 4 to 6; and chroma of 1 to 8. In some pedons it is clay loam or sandy clay loam. The IIC horizon has hue of 10YR, 2.5Y, or 5Y; value of 4 to 6; and chroma of 1 to 4.

Curran series

The Curran series consists of somewhat poorly drained soils in drainageways on outwash plains and stream terraces. These soils are moderately slowly permeable in the subsoil and rapidly permeable in the substratum. They formed in silty sediments over sandy material. The slope is 0 to 3 percent.

Curran soils are similar to Bertrand and Jackson soils and are near Bertrand, Ettrick, and Jackson soils. Bertrand soils are well drained. Ettrick soils are poorly drained and very poorly drained and are underlain by stratified sediments rather than by sandy material. Jackson soils are moderately well drained.

Typical pedon of Curran silt loam, 0 to 3 percent slopes, in a cultivated field approximately 650 feet west and 1,100 feet south of the center of sec. 34, T. 12 N., R. 4 E.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak very fine subangular blocky structure; friable; common roots; few pores; some brown (10YR 5/3) soil in worm channels; neutral; abrupt smooth boundary.

B1t—8 to 15 inches; brown (10YR 5/3) silt loam; many fine and medium faint grayish brown (10YR 5/2) and many fine prominent yellowish brown (10YR 5/6) mottles; moderate very fine subangular blocky structure; firm; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; some dark grayish brown (10YR 4/2) soil in worm and root channels; slightly acid; gradual wavy boundary.

B21t—15 to 20 inches; brown (10YR 5/3) silty clay loam; many fine and medium faint grayish brown (10YR 5/2) and many fine prominent yellowish brown (10YR 5/6) mottles; moderate very fine subangular blocky structure; firm; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; medium acid; clear wavy boundary.

B22tg—20 to 35 inches; grayish brown (2.5Y 5/2) silty clay loam; many fine and medium prominent yellowish brown (10YR 5/6) mottles; weak fine prismatic structure parting to moderate very fine subangular blocky; firm; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; clean light gray (10YR 7/2) silt grains coating faces of many peds; medium acid; gradual wavy boundary.

B23tg—35 to 40 inches; grayish brown (2.5Y 5/2) silty clay loam; common fine and medium prominent yellowish brown (10YR 5/6) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; firm; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; clean light gray (10YR 7/2) silt grains coating faces of some peds; few soft dark nodules (iron and manganese oxides); strongly acid; clear smooth boundary.

B31tg—40 to 50 inches; grayish brown (2.5Y 5/2) silt loam; many fine and medium prominent yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; firm; few roots; common pores; thin patchy clay films on faces of peds; clean light gray (10YR 7/2) silt grains coating faces of some peds; common soft dark nodules (iron and manganese oxides); strongly acid; clear wavy boundary.

IIB32t—50 to 59 inches; yellowish brown (10YR 5/4) stratified silt loam, loam, sandy loam, and loamy sand; many fine and medium distinct yellowish brown (10YR 5/6) and light brownish gray (10YR 6/2) mottles; weak medium subangular blocky structure; friable; few roots; few pores; thin patchy clay films on faces of some peds; many soft dark nodules and coatings (iron and manganese oxides); medium acid; clear smooth boundary.

IIC—59 to 60 inches; dark yellowish brown (10YR 4/4) loamy fine sand; massive; very friable; slightly acid.

Solum thickness and depth to underlying sand range from 45 to 60 inches. Thickness of the silty sediments ranges from 40 to 50 inches. Reaction ranges from very strongly acid to slightly acid in the subsoil and from strongly acid to slightly acid in the substratum.

The A1 or Ap horizon ranges from 6 to 9 inches in thickness. It has value and chroma of 2 or 3. Some pedons have an A2 horizon. The B2t horizon has hue of 2.5Y or 10YR, value of 4 or 5, and chroma of 2 or 3. In some pedons it is silt loam. Some pedons do not have a B3t horizon. The IIB3 horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 to 4. The IIC horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 to 6. In some pedons it is sand.

Dakota series

The Dakota series consists of well drained soils on outwash plains and stream terraces. These soils are moderately permeable in the subsoil and rapidly permeable in the substratum. They formed in loamy sediments over outwash sand. The slope is 0 to 6 percent.

Dakota soils are similar to Pillot soils and are near Dickinson and Pillot soils. Dickinson soils have a coarse-loamy subsoil, and Pillot soils have a fine-silty subsoil.

Typical pedon of Dakota loam, 0 to 2 percent slopes, in a cultivated field approximately 130 feet west and 65 feet south of the northeast corner SE1/4 sec. 26, T. 10 N., R. 6 E.

Ap—0 to 9 inches; very dark brown (10YR 2/2) loam, dark grayish brown (10YR 4/2) dry; weak fine subangular blocky structure; friable; common roots; neutral; abrupt smooth boundary.

A12—9 to 12 inches; very dark brown (10YR 2/2) loam, dark grayish brown (10YR 4/2) dry; weak fine subangular blocky structure; friable; common roots; common pores; some dark brown (10YR 3/3) soil in old worm channels; neutral; clear smooth boundary.

B1t—12 to 15 inches; dark brown (10YR 3/3) loam; moderate fine and medium subangular blocky structure; firm; common roots; common pores; thin patchy clay films on faces of peds and in pores and channels; slightly acid; clear smooth boundary.

B21t—15 to 20 inches; dark yellowish brown (10YR 3/4) clay loam; moderate medium and fine subangular blocky structure; firm; common roots; many pores; thin patchy clay films on faces of peds and in pores and channels; medium acid; clear wavy boundary.

B22t—20 to 26 inches; dark brown (7.5YR 4/4) clay loam; moderate medium and fine subangular blocky structure; firm; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; few pebbles; medium acid; clear wavy boundary.

B23t—26 to 30 inches; dark brown (7.5YR 4/4) sandy clay loam; weak medium subangular blocky structure; friable; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; few pebbles; medium acid; clear wavy boundary.

IIB3t—30 to 34 inches; dark yellowish brown (10YR 4/4) loamy sand; weak coarse subangular blocky structure; very friable; few roots; clay bridging between sand grains; few pebbles; medium acid; clear wavy boundary.

IIC—34 to 60 inches; dark yellowish brown (10YR 4/4) sand; single grained; loose; few pebbles; medium acid.

Solum thickness and depth to underlying sand range from 28 to 40 inches. The mollic epipedon ranges from 10 to 20 inches in thickness. Reaction ranges from strongly acid to slightly acid in the subsoil and substratum.

The A horizon ranges from 10 to 17 inches in thickness. It has value of 2 or 3 and chroma of 1 or 2. Some pedons have an A3 horizon or a B1 horizon. The B2t horizon is sandy clay loam and clay loam. It has hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 3 or 4. The IIB3 horizon ranges from 2 to 4 inches in thickness and has colors similar to those of the B2t horizon. In some pedons it is sandy loam or sand. In some, the IIC horizon has thin strata of fine sand or gravel.

Dells series

The Dells series consists of somewhat poorly drained soils on outwash plains and stream terraces. These soils

are moderately permeable in the subsoil and rapidly permeable in the substratum. They formed in silty sediments over outwash sand. The slope is 0 to 3 percent.

Dells soils are similar to and are near Pillot and Tell soils. Pillot soils have a mollic epipedon and are well drained. Tell soils have an ochric epipedon and are well drained.

Typical pedon of Dells silt loam, 0 to 3 percent slopes, in a cultivated field approximately 550 feet west and 930 feet south of the northeast corner NW1/4 sec. 15, T. 10 N., R. 5 E.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine subangular blocky structure; friable; common roots; few pores; some brown (10YR 5/3) soil in worm channels; neutral; abrupt smooth boundary.

B21t—8 to 18 inches; brown (10YR 5/3) silty clay loam; many fine prominent yellowish brown (10YR 5/6) and few fine faint grayish brown (10YR 5/2) mottles; moderate fine subangular blocky structure; firm; few roots; many pores; thin patchy clay films on faces of peds and in pores and channels; some very dark grayish brown (10YR 3/2) soil in worm and root channels; medium acid; gradual wavy boundary.

B22tg—18 to 24 inches; grayish brown (10YR 5/2) silty clay loam; common fine prominent yellowish brown (10YR 5/8) mottles; moderate very fine subangular blocky structure; firm; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; strongly acid; clear smooth boundary.

IIB3tg—24 to 27 inches; light brownish gray (10YR 6/2) loam; common fine and medium prominent yellowish brown (10YR 5/8) mottles; weak medium subangular blocky structure; firm; few roots; common pores; thin patchy clay films on faces of most peds; strongly acid; abrupt smooth boundary.

IIC—27 to 60 inches; yellowish brown (10YR 5/6) sand; many fine and medium prominent light brownish gray (10YR 6/2) mottles; single grained; loose; medium acid.

Solum thickness ranges from 20 to 40 inches and in most pedons is the same as the depth to sand. Thickness of the silty sediments ranges from 20 to 36 inches. Reaction is medium acid or strongly acid in the subsoil and substratum.

The A1 or Ap horizon ranges from 6 to 9 inches in thickness. It has value of 2 or 3 and chroma of 1 or 2. Some pedons have an A2 horizon. The B2t horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2 to 5. In some pedons it is silt loam. In some, the IIB horizon is sandy loam. It has colors similar to those of the B2t horizon. In some pedons the IIC horizon is loamy sand. It has hue of 10YR or 7.5YR and value and chroma of 4 to 8.

Dickinson series

The Dickinson series consists of somewhat excessively drained, moderately rapidly permeable soils on outwash plains and stream terraces. These soils formed in loamy sediments over outwash sand. The slope ranges from 1 to 12 percent.

Dickinson soils are similar to Billett soils and are near Billett, Dakota, and Gotham soils. Billett soils have a mollic intergrade surface layer. Dakota soils have more silt and clay in the solum than Dickinson soils. Gotham soils have more sand and less silt and clay in the solum than Dickinson soils.

Typical pedon of Dickinson sandy loam, 1 to 6 percent slopes, in a cultivated field approximately 530 feet east and 680 feet south of the northwest corner SW1/4 sec. 15, T. 12 N., R. 6 E.

Ap—0 to 9 inches; very dark brown (10YR 2/2) sandy loam, dark grayish brown (10YR 4/2) dry; weak medium subangular blocky structure; friable; few roots; few pores; strongly acid; abrupt smooth boundary.

A12—9 to 12 inches; very dark brown (10YR 2/2) sandy loam, dark grayish brown (10YR 4/2) dry; weak medium subangular blocky structure; friable; few roots; common pores; strongly acid; clear wavy boundary.

B1—12 to 18 inches; dark brown (10YR 3/3) sandy loam; weak medium subangular blocky structure; friable; few roots; common pores; few pebbles; strongly acid; gradual wavy boundary.

B2—18 to 26 inches; dark yellowish brown (10YR 4/4) sandy loam; weak medium subangular blocky structure; friable; few roots; common pores; few pebbles; strongly acid; clear wavy boundary.

B3—26 to 31 inches; dark yellowish brown (10YR 4/4) loamy sand; weak medium subangular blocky structure; very friable; few roots; few pebbles; strongly acid; clear wavy boundary.

C—31 to 60 inches; yellowish brown (10YR 5/6) sand; single grained; loose; strongly acid.

Solum thickness typically ranges from 24 to 36 inches, but in some pedons it is as much as 50 inches. The mollic epipedon ranges from 10 to 20 inches in thickness. Depth to loamy sand and sand typically ranges from 20 to 30 inches, but in some pedons it is as much as 42 inches. Reaction ranges from strongly acid to slightly acid in the subsoil and substratum.

The A horizon ranges from 10 to 18 inches in thickness. It has value of 2 or 3 and chroma of 1 or 2. The B horizon has hue of 10YR or 7.5YR. The upper part has value and chroma of 3 or 4. The lower part has value or 3 to 5 and chroma of 4 to 6. The C horizon has value of 4 or 5 and chroma of 3 to 6. In some pedons it is fine sand, loamy sand, or loamy fine sand.

Eleva series

The Eleva series consists of somewhat excessively drained, moderately rapidly permeable soils on sandstone uplands. These soils formed in loamy residuum from sandstone over sandstone bedrock. The slope ranges from 2 to 60 percent.

Eleva soils are similar to Eleva variant soils and are near Boone, Eleva variant, and Elkmound soils. Boone soils have more sand and less silt and clay in the solum than Eleva soils. Eleva variant soils are somewhat poorly drained. Elkmound soils do not have an argillic horizon and have a thinner solum than Eleva soils.

Typical pedon of Eleva sandy loam, 2 to 6 percent slopes, in a cultivated field, now idle, approximately 900 feet north and 600 feet west of the southeast corner NE1/4 sec. 33, T. 13 N., R. 5 E.

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) sandy loam; weak fine subangular blocky structure; very friable; few roots; common pores; strongly acid; abrupt smooth boundary.

B1t—9 to 15 inches; brown (10YR 4/3) sandy loam; weak medium subangular blocky structure; friable; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; strongly acid; clear wavy boundary.

B2t—15 to 27 inches; dark yellowish brown (10YR 4/4) sandy loam; weak medium subangular blocky structure; friable; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; strongly acid; gradual wavy boundary.

B3—27 to 31 inches; yellowish brown (10YR 5/4) loamy sand; weak medium subangular blocky structure; very friable; few roots; strongly acid; clear wavy boundary.

C—31 to 36 inches; yellowish brown (10YR 5/6) sand; single grained; loose; common small sandstone fragments; strongly acid; clear smooth boundary.

Cr—36 to 60 inches; light yellowish brown (10YR 6/4) weakly cemented sandstone.

Solum thickness ranges from 20 to 40 inches and coincides with the depth to sandstone in many pedons. Reaction ranges from strongly acid to slightly acid in the subsoil and substratum.

The Ap horizon has value of 4 or 5 and chroma of 2 or 3. The A1 horizon ranges from 2 to 5 inches in thickness. It has value and chroma of 2 or 3. The B2t horizon has hue of 10YR or 7.5YR and chroma of 3 to 5. In some pedons it is loam. Some pedons do not have a B3 horizon, and some do not have a sand C horizon above the sandstone. In some pedons the sandstone is hard or has hard layers.

Eleva variant

The Eleva variant consists of somewhat poorly drained, moderately rapidly permeable soils on sandstone uplands. These soils formed in loamy and sandy sediments over sandstone bedrock. The slope is 0 to 3 percent.

Eleva variant soils are similar to and are near Eleva and Urne soils. Eleva and Urne soils are somewhat excessively drained.

Typical pedon of Eleva Variant sandy loam, 0 to 3 percent slopes, in a woods approximately 975 feet east and 100 feet north of the southwest corner SE1/4 sec. 7, T. 13 N., R. 6 E.

O1—2 inches to 0; organic matter of partly decomposed leaves and twigs.

A1—0 to 6 inches; very dark gray (10YR 3/1) sandy loam, grayish brown (10YR 5/2) dry; weak fine subangular blocky structure; friable; common roots; common pores; extremely acid; clear smooth boundary.

A2—6 to 8 inches; dark grayish brown (10YR 4/2) sandy loam; few fine prominent yellowish brown (10YR 5/8) mottles; moderate thin platy structure; friable; common roots; many pores; extremely acid; abrupt smooth boundary.

B2tg—8 to 20 inches; grayish brown (2.5Y 5/2) sandy loam; common medium prominent yellowish brown (10YR 5/8) mottles; weak fine and very fine subangular blocky structure; friable; few roots; common pores; thin patchy clay films on faces of peds; extremely acid; clear wavy boundary.

IIB3t—20 to 26 inches; mixed pale brown (10YR 6/3) and yellowish brown (10YR 5/8) loamy fine sand; few medium distinct light gray (10YR 7/1) and strong brown (7.5YR 5/8) mottles; weak fine subangular blocky structure; very friable; few roots; some clay bridging between sand grains; very strongly acid; clear smooth boundary.

R—26 inches; light yellowish brown (10YR 6/4) and brownish yellow (10YR 6/6) hard sandstone bedrock.

Solum thickness ranges from 20 to 40 inches and typically is the same as the depth to sandstone. Reaction ranges from extremely acid to medium acid in the subsoil.

The A1 or Ap horizon ranges from 6 to 9 inches in thickness. It has value of 2 or 3 and chroma of 1 to 3. Some pedons do not have an A2 horizon. A C horizon of sand or fine sand is above the sandstone is some pedons. The sandstone bedrock below some pedons is soft.

Elkmound series

The Elkmound series consists of well drained, moderately rapidly permeable soils on sandstone uplands. These soils formed in loamy sediments over sandstone bedrock. The slope ranges from 2 to 20 percent.

Elkmound soils are near Boone and Eleva soils. Boone and Eleva soils are thicker over sandstone than

Elkmound soils. Boone soils have more sand and less silt and clay in the solum.

Typical pedon of Elkmound sandy loam, 2 to 6 percent slopes, in a cultivated field approximately 275 feet north and 50 feet west of the southeast corner of sec. 12, T. 12 N., R. 5 E.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) sandy loam; weak medium subangular blocky structure; friable; common roots; few pores; some brown (10YR 4/3) soil in worm channels; medium acid; abrupt smooth boundary.

B2—8 to 18 inches; brown (10YR 4/3) sandy loam; weak fine and medium subangular blocky structure; friable; common roots; common pores; few sandstone fragments; strongly acid; abrupt, smooth boundary.

R—18 inches; yellowish brown (10YR 5/6) and light brown (7.5YR 6/4) sandstone bedrock.

Solum thickness ranges from 10 to 20 inches and commonly is the same as the depth to bedrock. Reaction ranges from slightly acid to very strongly acid in the subsoil.

The Ap horizon has value of 3 or 4. The A1 horizon ranges from 2 to 4 inches in thickness. It has value of 2 or 3 and chroma of 1 to 3. Some pedons do not have an A2 horizon. The B2 horizon has value and chroma of 3 to 5. In some pedons it is loam. Some pedons have a B3 horizon.

Ettrick series

The Ettrick series consists of poorly drained and very poorly drained, moderately slowly permeable soils in drainageways on flood plains, on low stream terraces, and in lake basins. These soils formed in silty sediments over stratified sandy, loamy, and silty sediments. The slope is 0 to 2 percent.

Ettrick soils are near Curran, Jackson, and Orion soils. Curran soils are somewhat poorly drained and are underlain by sandy material. Jackson soils are moderately well drained and are underlain by sand. Orion soils are somewhat poorly drained and have 20 to 40 inches of silty alluvium.

Typical pedon of Ettrick silt loam in a cultivated field approximately 800 feet north and 40 feet east of the southwest corner of sec. 10, T. 11 N., R. 5 E.

Ap—0 to 8 inches; black (10YR 2/1) silt loam, dark grayish brown (10YR 4/2) dry; moderate very fine subangular blocky structure; friable; many roots; few pores; neutral; abrupt smooth boundary.

A12—8 to 11 inches; black (10YR 2/1) silt loam, dark grayish brown (10YR 4/2) dry; moderate very fine subangular blocky structure; friable; many roots; common pores; some grayish brown (10YR 5/2) soil in worm channels; neutral; clear smooth boundary.

B21tg—11 to 16 inches; olive gray (5Y 5/2) silt clay loam; few fine prominent yellowish brown (10YR 5/6) mottles; moderate very fine subangular blocky structure; firm; common roots; many pores; some black (10YR 2/1) soil in worm channels; thin patchy clay films on faces of peds and in pores and channels; neutral; clear wavy boundary.

B22tg—16 to 24 inches; olive gray (5Y 5/2) silt loam; common fine prominent yellowish brown (10YR 5/6) mottles; moderate very fine subangular blocky structure; firm; few roots; many pores; thin patchy clay films on faces of peds and in pores and channels; neutral; gradual wavy boundary.

B23tg—24 to 32 inches; olive gray (5Y 5/2) silt loam; common fine prominent yellowish brown (10YR 5/6) mottles; moderate fine prismatic structure parting to moderate fine and very fine subangular blocky; firm; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; mildly alkaline; clear wavy boundary.

B31g—32 to 37 inches; light olive gray (5Y 6/2) silt loam; many fine and medium prominent yellowish brown (10YR 5/6) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; firm; few roots; common pores; mildly alkaline; clear wavy boundary.

IIB32g—37 to 46 inches; light olive gray (5Y 6/2) stratified silt loam, loam, and fine sandy loam; many fine and medium prominent yellowish brown (10YR 5/6) mottles; weak very thick platy structure parting to weak medium subangular blocky; friable; few roots; common pores; mildly alkaline; clear wavy boundary.

IIC—46 to 60 inches; mixed light brownish gray (2.5Y 6/2) and yellowish brown (10YR 5/6) stratified, silt loam, loam, fine sandy loam, loamy fine sand, and fine sand; weak very thick platy structure; friable; common pores; slight effervescence; mildly alkaline.

Solum thickness ranges from 24 to 48 inches. The silty mantle ranges from 24 to 40 inches in thickness. The mollic epipedon ranges from 10 to 20 inches in thickness. Reaction ranges from slightly acid to moderately alkaline in the subsoil and substratum.

The A horizon ranges from 10 to 18 inches in thickness. It has hue or 10YR or 2.5Y and chroma of 0 to 2 or is neutral. Some pedons do not have a B1 horizon. In some pedons the B2t horizon has hue of 10YR, value of 4 or 5, and chroma of 0 to 1. In others it has hue of 2.5Y or 5Y, value of 4 to 6, and chroma of 2 or less. In some pedons the IIB3 horizon has strata of silty clay loam, loamy sand, or sand. It has colors similar to those of the B2tg horizon. The IIC horizon is similar in color and texture to the B2tg horizon.

Fayette series

The Fayette series consists of well drained, moderately permeable soils on unglaciated uplands. These soils

formed in deep silty loess deposits. The slope ranges from 2 to 20 percent.

Fayette soils are similar to Atterberry and Tama soils and are near Atterberry, Gale, and La Farge soils. Gale and La Farge soils are underlain by sandstone bedrock at a depth of 20 to 40 inches. Atterberry soils are somewhat poorly drained. Tama soils have a mollic epipedon.

Typical pedon of Fayette silt loam, 2 to 6 percent slopes, in a cultivated field approximately 1,100 feet south and 65 feet east of the center of sec. 10, T. 10 N., R. 5 E.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam; moderate very fine subangular blocky structure; friable; common roots; few pores; mildly alkaline; abrupt smooth boundary.

B1t—8 to 15 inches; brown (10YR 4/3) silty clay loam; moderate fine and very fine subangular blocky structure; firm; common roots; common pores; thin patchy clay films on faces of peds; some dark grayish brown (10YR 4/2) soil in worm and root channels; clean silt grains on faces of some peds; neutral; gradual wavy boundary.

B21t—15 to 24 inches; brown (10YR 4/3) silty clay loam; moderate fine subangular blocky structure; firm; few roots; many pores; thin patchy clay films on faces of most peds and in pores and channels; thick patchy dark yellowish brown (10YR 3/4) clay films on faces of some peds; clean silt grains on faces of some peds; medium acid; gradual wavy boundary.

B22t—24 to 36 inches; brown (10YR 4/3) silty clay loam; moderate medium and fine subangular blocky structure; firm; few roots; many pores; thin patchy clay films on faces of most peds and in pores and channels; thick patchy dark yellowish brown (10YR 3/4) clay films on faces of a few peds; clean silt grains on faces of a few peds; strongly acid; gradual wavy boundary.

B3—36 to 45 inches; dark yellowish brown (10YR 4/4) silt loam; moderate medium and fine subangular blocky structure; friable; few roots; many pores; thick patchy dark yellowish brown (10YR 3/4) clay films in a few pores and on faces of a few peds; strongly acid; gradual irregular boundary.

C—45 to 60 inches; yellowish brown (10YR 5/4) silt loam; weak coarse prismatic structure parting to weak medium and coarse subangular blocky; friable; few roots; many pores; thin patchy clay flows on vertical faces of a few peds and in a few pores and channels; medium acid.

Solum thickness typically is 42 to 50 inches but ranges from 36 to 60 inches. Reaction is strongly acid or medium acid in the subsoil and substratum.

The Ap horizon has chroma of 2 or 3. The A1 horizon ranges from 2 to 5 inches in thickness. It has value of 2 or 3 and chroma of 1 or 2. Some pedons have an A2 horizon. Some pedons do not have a B1 horizon. The B2t horizon has value of 4 or 5 and chroma of 3 or 4. Some pedons do not have a B3 horizon. The C horizon has value of 4 or 5 and chroma of 4 to 6.

Fox series

The Fox series consists of well drained soils on outwash plains and stream terraces. These soils are moderately permeable in the subsoil and very rapidly permeable in the substratum. They formed in loamy deposits underlain by stratified, calcareous sand and gravel. The slope ranges from 2 to 15 percent.

Fox soils are near Billett and Sisson soils. Billett soils have a coarse-loamy subsoil. Sisson soils are underlain by stratified lacustrine deposits.

Typical pedon of Fox loam, 2 to 6 percent slopes, in a cultivated field approximately 900 feet north and 925 feet east of the southwest corner of sec. 26, T. 11 N., R. 7 E.

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) loam; weak medium subangular blocky structure; friable; few roots; few pores; some dark yellowish brown (10YR 4/4) soil in worm channels; neutral; abrupt smooth boundary.

B1t—9 to 12 inches; dark yellowish brown (10YR 4/4) loam; weak medium subangular blocky structure; firm; few roots; common pores; some dark grayish brown (10YR 4/2) soil in worm and root channels; thin patchy clay films on faces of peds and in pores and channels; slightly acid; clear smooth boundary.

B21t—12 to 24 inches; dark yellowish brown (10YR 4/4) clay loam; moderate medium and fine subangular blocky structure; firm; few roots; common pores; thin patchy clay films on faces of most peds and in pores and channels; medium acid; gradual wavy boundary.

B22t—24 to 33 inches; dark yellowish brown (10YR 4/4) clay loam; weak and moderate medium subangular blocky structure; firm; few roots; many pores; thin patchy clay films on faces of peds and in pores and channels; medium acid; clear smooth boundary.

IIB3t—33 to 37 inches; dark yellowish brown (10YR 3/4) gravelly sandy loam; weak medium subangular blocky structure; friable; few roots; many pores; thin patchy clay films on pebbles; clay bridging between sand grains; about 20 percent pebbles by volume; neutral; clear wavy boundary.

IIC—37 to 60 inches; pale brown (10YR 6/3) sand and gravel; single grained; loose; slight effervescence; mildly alkaline.

Solum thickness ranges from 24 to 40 inches. Reaction ranges from strongly to slightly acid in the upper part of the subsoil and is neutral or mildly alkaline in the lower part. Below this it is mildly or moderately alkaline.

The Ap horizon has value of 4 or 5 and chroma of 2 or 3. The A1 horizon ranges from 2 to 4 inches in thick-

ness. It has value of 2 or 3 and chroma of 1 or 2. Some pedons have an A2 horizon. The B2t horizon has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 3 to 5. In some pedons it has thin subhorizons of sandy clay loam.

Gale series

The Gale series consists of well drained soils on sandstone uplands. These soils are moderately permeable in the subsoil and rapidly permeable in the substratum. They formed in loess and in a thin layer of residuum from the underlying sandstone. The slope ranges from 2 to 30 percent.

Gale soils are similar to La Farge soils and are near Fayette and La Farge soils. Fayette soils have a loess mantle more than 60 inches thick. La Farge soils are underlain by glauconitic sandstone.

Typical pedon of Gale silt loam, 6 to 12 percent slopes, eroded, in a cultivated field approximately 825 feet west and 50 feet north of the southeast corner SW1/4 sec. 15, T. 12 N., R. 4 E.

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) silt loam; moderate very fine granular structure; very friable; common roots; few pores; some brown (10YR 4/3) soil mixed in by plowing; neutral; abrupt smooth boundary.

B1t—7 to 9 inches; brown (10YR 4/3) silt loam; moderate fine subangular blocky structure; friable; common roots; many pores; thin patchy clay films on faces of some peds and in pores and channels; clean silt grains on faces of many peds; slightly acid; abrupt smooth boundary.

B2t—9 to 29 inches; dark yellowish brown (10YR 4/4) silt loam; moderate fine and very fine subangular blocky structure; firm; common roots; many pores; thin patchy clay films on faces of most peds and in pores and channels; clean silt grains on faces of some peds; strongly acid; clear smooth boundary.

IIB3t—29 to 31 inches; brown (7.5YR 4/4) loam; weak fine and very fine subangular blocky structure; firm; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; strongly acid; abrupt smooth boundary.

IIC—31 to 35 inches; yellowish brown (10YR 5/6) sand; single grained; loose; many sandstone fragments; medium acid; clear smooth boundary.

Cr—35 to 60 inches; layered brown (7.5YR 4/4), yellowish brown (10YR 5/6), and brownish yellow (10YR 6/8) soft sandstone bedrock; few thin bands of hard iron cemented sandstone.

Solum thickness ranges from 24 to 34 inches. The loess mantle ranges from 15 to 34 inches in thickness. Reaction ranges from strongly acid to slightly acid in the subsoil and sand substratum.

The A1 horizon ranges from 2 to 5 inches in thickness. It has value of 3 and chroma of 2 or 3. Some pedons have an A2 horizon. The B2t horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4. In some pedons it is silty clay loam. The IIB horizon has hue of 10YR or 7.5YR and value and chroma of 4 to 6. In some pedons it is sandy loam. Some pedons do not have a IIC horizon.

Gotham series

The Gotham series consists of somewhat excessively drained, rapidly permeable soils on outwash plains and stream terraces and in sandy deposits on uplands. These soils formed in deep sandy outwash deposits. The slope ranges from 1 to 25 percent.

Gotham soils are similar to Brems soils and are near Brems and Dickinson soils. Brems soils are moderately well drained and do not have an argillic horizon. Dickinson soils have a mollic epipedon and a coarse loamy subsoil.

Typical pedon of Gotham loamy sand, 1 to 6 percent slopes, in a cultivated field approximately 80 feet south and 270 feet west of the northeast corner of sec. 16, T. 12 N., R. 6 E.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) loamy sand, light brownish gray (10YR 6/2) dry; weak medium subangular blocky structure; very friable; few roots; slightly acid; abrupt smooth boundary.

B1—9 to 20 inches; dark yellowish brown (10YR 4/4) loamy sand; weak medium subangular blocky structure; very friable; few roots; few pebbles; slightly acid; gradual wavy boundary.

B2t—20 to 30 inches; yellowish brown (10YR 5/6) loamy sand; weak medium subangular blocky structure; very friable; few roots; few pebbles; clay bridging between sand grains; slightly acid; clear wavy boundary.

B3—30 to 34 inches; yellowish brown (10YR 5/6) loamy sand; weak coarse subangular blocky structure; very friable; few roots; few pebbles; medium acid; clear wavy boundary.

C—34 to 60 inches; yellowish brown (10YR 5/4) sand; single grained; loose; few pebbles; medium acid.

Solum thickness ranges from 24 to 40 inches. Reaction ranges from strongly acid to neutral in the subsoil and substratum.

The Ap horizon has value and chroma of 2 or 3. The A1 horizon ranges from 2 to 5 inches in thickness and has the same color as the Ap horizon. The B2t horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. In some pedons the C horizon is loamy sand, and in some it has thin bands of sandy loam.

Granby series

The Granby series consists of poorly drained and very poorly drained, rapidly permeable soils on flood plains, in

drainageways, and in glacial lake basins. These soils formed in sandy outwash. The slope is 0 to 2 percent.

Granby soils are near Adrian, Brems, and Marshan soils. Adrian soils have a 16- to 50-inch organic layer over sand. Brems soils do not have a mollic epipedon and are moderately well drained. Marshan soils have a fine-loamy subsoil over sand.

Typical pedon of Granby loamy sand in a cultivated field approximately 180 feet north and 150 feet east of the southwest corner SE1/4 sec. 23, T. 13 N., R. 5 E.

Ap—0 to 9 inches; black (10YR 2/1) loamy sand, dark grayish brown (10YR 4/2) dry; common fine prominent strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; very friable; common roots; neutral; abrupt smooth boundary.

A12—9 to 11 inches; black (10YR 2/1) loamy sand, dark grayish brown (10YR 4/2) dry; common fine prominent strong brown (7.5YR 5/6) mottles; weak medium and fine subangular blocky structure; very friable; common roots; slightly acid; abrupt smooth boundary.

B2g—11 to 18 inches; dark grayish brown (2.5Y 4/2) sand; few medium distinct grayish brown (10YR 5/2) mottles; weak medium subangular blocky structure; very friable; common roots; medium acid; gradual wavy boundary.

B3g—18 to 29 inches; grayish brown (2.5Y 5/2) sand; few fine prominent yellowish brown (10YR 5/6) and common medium distinct light brownish gray (10YR 6/2) mottles; weak coarse subangular blocky structure; very friable; few roots; medium acid; gradual wavy boundary.

C1—29 to 48 inches; grayish brown (10YR 5/2) sand; single grained; loose; medium acid; clear smooth boundary.

C2—48 to 60 inches; brown (10YR 5/3) sand; single grained; loose; medium acid.

Solum thickness typically is 24 to 36 inches but ranges to 45 inches. Reaction ranges from medium acid to neutral throughout this soil.

The A horizon ranges from 10 to 20 inches in thickness. It has value or 2 or 3 and chroma of 1 or 2. The B2 horizon has hue of 10YR, 2.5Y or 5Y; value of 4 to 6; and chroma of 2 or less. In some pedons it is loamy sand. The C horizon has hue of 10YR, 2.5Y, or 5Y; value of 5 to 7; and chroma of 1 to 4. Some pedons have thin lenses of sandy loam or sandy clay loam in the substratum.

Granby variant

The Granby variant consists of poorly drained and very poorly drained soils on outwash plains, in glacial lake basins, and in drainageways. These soils are moderately slowly permeable in the loamy substratum and rapidly permeable in the sandy substratum. They formed in sandy alluvial deposits. The slope is 0 to 2 percent.

Granby variant soils are near Marshan and Shiffer variant soils. Granby variant soils are near Marshan and Shiffer variant soils. Granby variant soils have a 20- to 36-inch sandy mantle that Marshan and Shiffer variant soils do not have. In addition, Shiffer variant soils are somewhat poorly drained.

Typical pedon of Granby Variant loamy sand, in a cultivated field approximately 150 feet west and 800 feet south of the northeast corner SE1/4 sec. 4, T. 13 N., R. 4 E.

Ap—0 to 10 inches; black (10YR 2/1) loamy sand, dark grayish brown (10YR 4/2) dry; weak medium subangular blocky structure; very friable; many roots; slightly acid; abrupt smooth boundary.

B2g—10 to 18 inches; dark gray (10YR 4/1) loamy fine sand; common fine prominent yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; very friable; common roots; slightly acid; gradual wavy boundary.

B3g—18 to 28 inches; mixed grayish brown (10YR 5/2) and light brownish gray (10YR 6/2) fine sand; common fine prominent yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; very friable; few roots; neutral; abrupt smooth boundary.

IIC1g—28 to 36 inches; gray (5Y 5/1) stratified sandy loam, loam, clay loam, and silty clay loam; many medium prominent yellowish brown (10YR 5/6) and common fine and medium prominent strong brown (7.5YR 5/6) mottles; massive; firm; few very thin lenses of fine sand; neutral; clear smooth boundary.

IIIC2—36 to 45 inches; light olive gray (5Y 6/2) fine sand; single grained; loose; neutral; clear wavy boundary.

IIIC3—45 to 60 inches; light yellowish brown (2.5Y 6/4) loamy fine sand; few fine distinct grayish brown (2.5Y 5/2) and olive (5Y 5/3) mottles; massive; very friable; neutral.

Solum thickness ranges from 24 to 36 inches. Reaction ranges from medium acid to neutral throughout this soil.

The A horizon ranges from 10 to 20 inches in thickness. It has value of 2 or 3 and chroma of 1 or 2. In some pedons the B horizon is loamy sand or sand. The B horizon has hue of 10YR, 2.5Y, or 5Y; value of 4 to 6; and chroma of 2 or less. In some pedons the IIIC horizon is sand or loamy sand.

Houghton series

The Houghton series consists of very poorly drained, moderately rapidly permeable soils on flood plains, along drainageways, and in glacial lake basins. These soils formed in deep accumulations of organic material. The slope is 0 to 2 percent.

Houghton soils are near Adrian and Palms soils. Adrian soils have thinner organic layers underlain by

sand. Palms soils have thinner organic layers underlain by loamy soils.

Typical pedon of Houghton muck in a cultivated field approximately 350 feet north and 20 feet west of the center of sec. 15, T. 12 N., R. 7 E.

Oap—0 to 10 inches; black (N 2/0) broken face and rubbed sapric material; about 10 percent fiber, less than 2 percent rubbed; weak fine granular structure; common roots; neutral; abrupt smooth boundary.

Oa2—10 to 13 inches; black (10YR 2/1) broken face, black (N 2/0) rubbed sapric material; about 50 percent fiber, 5 percent rubbed; weak medium platy structure; few roots; slightly acid; abrupt smooth boundary.

Oa3—13 to 33 inches; black (N 2/0) broken face and rubbed sapric material; about 15 percent fiber, a trace rubbed; weak coarse subangular blocky structure; slightly acid; clear smooth boundary.

Oa4—33 to 49 inches; black (N 2/0) broken face and rubbed sapric material; about 25 percent fiber, 5 percent rubbed; weak medium and thick platy structure; few woody fragments up to 1/4 inch in diameter; medium acid; clear wavy boundary.

Oa5—49 to 60 inches; black (N 2/0) broken face and rubbed sapric material; about 30 percent fiber, less than 5 percent rubbed; massive; few woody fragments up to 3/4 inch in diameter; medium acid.

The organic layers are more than 51 inches thick. Reaction ranges from strongly acid to mildly alkaline in the organic layers.

The organic layer has hue of 10YR and chroma of 1 or 2 or is neutral. Some uncultivated pedons have a thin mat of undecomposed plant remains on the surface. Some pedons have thin layers of hemic material or fibric material, or both. The layers of hemic material are less than 10 inches thick, and the layers of fibric material are less than 5 inches thick. The organic materials are primarily from herbaceous plants, but a few woody fragments, ranging from 1/8 inch to several inches in diameter, are mixed throughout some pedons.

Jackson series

The Jackson series consists of moderately well drained soils on outwash plains and stream terraces. These soils are moderately permeable in the subsoil and rapidly permeable in the substratum. They formed in silty, loamy, and sandy sediments over sand. The slope is 0 to 6 percent.

Jackson soils are similar to Bertrand and Curran soils and are near Bertrand, Curran, and Ettrick soils. Bertrand soils are well drained. Curran soils are somewhat poorly drained and have a mollic intergrade surface layer. Ettrick soils are poorly drained and very poorly drained and have a mollic epipedon.

Typical pedon of Jackson silt loam, 2 to 6 percent slopes, in a cultivated field approximately 400 feet west and 1,000 feet south of the northeast corner NW1/4 sec. 8, T. 11 N., R. 4 E.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam; weak thick platy structure parting to weak very fine subangular blocky; friable; few roots; few pores; some brown (10YR 4/3) soil in worm channels; neutral; abrupt smooth boundary.

B1t—8 to 13 inches; brown (10YR 4/3) silt loam; moderate very fine subangular blocky structure; firm; few roots; common pores; thin patchy clay films on faces of peds; some dark grayish brown (10YR 4/2) soil in worm and root channels; clean very pale brown (10YR 7/3 dry) silt grains coating faces of some peds; neutral; clear smooth boundary.

B21t—13 to 23 inches; dark yellowish brown (10YR 4/4) silt loam; moderate very fine subangular blocky structure; firm; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; clean very pale brown (10YR 7/3 dry) silt grains coating faces of some peds; slightly acid; gradual wavy boundary.

B22t—23 to 36 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium prismatic structure parting to moderate very fine subangular blocky; firm; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; clean very pale brown (10YR 7/3 dry) silt grains coating faces of most peds; medium acid; gradual wavy boundary.

B31t—36 to 47 inches; mixed brown (10YR 5/3) and yellowish brown (10YR 5/4) silt loam; few fine distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; firm; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; common soft dark nodules (iron and manganese oxides); medium acid; clear wavy boundary.

IIB32t—47 to 52 inches; mixed brown (10YR 5/3) and yellowish brown (10YR 5/4) stratified silt loam and loam; common medium faint grayish brown (10YR 5/2) and common medium prominent yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable; few roots; common pores; thin patchy clay films on faces of peds; medium acid; clear smooth boundary.

IIB33t—52 to 56 inches; dark yellowish brown (10YR 4/4) stratified sandy loam and loamy sand; common medium faint yellowish brown (10YR 5/4) mottles; weak coarse subangular blocky structure; friable; few roots; common pores; thin patchy clay films on faces of peds; medium acid; clear wavy boundary.

IIC—56 to 60 inches; yellowish brown (10YR 5/4) fine sand; single grained; loose; slightly acid.

Solum thickness ranges from 45 to 65 inches. Thickness of the silty mantle ranges from 40 to 59 inches. Reaction ranges from medium acid to neutral in the

upper part of the subsoil and from strongly acid to slightly acid in the lower part and in the substratum.

The A1 horizon ranges from 2 to 5 inches in thickness. It has hue of 10YR, value of 3, and chroma of 2 or 3. Some pedons have an A2 horizon. The B2t horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4. The IIB horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4. The IIC horizon has hue of 10YR or 7.5YR, value of 4 to 8, and chroma of 2 to 6. In some pedons it is sand, loamy sand, or loamy fine sand.

Kendall series

The Kendall series consists of somewhat poorly drained, moderately permeable soils on outwash plains, on till plains, and in glacial lake basins. These soils formed in loess and in the underlying stratified silty and loamy sediments. The slope is 0 to 3 percent.

Kendall soils are similar to St. Charles soils and are near McHenry, Ossian, and St. Charles soils. Ossian soils are poorly drained and have a mollic epipedon. McHenry soils are well drained and have a thinner loess mantle than Kendall soils. St. Charles soils are well drained.

Typical pedon of Kendall silt loam, 0 to 3 percent slopes, in a cultivated field, now idle, approximately 35 feet west and 520 feet south of the center of sec. 18, T. 11 N., R. 7 E.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam; weak fine subangular blocky structure; friable; common roots; few pores; slightly acid; abrupt smooth boundary.

A2—8 to 11 inches; brown (10YR 5/3) silt loam; moderate fine subangular blocky structure; friable; few roots; common pores; some dark grayish brown (10YR 4/2) soil in worm and root channels; neutral; abrupt smooth boundary.

B1t—11 to 15 inches; brown (10YR 4/3) silt loam; few fine faint grayish brown (10YR 5/2) and common fine prominent yellowish brown (10YR 5/6) mottles; moderate fine subangular blocky structure; friable; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; clean silt grains coating faces of most peds; neutral; clear wavy boundary.

B21tg—15 to 24 inches; grayish brown (10YR 5/2) silty clay loam; common fine prominent yellowish brown (10YR 5/6) mottles; few roots; common pores; thin continuous clay films on faces of peds and in pores and channels; clean silt grains coating faces of some peds; some soft dark accumulations (iron and manganese oxides); neutral; gradual wavy boundary.

B22tg—24 to 32 inches; grayish brown (10YR 5/2) silty clay loam; many fine and medium prominent yellowish brown (10YR 5/6) and few fine prominent strong brown (7.5YR 5/6) mottles; moderate very fine subangular blocky structure; firm; few roots; many pores; thin patchy clay films on faces of peds and in pores and channels; clean silt grains coating faces of some peds; some dark accumulations (iron and manganese oxides); neutral; gradual wavy boundary.

B31tg—32 to 45 inches; grayish brown (10YR 5/2) silt loam; many fine and medium prominent yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; clean silt grains coating faces of many peds; common dark soft accumulations (iron and manganese oxides); neutral; clear smooth boundary.

IIB32g—45 to 58 inches; grayish brown (10YR 5/2) loam; many fine and medium prominent yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; friable; few pores; few pebbles; few thin lenses of yellowish brown (10YR 5/4) sandy loam; slight effervescence; moderately alkaline; gradual smooth boundary.

IIC—58 to 60 inches; yellowish brown (10YR 5/4) stratified silt loam, loam, and sandy loam; massive; friable; few pores; few small pebbles; strong effervescence; moderately alkaline.

Solum thickness ranges from 44 to 70 inches. Thickness of the loess or silty mantle ranges from 40 to 60 inches. Depth to free carbonates ranges from 45 to 70 inches. Reaction ranges from medium acid to neutral in the subsoil and is mildly alkaline or moderately alkaline in the substratum.

The A1 horizon ranges from 2 to 5 inches in thickness. It has value of 2 or 3 and chroma of 1 or 2. The B2t horizon has hue of 10YR or 2.5Y, value of 5 or 6, and dominant chroma of 2. In some pedons it is silt loam. In some pedons the IIC horizon is sandy loam till.

La Farge series

The La Farge series consists of well drained, moderately permeable soils on unglaciated sandstone uplands. These soils formed in loess and in residuum from the underlying glauconitic sandstone bedrock. The slope ranges from 2 to 30 percent.

La Farge soils are similar to Gale and Norden soils and are near Fayette, Gale, and Norden soils. Fayette soils have a loess mantle more than 60 inches thick. Gale soils are underlain by nonglauconitic sandstone. Norden soils have a fine-loamy subsoil.

Typical pedon of La Farge silt loam, 12 to 20 percent slopes, eroded, in a cultivated field approximately 450 feet north and 600 feet west of southeast corner NE1/4 sec. 33, T. 12 N., R. 4 E.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam; weak fine subangular blocky structure; friable; common roots; few pores; some brown (10YR 4/3) soil mixed in by plowing and in worm channels; neutral; abrupt smooth boundary.

B1—8 to 12 inches; brown (10YR 4/3) silt loam; moderate thick platy structure parting to moderate very fine subangular blocky; friable; few roots; common pores; some dark grayish brown (10YR 4/2) soil in worm and root channels; neutral; clear smooth boundary.

B21t—12 to 18 inches; dark yellowish brown (10YR 4/4) silt loam; moderate very fine subangular blocky structure; firm; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; slightly acid; gradual wavy boundary.

B22t—18 to 27 inches; dark yellowish brown (10YR 4/4) silt loam; weak medium prismatic structure parting to moderate very fine subangular blocky; firm; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; thick patchy dark brown (7.5YR 4/4) clay films on faces of some peds; slightly acid; clear wavy boundary.

IIB3t—27 to 33 inches; light olive brown (2.5Y 5/6) clay loam; moderate fine subangular blocky structure; firm; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; about 10 percent by volume very fine grained glauconitic sandstone fragments; strongly acid; gradual wavy boundary.

Cr—33 to 60 inches; light olive brown (2.5Y 5/6) interbedded siltstone and very fine grained glauconitic sandstone.

Solum thickness ranges from 24 to 40 inches. The loess mantle ranges from 24 to 38 inches in thickness. Reaction ranges from medium acid to neutral in the upper part of the subsoil and is strongly acid or medium acid in the lower part.

The A1 horizon ranges from 2 to 5 inches in thickness. It has value and chroma of 2 or 3. Some pedons have an A2 horizon. The B2t horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4. In some pedons it is silty clay loam. The IIB horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 3 to 6. In some pedons it is loam or sandy clay loam. Some pedons have a IIC horizon of residuum from glauconitic sandstone. This material is medium or coarse grained, and in some pedons there are no layers or lenses of siltstone.

Marshan series

The Marshan series consists of poorly drained and very poorly drained soils on flood plains, in drainageways, and on outwash plains. These soils are moderately permeable in the subsoil and rapidly permeable in the substratum. They formed in loamy sediment over outwash sand. The slope is 0 to 2 percent.

Marshan soils are similar to Shiffer soils and are near Granby and Shiffer soils. Granby soils have a sandy subsoil. Shiffer soils are somewhat poorly drained.

Typical pedon of Marshan loam in a cultivated field approximately 60 feet west and 1,050 feet south of the northeast corner of sec. 14, T. 9 N., R. 6 E.

Ap—0 to 10 inches; black (10YR 2/1) loam, dark grayish brown (10YR 4/2) dry; weak medium and fine granular structure; friable; few roots; few pores; slightly acid; abrupt smooth boundary.

A12—10 to 14 inches; black (10YR 2/1) clay loam, dark grayish brown (10YR 4/2) dry; common fine prominent yellowish red (5YR 4/8) mottles; weak very fine subangular blocky structure; firm; few roots; common pores; slightly acid; clear smooth boundary.

B21g—14 to 18 inches; dark gray (10YR 4/1) clay loam; few fine prominent yellowish red (5YR 4/8) and many fine prominent yellowish brown (10YR 5/6) mottles; weak fine prismatic structure parting to moderate fine subangular blocky; firm; few roots; common pores; black (10YR 2/1) coatings on faces of some peds; neutral; clear smooth boundary.

B22g—18 to 26 inches; gray (10YR 5/1) clay loam; common fine and medium prominent yellowish brown (10YR 5/6) mottles; moderate fine prismatic structure parting to moderate fine subangular blocky; firm; few roots; common pores; neutral; clear wavy boundary.

B3g—26 to 30 inches; dark gray (10YR 4/1) sandy loam; few medium prominent yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; firm; few roots; common pores; neutral; clear smooth boundary.

IIC1—30 to 36 inches; grayish brown (10YR 5/2) sand; single grained; loose; neutral; clear smooth boundary.

IIC2—36 to 60 inches; brown (10YR 5/3) sand; single grained; loose; neutral.

Solum thickness ranges from 24 to 40 inches. The mollic epipedon ranges from 12 to 20 inches in thickness. Reaction ranges from medium acid to neutral in the subsoil and is slightly acid or neutral in the substratum.

The A horizon ranges from 12 to 18 inches in thickness. It has hue of 10YR or N, value of 2 or 3, and chroma of 1 or 2. The B2 horizon has hue of 10YR, 2.5Y, or 5Y; value of 4 or 5; and chroma of 1 or 2. In some pedons this horizon is loam. In some pedons the B3 horizon is loam.

McHenry series

The McHenry series consists of well drained, moderately permeable soils on till plains and moraines. These soils formed in loess and loamy glacial till and are underlain by gravelly sandy loam glacial till. The slope ranges from 2 to 30 percent.

McHenry soils are similar to St. Charles and Ringwood soils and are near Kendall and St. Charles soils.

McHenry soils have a thinner loess mantle and a thinner solum than St. Charles and Kendall soils. In addition, Kendall soils are somewhat poorly drained. Ringwood soils have a mollic epipedon.

Typical pedon of McHenry silt loam, 6 to 12 percent slopes, eroded, in a cultivated field approximately 725 feet north and 60 feet west of the southeast corner SW1/4 sec. 22, T. 11 N., R. 7 E.

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) silt loam; weak very fine subangular blocky structure; friable; many roots; few pores; some brown (10YR 5/3) soil mixed in by plowing; neutral; abrupt smooth boundary.

A2—6 to 8 inches; brown (10YR 5/3) silt loam; weak fine subangular blocky structure; friable; common roots; common pores; some grayish brown (10YR 5/2) soil in worm and root channels; neutral; abrupt smooth boundary.

B21t—8 to 13 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate very fine subangular blocky structure; firm; common roots; common pores; thin patchy clay films on faces of peds and in pores and channels; slightly acid; clear wavy boundary.

B22t—13 to 22 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate very fine subangular blocky structure; firm; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; medium acid; clear wavy boundary.

IIB23t—22 to 37 inches; dark yellowish brown (10YR 4/4) clay loam; moderate fine subangular blocky structure; firm; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; thick patchy dark brown (7.5YR 3/2) clay films on faces of a few peds; about 3 percent by volume pebbles; medium acid; gradual wavy boundary.

IIB24t—37 to 47 inches; dark yellowish brown (10YR 4/4) sandy clay loam; moderate fine subangular blocky structure; firm; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; about 3 percent by volume pebbles; slightly acid; clear wavy boundary.

IIB3t—47 to 59 inches; dark yellowish brown (10YR 4/4) sandy loam; weak medium subangular blocky structure; friable; few roots; thin patchy clay films on faces of some peds; about 10 percent by volume pebbles; slightly acid; gradual irregular boundary.

IIC—59 to 60 inches; yellowish brown (10YR 5/4) gravelly sandy loam; massive; very friable; few roots; about 18 percent by volume pebbles; strong effervescence; mildly alkaline.

Solum thickness and depth to free carbonates range from 40 to 60 inches. The thickness of the loess mantle ranges from 15 to 30 inches. Reaction ranges from strongly acid to neutral in the upper part of the subsoil and from slightly acid to mildly alkaline in the lower part. It is mildly alkaline or moderately alkaline in the substratum.

The A1 horizon ranges from 3 to 5 inches in thickness. It has hue of 10YR, value of 2 or 3, and chroma of 1 to 3. The B2t horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 3 to 8. In some pedons it is silt loam. The IIB2t horizon has colors similar to those of the B2t horizon. In some pedons it is loam.

Mosel series

The Mosel series consists of somewhat poorly drained, moderately slowly permeable soils in glacial lake basins. These soils formed in loamy sediments over stratified lacustrine deposits. The slope is 0 to 3 percent.

Mosel soils are near Colwood and Sisson soils. Colwood soils are poorly drained and very poorly drained. Sisson soils are well drained.

Typical pedon of Mosel loam, 0 to 3 percent slopes, in a cultivated field approximately 660 feet south and 600 feet west of the northeast corner of sec. 8, T. 12 N., R. 7 E.

Ap—0 to 9 inches; black (10YR 2/1) loam, dark grayish brown (10YR 4/2) dry; weak medium subangular blocky structure; friable; common roots; few pores; neutral; abrupt smooth boundary.

B1t—9 to 14 inches; dark brown (10YR 4/3) loam; few fine prominent yellowish brown (10YR 5/8) mottles; weak very fine subangular blocky structure; firm; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; very dark grayish brown (10YR 3/2) coatings on faces of some peds; some black (10YR 2/1) soil in worm and root channels; some grayish brown (10YR 5/2) soil in worm channels; neutral; clear smooth boundary.

B21t—14 to 22 inches; brown (10YR 5/3) clay loam; many fine prominent yellowish brown (10YR 5/6) and common fine faint grayish brown (10YR 5/2) mottles; moderate very fine subangular blocky structure; firm; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; mildly alkaline; gradual wavy boundary.

B22t—22 to 26 inches; brown (10YR 5/3) clay loam; many fine and medium prominent yellowish brown (10YR 5/6) and common fine faint light brownish gray (10YR 6/2) mottles; moderate very fine subangular blocky structure; firm; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; slight effervescence; mildly alkaline; clear wavy boundary.

B23t—26 to 31 inches; brown (7.5YR 4/4) clay loam; many fine distinct light brownish gray (2.5Y 6/2) and common fine distinct strong brown (7.5YR 5/6) mottles; moderate very fine subangular blocky structure; firm; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; slight effervescence; mildly alkaline; clear smooth boundary.

IIB3t—31 to 36 inches; brown (7.5YR 4/4) silty clay loam; common fine and medium distinct strong brown (7.5YR 5/6) and many fine distinct light brownish gray (2.5Y 6/2) mottles; weak medium prismatic structure parting to moderate very fine subangular blocky; firm; few roots; common pores; thin patchy clay films on faces of a few peds and in pores and channels; slight effervescence; mildly alkaline; clear wavy boundary.

IIC—36 to 60 inches; brown (7.5YR 5/4) silty clay loam; common fine distinct light brownish gray (2.5Y 6/2) mottles; weak very fine subangular blocky structure; firm; few thin strata of silt loam; strong effervescence; mildly alkaline.

Solum thickness ranges from 24 to 40 inches. The fine loamy upper layers range from 20 to 36 inches in thickness. Reaction ranges from medium acid to mildly alkaline in the upper part of the subsoil and is mildly alkaline or moderately alkaline in the lower part and in the substratum.

The A1 or Ap horizon ranges from 6 to 9 inches in thickness. It has value of 2 or 3 and chroma of 1 to 3. Some pedons have an A2 horizon. The B1 horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. In some pedons it is sandy clay loam. The B2t horizon has hue of l0YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4. In some pedons it is loam or sandy clay loam. The IIBt horizon has hue of 10YR, 7.5YR, or 5YR; value of 4 or 5; and chroma of 3 to 6. The IIC horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 3 to 6.

Norden series

The Norden series consists of well drained, moderately permeable soils on unglaciated sandstone uplands. These soils formed in loamy residuum from the underlying, fine-grained glauconitic sandstone bedrock. The slope ranges from 2 to 60 percent.

Norden soils are similar to La Farge soils and are near La Farge and Urne soils. La Farge soils formed mainly in loess and are fine-silty. Urne soils do not have an argillic horizon and are coarse-loamy.

Typical pedon of Norden loam, 20 to 30 percent slopes, in a wooded area approximately 925 feet east and 1,000 feet south of the northwest corner NE1/4 sec. 15, T. 13 N., R. 3 E.

A1—0 to 3 inches; very dark gray (10YR 3/1) loam; moderate fine granular structure; friable; common roots; few pores; some brown (10YR 4/3) soil in worm channels; neutral; abrupt irregular boundary.

A2—3 to 7 inches; brown (10YR 4/3) loam; weak thick platy structure parting to moderate very fine subangular blocky; friable; common roots; common pores; some very dark gray (10YR 3/1) soil coating faces of peds and in worm and root channels; few sandstone fragments; neutral; clear wavy boundary.

B1t—7 to 12 inches; dark yellowish brown (10YR 4/4) loam; moderate very fine subangular blocky structure; friable; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; about 12 percent by volume sandstone fragments; slightly acid; clear wavy boundary.

B2t—12 to 22 inches; olive brown (2.5Y 4/4) loam; moderate very fine subangular blocky structure; firm; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; about 15 percent by volume sandstone fragments; medium acid; gradual wavy boundary.

B3t—22 to 28 inches; light olive brown (2.5Y 5/4) gravelly loam; moderate very fine subangular blocky structure; firm; few roots; few pores; thin patchy clay films on faces of peds and in pores and channels; about 25 percent by volume sandstone fragments; strongly acid; clear wavy boundary.

Cr—28 to 60 inches; light olive brown (2.5Y 5/4) very fine grained platy sandstone with thin lenses of siltstone; many bands containing many grains of grayish green (5G 4/2) glauconite.

Solum thickness ranges from 20 to 40 inches and commonly is the same as the depth to sandstone. Reaction ranges from strongly acid to slightly acid in the subsoil.

The A1 horizon ranges from 2 to 5 inches in thickness. It has value of 2 or 3 and chroma of 1 to 3. The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. Some pedons do not have an A2 horizon. The B2t horizon has hue of 10YR, 7.5YR, 2.5Y, or 5Y; value of 4 to 7; and chroma of 2 to 6. In some pedons it is sandy clay loam, clay loam, or silty clay loam.

Orion series

The Orion series consists of somewhat poorly drained, moderately permeable soils on flood plains. These soils formed in recently deposited silty alluvium over older, darker colored silty alluvium. The slope is 0 to 2 percent.

Orion soils are similar to Arenzville soils and are near Arenzville, Chaseburg, and Ettrick soils and Fluvaquents, wet. Arenzville and Chaseburg soils are moderately well drained. In addition, Chaseburg soils do not have a buried A horizon. Ettrick soils and Fluvaquents, wet, are poorly drained and very poorly drained.

Typical pedon of Orion silt loam in a cultivated field approximately 350 feet north and 1,190 feet west of the center of sec. 17, T. 12 N., R. 4 E.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam; weak fine subangular blocky structure; very friable; few roots; few pores; neutral; abrupt smooth boundary.

C1—8 to 36 inches; brown (10YR 5/3) silt loam with thin lenses of dark grayish brown (10YR 4/2) silt loam; common fine prominent strong brown (7.5YR 5/8)

mottles; moderate thin platy structure; very friable; few roots; few pores; few very thin lenses of fine sand; neutral; clear smooth boundary.

Ab—36 to 48 inches; black (10YR 2/1) silt loam; weak fine subangular blocky structure; very friable; few pores; some brown (10YR 5/3) soil in worm and root channels; medium acid; clear wavy boundary.

C2g—48 to 54 inches; dark gray (10YR 4/1) silt loam; many fine prominent yellowish brown (10YR 5/6) and few fine distinct light brownish gray (2.5Y 6/2) mottles; massive; very friable; few pores; slightly acid; clear smooth boundary.

C3g—54 to 60 inches; gray (10YR 5/1) silt loam; many fine prominent yellowish brown (10YR 5/6) mottles; massive; very friable; few roots; neutral.

Thickness of the recent alluvium over the Ab horizon ranges from 20 to 40 inches. Reaction ranges from medium acid to mildly alkaline throughout the soil.

In some pedons the Ap horizon is 10YR 5/3. The A1 horizon ranges from 5 to 10 inches in thickness. Typically it is 10YR 4/2, but in some pedons it is 10YR 5/3 and in some it has thin lenses with hue of 10YR, value of 3 to 5, and chroma of 1 to 3. In some pedons the C horizon between the A horizon and the Ab horizon has thin lenses of 10YR 3/2. The Ab horizon ranges from 10 to 30 inches in thickness. It has hue of 10YR or 2.5Y, value of 2 or 3, and chroma of 0 to 2. The C horizon below the Ab horizon has value of 4 to 6 and chroma of 1 or 2.

Ossian series

The Ossian series consists of poorly drained, moderately permeable soils on flood plains and low stream terraces and in drainageways and depressions of glaciated uplands. These soils formed in deep silty alluvium. The slope is 0 to 2 percent.

Ossian soils are similar to Kendall soils and are near Kendall and Palms soils. Kendall soils do not have a mollic epipedon and are somewhat poorly drained. Palms soils have a 16- to 50-inch organic layer that Ossian soils do not have.

Typical pedon of Ossian silt loam in a cultivated field approximately 360 feet south and 990 feet west of the northeast corner SE1/4 sec. 9, T. 11 N., R. 7 E.

Ap—0 to 8 inches; black (10YR 2/1) silt loam, dark grayish brown (10YR 4/2) dry; moderate very fine granular structure; friable; many roots; few pores; neutral; abrupt smooth boundary.

2A12—8 to 11 inches; black (10YR 2/1) silt loam, dark grayish brown (10YR 4/2) dry; few fine prominent yellowish brown (10YR 5/6) mottles; weak very fine subangular blocky structure; friable; many roots; common pores; some dark grayish brown (2.5Y 4/2) soil in worm channels; neutral; clear smooth boundary.

B1g—11 to 16 inches; dark grayish brown (2.5Y 4/2) silt loam; common fine prominent yellowish brown (10YR 5/6) mottles; weak fine subangular blocky structure; friable; common roots; common pores; some black (10YR 2/1) organic coatings on faces of peds and in worm and root channels; neutral; clear wavy boundary.

B2g—16 to 26 inches; gray (5Y 5/1) silty clay loam; many fine prominent yellowish brown (10YR 5/8) mottles; moderate very fine prismatic structure parting to moderate very fine subangular blocky; firm; common roots; common pores; neutral; gradual wavy boundary.

B3g—26 to 35 inches; light olive gray (5Y 6/2) silty clay loam; many fine and medium prominent yellowish brown (10YR 5/6 and 5/8) mottles; moderate medium subangular blocky structure; firm; few roots; common pores; neutral; gradual wavy boundary.

C—35 to 60 inches; light olive gray (5Y 6/2) silt loam; common fine and medium prominent yellowish brown (10YR 5/6 and 5/8) mottles; massive; friable; few roots; few pores; neutral; below a depth of 48 inches, slight effervescence, mildly alkaline.

Solum thickness ranges from 30 to 50 inches. Depth to free carbonates ranges from 40 to 60 inches. The mollic epipedon ranges from 10 to 18 inches in thickness. Reaction ranges from neutral to mildly alkaline in the subsoil and substratum.

The A horizon ranges from 10 to 15 inches in thickness. It has hue of 10YR, 2.5Y, or 5Y; value of 2; and chroma of 1 or is neutral. The B2 horizon has value of 4 to 6 and chroma of 1 or 2. In some pedons it is silt loam.

Palms series

The Palms series consists of very poorly drained, moderately permeable soils in glacial lake basins, drainageways, and depressions. These soils formed in organic deposits over loamy alluvium. The slope is 0 to 2 percent.

Palms soils are near Adrian, Houghton, and Ossian soils. Adrian soils are underlain by sand. Houghton soils have a thicker organic layer than Palms soils. Ossian soils do not have the 16- to 50-inch organic layer that is typical of Palms soils.

Typical pedon of Palms muck in a cultivated field approximately 1,040 feet south and 50 feet east of the northwest corner of sec. 14, T. 12 N., R. 7 E.

Oap—0 to 10 inches; black (N 2/0) broken face and rubbed sapric material; about 3 percent fiber, less than 2 percent rubbed; weak fine granular structure; primarily herbaceous fibers; few roots; about 5 percent by volume clean sand grains; slightly acid; abrupt smooth boundary.

Oa2—10 to 31 inches; black (N 2/0) broken face and rubbed sapric material; about 30 percent fibers, 5

percent rubbed; weak very coarse subangular blocky structure; primarily herbaceous fibers; few roots; some clean sand grains; slightly acid; clear wavy boundary.

Oa3—31 to 37 inches; black (10YR 2/1) broken face, black (N 2/0) rubbed sapric material; about 10 percent fibers, less than 2 percent rubbed; weak medium and thick platy structure; primarily herbaceous fibers; few roots; some clean sand grains; medium acid; abrupt smooth boundary.

IIC1g—37 to 41 inches; very dark gray (5Y 3/1) silt loam; massive; friable; slightly acid; clear smooth boundary.

IIC2g—41 to 60 inches; dark gray (5Y 4/1) silt loam; massive; friable; neutral.

Thickness of the organic layer and depth to underlying loamy soil range from 16 to 50 inches. The organic layer is primarily from herbaceous plants, but a few woody fragments, ranging from 1/8 inch to several inches in diameter, are in the organic part of the control section in some pedons. Reaction ranges from medium acid to mildly alkaline in the organic layers and from slightly acid to moderately alkaline in the substratum.

The organic layer has hue of 10YR and chroma of 1 or 2 or is neutral. Some uncultivated pedons have a thin mat of undecomposed plant remains on the surface. Some pedons have thin layers of hemic material less than 10 inches thick in the lower part of the organic layer. Some pedons have thin layers of fibric material less than 5 inches thick in the lower part of the organic layer. In some pedons the organic layer directly above the IIC horizon is as much as 50 percent by volume mineral material. The IICg horizon has hue of 10YR, 2.5Y, or 5Y; value of 3 to 7; and chroma of 1 or 2. In some pedons it is sandy loam, loam, silty clay loam, or clay loam.

Pillot series

The Pillot series consists of well drained soils on outwash plains and stream terraces. These soils are moderately permeable in the subsoil and rapidly permeable in the substratum. They formed in silty and loamy sediments over outwash sand. The slope is 0 to 6 percent.

Pillot soils are similar to Dells and Richwood soils and are near Dakota, Dells, and Richwood soils. Dakota soils are fine-loamy. Dells soils are somewhat poorly drained and have a mollic intergrade surface layer. Richwood soils have a thicker silty mantle over outwash sand than Pillot soils.

Typical pedon of Pillot silt loam, 0 to 2 percent slopes, in a cultivated field approximately 240 feet west and 1,140 feet north of the center of sec. 22, T. 10 N., R. 6 E.

Ap—0 to 8 inches; black (10YR 2/1) silt loam, dark grayish brown (10YR 4/2) dry; weak fine subangular blocky structure; friable; few roots; few pores; neutral; abrupt smooth boundary.

A12—8 to 11 inches; black (10YR 2/1) silt loam, dark grayish brown (10YR 4/2) dry; weak very fine subangular blocky structure; friable; few roots; many pores; neutral; clear wavy boundary.

B1—11 to 15 inches; dark brown (10YR 3/3) silt loam; weak very fine subangular blocky structure; friable; few roots; many pores; black (10YR 2/1) organic coatings on faces of some peds; neutral; clear wavy boundary.

B21t—15 to 19 inches; brown (10YR 4/3) silty clay loam; moderate very fine subangular blocky structure; firm; few roots; many pores; thin patchy clay films on faces of peds and in pores and channels; dark brown (10YR 3/3) and very dark grayish brown (10YR 3/2) organic-clay coatings on faces of some peds; slightly acid; clear wavy boundary.

B22t—19 to 28 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate fine prismatic structure parting to moderate very fine subangular blocky; firm; few roots; many pores; thin patchy clay films on faces of peds and in pores and channels; very dark grayish brown (10YR 3/2) organic-clay coatings in some pores and channels; slightly acid; gradual wavy boundary.

B23t—28 to 33 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium prismatic structure parting to moderate very fine subangular blocky; firm; few roots; many pores; thin patchy clay films on faces of peds and in pores and channels; thick patchy dark brown (10YR 3/3) clay films on faces of some peds and in some pores and channels; very dark brown (10YR 3/2) organic-clay coatings on faces of some peds and in some pores and channels; medium acid; clear wavy boundary.

IIB3t—33 to 37 inches; dark yellowish brown (10YR 4/4) clay loam; moderate medium subangular blocky structure; firm; few roots; many pores; thin patchy clay films on faces of peds and in pores and channels; thick patchy dark brown (10YR 3/3) organic-clay coatings on faces of some peds and in some pores and channels; medium acid; clear smooth boundary.

IIC—37 to 60 inches; dark yellowish brown (10YR 4/4) sand; single grained; loose; few lenses of dark yellowish brown (10YR 3/4) loamy sand and sandy loam up to 1 inch thick; medium acid.

Solum thickness ranges from 24 to 44 inches and is the same as the depth to underlying sand. The silty mantle ranges from 20 to 40 inches in thickness. The mollic epipedon ranges from 10 to 20 inches in thickness. Reaction is medium acid or slightly acid in the subsoil and substratum.

The A horizon ranges from 10 to 18 inches in thickness. It has value of 2 or 3 and chroma of 1 or 2. The B horizon has hue of 10YR or 7.5YR, value of 3 to 5, and

chroma of 3 or 4. In some pedons the IIB horizon is sandy clay loam, loam, sandy loam, or less commonly loamy sand. In some the IIC horizon is loamy sand.

Plainfield series

The Plainfield series consists of excessively drained, rapidly permeable soils on outwash plains, stream terraces, and moraines. These soils formed in deep deposits of outwash sand. The slope ranges from 1 to 30 percent.

Plainfield soils are similar to Brems soils and are near Boone, Brems, and Gotham soils. Boone soils are underlain by soft sandstone at a depth between 20 and 40 inches. Brems soils are moderately well drained. Gotham soils have an argillic horizon that Plainfield soils do not have.

Typical pedon of Plainfield loamy sand, 1 to 6 percent slopes, in a cultivated field approximately 60 feet south and 130 feet west of the northeast corner SE1/4 sec. 6, T. 12 N., R. 6 E.

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) loamy sand; weak medium subangular blocky structure; very friable; common roots; neutral; abrupt smooth boundary.

B2—7 to 22 inches; yellowish brown (10YR 5/6) sand; weak coarse subangular blocky structure; very friable; few roots; few small pebbles; slightly acid; gradual wavy boundary.

B3—22 to 30 inches; dark yellowish brown (10YR 4/4) sand; single grained; loose; slightly acid; clear wavy boundary.

C1—30 to 45 inches; yellowish brown (10YR 5/4) fine sand; single grained; loose; medium acid; gradual wavy boundary.

C2—45 to 60 inches; light yellowish brown (10YR 6/4) sand; single grained; loose; medium acid.

Solum thickness ranges from 18 to 34 inches. Reaction ranges from strongly acid to slightly acid in the subsoil and substratum.

The A1 horizon ranges from 1 to 4 inches in thickness and has value of 2 or 3. The B horizon has hue of 10YR or 7.5YR, value of 4 or more, and chroma of 3 to 6.

Reedsburg series

The Reedsburg series consists of somewhat poorly drained soils on unglaciated uplands. These soils are moderately permeable in the loess mantle and slowly permeable in the cherty clay. They formed in loess and cherty clay residuum from dolomite. The slope is 2 to 6 percent.

Reedsburg soils are similar to and are near Valton and Wildale soils. Valton and Wildale soils are well drained. In addition, Wildale soils have a thinner loess mantle than Reedsburg soils.

Typical pedon of Reedsburg silt loam, 2 to 6 percent slopes, in a cultivated field approximately 15 feet south and 115 feet west of the center of sec. 26, T. 11 N., R. 4 E.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine subangular blocky structure; very friable; common roots; few pores; some brown (10YR 5/3) soil mixed in by plowing; few chert fragments; slightly acid; abrupt smooth boundary.

B1t—9 to 17 inches; brown (10YR 5/3) silt loam; few fine faint grayish brown (10YR 5/2) and common fine and medium prominent yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable; few roots; common pores; some very dark grayish brown (10YR 3/2) soil in worm and root channels; thin patchy clay films on some faces of peds and in pores and channels; few chert fragments; strongly acid; gradual wavy boundary.

B21t—17 to 26 inches; brown (10YR 5/3) silt loam; common fine faint grayish brown (10YR 5/2) and common fine and medium prominent yellowish brown (10YR 5/6) mottles; moderate fine subangular blocky structure; friable; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; few chert fragments; some dark coatings and soft accumulations (iron and manganese oxides); strongly acid; gradual wavy boundary.

B22tg—26 to 31 inches; light brownish gray (10YR 6/2) silty clay loam; many fine and medium prominent yellowish brown (10YR 5/6) mottles; moderate fine subangular blocky structure; firm; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; few chert fragments; some dark coatings and soft accumulations (iron and manganese oxides); strongly acid; abrupt wavy boundary.

IIB23t—31 to 37 inches; strong brown (7.5YR 5/6) cherty clay; common fine prominent brown (7.5YR 5/2) and common fine distinct red (2.5YR 4/6) mottles; strong very fine angular blocky structure; very firm; few roots; common pores; thick continuous clay films on faces of peds and in pores and channels; clean silt grains in thin coatings on faces of some peds; about 20 percent by volume angular chert fragments; some dark coatings and soft accumulations (iron and manganese oxides); strongly acid; clear smooth boundary.

IIB24t—37 to 60 inches; mixed reddish brown (5YR 4/4), strong brown (7.5YR 5/6), and red (2.5YR 4/6) cherty clay; common medium distinct yellowish brown (10YR 5/6) mottles; strong very fine angular blocky structure; very firm; few roots; common pores; thick continuous clay films on faces of peds and in pores and channels; about 25 percent by volume angular chert fragments; some dark coatings and soft accumulations (iron and manganese oxides); strongly acid.

Solum thickness and depth to dolomite typically range from 7 to 15 feet or more but in some pedons are only 5 feet. Thickness of the loess is dominantly 24 to 36 inches but ranges from 15 to 40 inches. The content of angular chert fragments is less than 15 percent by volume in the loess and is dominantly 15 to 35 percent by volume in the clay residuum. The chert fragments are dominantly less than 3 inches in diameter, but some are 10 inches or more in diameter. Reaction ranges from very strongly acid to slightly acid in the loess and from very strongly acid to medium acid in the clay residuum.

The A horizon ranges from 6 to 9 inches in thickness. It has value of 2 or 3 and chroma of 1 or 2. Some pedons have an A2 horizon. The B2t horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 2 to 6. The IIB horizon commonly has hue of 2.5YR, 5YR, or 7.5YR; value of 4 or 5; and chroma of 3 to 8. Less commonly it has hue of 10R, and in some pedons it has hue of 10YR either as layers or mottles.

Richwood series

The Richwood series consists of well drained soils on outwash plains and stream terraces. These soils are moderately permeable in the subsoil and rapidly permeable in the substratum. They formed in silty and loamy sediments over outwash sand. The slope is 0 to 6 percent.

Richwood soils are similar to and are near Pillot, Rowley, and Toddville soils. Pillot soils have a thinner silty mantle over outwash sand than Richwood soils. Rowley soils are somewhat poorly drained. Toddville soils are moderately well drained.

Typical pedon of Richwood silt loam, 0 to 2 percent slopes, in a cultivated field approximately 1,300 feet south and 130 feet east of the northwest corner of sec. 14, T. 10 N., R. 6 E.

Ap—0 to 9 inches; black (10YR 2/1) silt loam; dark grayish brown (10YR 4/2) dry; weak medium subangular blocky structure; friable; few roots; few pores; neutral; abrupt smooth boundary.

A12—9 to 13 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine subangular blocky structure; friable; few roots; common pores; some black (10YR 2/1) soil in worm and root channels; some brown (10YR 4/3) soil in worm channels; neutral; clear wavy boundary.

B1t—13 to 17 inches; brown (10YR 4/3) silt loam; moderate fine subangular blocky structure; friable; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; some very dark grayish brown (10YR 3/2) soil in worm and root channels; medium acid; clear smooth boundary.

B21t—17 to 34 inches; dark yellowish brown (10YR 4/4) silt loam; moderate fine subangular blocky structure; friable; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; clean light gray (10YR 7/2 dry) silt grains coating faces of some peds; medium acid; gradual wavy boundary.

B22t—34 to 49 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; clean light gray (10YR 7/2 dry) silt grains coating faces of many peds; medium acid; gradual wavy boundary.

IIB23t—49 to 56 inches; dark yellowish brown (10YR 4/4) stratified silt loam, loam, and sandy loam; weak and moderate medium subangular blocky structure; friable; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; clean light gray (10YR 7/2 dry) silt grains coating faces of some peds and in pores and channels; medium acid; clear smooth boundary.

IIC—56 to 60 inches; brown (10YR 4/3) sand; single grained; loose; slightly acid.

Solum depth ranges from 45 to 65 inches. Thickness of the silty mantle ranges from 40 to 60 inches. The mollic epipedon ranges from 10 to 20 inches in thickness. Reaction ranges from medium acid to neutral in the subsoil and is slightly acid or neutral in the substratum.

The A horizon ranges from 10 to 18 inches in thickness. It has value of 2 or 3 and chroma of 1 to 3. The B2t horizon has hue of 10YR or 7.5YR and value and chroma of 3 to 5. The IIBt horizon has hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 3 or 4. In some pedons it contains lenses of loamy sand.

Rimer series

The Rimer series consists of somewhat poorly drained soils in glacial lake basins. These soils are rapidly permeable in the sandy mantle and slowly permeable in the upper part of the subsoil and in the substratum. They formed in sandy outwash deposits and in the underlying lacustrine deposits. The slope is 0 to 3 percent. These soils have a slightly darker surface layer, a slightly higher pH in the sandy upper part of the solum, less clay in the IIC horizon, and redder hues in the IIC horizon than is defined as the range for the Rimer series. These differences do not alter the use or behavior of the soils.

Rimer soils are similar to Tustin soils and are near Briggsville and Tustin soils. Briggsville soils are well drained and are silty and clayey throughout the solum. Tustin soils are well drained.

Typical pedon of Rimer loamy sand, 0 to 3 percent slopes, in a cultivated field approximately 55 feet north and 1,120 feet east of the center of sec. 5, T. 12 N., R. 7 E.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) loamy sand, grayish brown (10YR 5/2) dry; weak

medium subangular blocky structure; very friable; few roots; mildly alkaline; abrupt smooth boundary.

A2—9 to 12 inches; dark grayish brown (10YR 4/2) loamy sand; common fine faint grayish brown (10YR 5/2) and distinct yellowish brown (10YR 5/4) mottles; weak medium subangular blocky structure; very friable; few roots; some very dark grayish brown (10YR 3/2) soil in root channels; mildly alkaline; clear smooth boundary.

B11—12 to 24 inches; brown (10YR 5/3) loamy sand; common fine and medium prominent yellowish brown (10YR 5/6) and strong brown (7.5YR 5/6) mottles and few fine faint grayish brown (10YR 5/2) mottles; weak coarse subangular blocky structure; very friable; mildly alkaline; gradual wavy boundary.

B12—24 to 30 inches; yellowish brown (10YR 5/4) loamy sand; few fine distinct light brownish gray (10YR 6/2) mottles and common fine and medium faint brown (10YR 5/3) and distinct yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; very friable; mildly alkaline; clear wavy boundary.

B21t—30 to 37 inches; dark yellowish brown (10YR 4/4) sandy loam; few fine distinct light brownish gray (10YR 6/2) and common fine and medium distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable; common pores; thin patchy dark brown (10YR 4/3) clay films on faces of peds; neutral; clear wavy boundary.

IIB22t—37 to 47 inches; reddish brown (5YR 5/3) silty clay loam; few fine distinct brown (7.5YR 4/2) and common fine prominent light brownish gray (2.5Y 6/2) mottles; moderate very fine subangular blocky structure; firm; many pores; thin patchy clay films on faces of peds and in pores and channels; neutral; gradual wavy boundary.

IIC—47 to 60 inches; brown (7.5YR 5/4) silty clay loam with thin strata of silt loam; few fine distinct yellowish brown (10YR 5/6) and common fine distinct grayish brown (2.5Y 5/2) mottles; weak thin platy structure; firm; strong effervescence; mildly alkaline.

Solum thickness ranges from 30 to 48 inches. Thickness of the sandy mantle ranges from 20 to 32 inches. Reaction is mildly alkaline in the sandy upper part of the subsoil, slightly acid or neutral in the lower part, and mildly alkaline or moderately alkaline in the substratum.

The Ap horizon has value of 2 or 3 and chroma of 1 through 3. The A1 horizon ranges from 2 to 5 inches in thickness. It has colors similar to those of the Ap horizon. In some pedons the B1 horizon is sand. The B2t horizon has hue of 10YR, or 7.5YR, value of 4 to 6, and chroma of 3 to 6. The IIBt horizon has hue of 5YR, 7.5YR, or 10YR; value of 4 to 6; and chroma of 2 or 3.

Ringwood series

The Ringwood series consists of well drained, moderately permeable soils on till plains and moraines. These soils formed in loess and loamy glacial till and are underlain by gravelly sandy loam glacial till. The slope ranges from 2 to 12 percent.

Ringwood soils are similar to and are near McHenry, St. Charles, and Richwood soils. McHenry soils do not have a mollic epipedon. St. Charles soils do not have a mollic epipedon and have a thicker loess mantle over glacial till than Ringwood soils. Richwood soils have a thicker loess mantle than Ringwood soils and overlie outwash sand.

Typical pedon of Ringwood silt loam, 2 to 6 percent slopes, in a cultivated field approximately 1,200 feet south and 1,250 feet west of the center of sec. 29, T. 12 N., R. 7 E.

Ap—0 to 10 inches; black (10YR 2/1) silt loam, dark grayish brown (10YR 4/2) dry; weak fine granular structure; friable; few roots; few pores; mildly alkaline; abrupt smooth boundary.

A12—10 to 13 inches; very dark brown (10YR 2/2) silt loam, grayish brown (10YR 5/2) dry; weak fine subangular blocky structure; friable; few roots; common pores; some dark yellowish brown (10YR 4/4) soil in worm channels; slightly acid; clear smooth boundary.

A3—13 to 16 inches; very dark grayish brown (10YR 3/2) silt loam; weak fine subangular blocky structure; friable; few roots; common pores; some dark yellowish brown (10YR 4/4) soil in worm channels; slightly acid; clear wavy boundary.

B21t—16 to 23 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate fine subangular blocky structure; firm; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; medium acid; clear wavy boundary.

IIB22t—23 to 29 inches; brown (10YR 4/3) clay loam; moderate fine subangular blocky structure; firm; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; medium acid; gradual wavy boundary.

IIB23t—29 to 40 inches; brown (7.5YR 4/4) sandy clay loam; moderate medium subangular blocky structure; firm; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; few pebbles; slightly acid; gradual wavy boundary.

IIB3t—40 to 50 inches; brown (7.5YR 4/4) sandy loam; weak medium subangular blocky structure; firm; few roots; many pores; thin patchy clay films on faces of peds and in pores and channels; about 10 percent by volume pebbles; slightly acid; gradual irregular boundary.

IIC—50 to 60 inches; yellowish brown (10YR 5/4) gravelly sandy loam; massive; friable; about 25 percent by volume pebbles; slight effervescence; mildly alkaline.

The solum is thicker than normal for the series; it ranges from 50 to 60 inches in thickness. Depth to free

carbonates is commonly the same as solum thickness, but in some pedons the lower part of the B horizon contains free carbonates. Thickness of the loess mantle ranges from 15 to 30 inches. Thickness of the mollic epipedon ranges from 10 to 20 inches. Reaction ranges from medium acid to neutral in the upper part of the subsoil and from slightly acid to mildly alkaline in the lower part. The substratum is mildly alkaline or moderately alkaline.

The A horizon ranges from 10 to 18 inches in thickness. It has value of 2 to 3 and chroma of 1 or 2. The B2t horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4. In some pedons it is silt loam. The IIB2t horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 8. In some pedons it is loam.

Rowley series

The Rowley series consists of somewhat poorly drained soils on outwash plains and stream terraces. These soils are moderately permeable in the subsoil and rapidly permeable in the substratum. They formed in silty and loamy sediments over sand. The slope is 0 to 2 percent.

Rowley soils are similar to and are near Richwood and Toddville soils. Richwood soils are well drained. Toddville soils are moderately well drained.

Typical pedon of Rowley silt loam in a cultivated field approximately 1,140 feet north and 35 feet west of the center sec. 16, T. 12 N., R. 4 E.

Ap—0 to 10 inches; black (10YR 2/1) silt loam, dark grayish brown (10YR 4/2) dry; weak fine subangular blocky structure; friable; few roots; few pores; neutral; abrupt smooth boundary.

A12—10 to 12 inches; black (10YR 2/1) silt loam, dark grayish brown (10YR 4/2) dry; weak fine subangular blocky structure; friable; few roots; common pores; neutral; abrupt smooth boundary.

A3—12 to 16 inches; dark brown (10YR 3/3) silt loam; moderate very fine subangular blocky structure; friable; few roots; many pores; medium acid; clear wavy boundary.

B21t—16 to 24 inches; brown (10YR 4/3) silt loam; common fine prominent yellowish brown (10YR 5/6) and faint grayish brown (10YR 5/2) mottles; moderate fine subangular blocky structure; firm; few roots; many pores; thin patchy clay films on faces of peds and in pores and channels; some very dark grayish brown (10YR 3/2) soil in worm and root channels; few soft dark nodules (iron and manganese oxides); strongly acid; clear smooth boundary.

B22tg—24 to 42 inches; grayish brown (10YR 5/2) silt loam; many fine and medium prominent yellowish brown (10YR 5/6) and few fine faint light brownish gray (2.5Y 6/2) mottles; moderate medium subangular blocky structure; firm; few roots; many pores; thin patchy clay films on faces of peds and in pores and channels; clean white (10YR 8/2 dry) silt grains coating faces of many peds; common soft dark nodules (iron and manganese oxides); strongly acid; gradual wavy boundary.

B31tg—42 to 50 inches; light brownish gray (2.5Y 6/2) silt loam; many fine and medium prominent strong brown (7.5YR 5/6 and 5/8) mottles; moderate medium subangular blocky structure; friable; common pores; thin patchy clay films on faces of peds and in pores and channels; clean white (10YR 8/2 dry) silt grains coating faces of few peds; common soft dark nodules (iron and manganese oxides); strongly acid; clear smooth boundary.

IIB32tg—50 to 56 inches; light brownish gray (2.5Y 6/2) stratified silt loam, loam, and sandy loam; many fine medium and coarse prominent strong brown (7.5YR 5/6 and 5/8) and few coarse prominent yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable; many pores; thin patchy clay films on faces of some peds and in pores and channels; clean white (10YR 8/2 dry) silt grains coating faces of some peds; medium acid; clear smooth boundary.

IIC—56 to 60 inches; light yellowish brown (10YR 6/4) sand; few medium distinct light brownish gray (10YR 6/2) and common medium distinct yellowish brown (10YR 5/6) mottles; single grained; loose; medium acid.

Solum thickness ranges from 45 to 65 inches. The thickness of the silty mantle ranges from 40 to 60 inches. Reaction ranges from strongly acid to neutral in the subsoil and from medium acid to neutral in the substratum.

The A horizon ranges from 10 to 20 inches in thickness. It has value or 2 or 3 and chroma of 1 through 3. Some pedons have a B1 horizon. The B2t horizon has value of 4 to 6 and chroma of 2 to 4. In some pedons the B2t horizon is silty clay loam. The IIB3 horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 to 4. In some pedons the IIB3 horizon has strata of loamy sand or sand.

St. Charles series

The St. Charles series consists of well drained, moderately permeable soils on till plains and moraines. These soils formed in loess over gravelly sandy loam glacial till. Slope ranges from 2 to 20 percent.

St. Charles soils are similar to Kendall, McHenry, and Ringwood soils and are near Kendall and McHenry soils. Kendall soils are somewhat poorly drained and are commonly underlain by stratified silty and loamy deposits. McHenry soils have a thinner loess mantle than St. Charles soils. Ringwood soils have a mollic epipedon and a thinner loess mantle than St. Charles soils.

Typical pedon of St. Charles silt loam, 2 to 6 percent slopes, in a cultivated field approximately 1,275 feet

north and 1,000 feet west of the southeast corner SW1/4 sec. 2, T. 11 N., R. 6 E.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam; moderate fine subangular blocky structure; friable; few roots; few pores; neutral; abrupt smooth boundary.

B21t—8 to 17 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate very fine subangular blocky structure; firm; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; clean white (10YR 8/2 dry) silt grains coating faces of some peds; slightly acid; gradual wavy boundary.

B22t—17 to 28 inches; brown (10YR 4/3) silty clay loam; moderate fine and medium subangular blocky structure; firm; few roots; many pores; thin patchy clay films on faces of peds and in pores and channels; clean white (10YR 8/2 dry) silt grains coating faces of some peds; medium acid; gradual wavy boundary.

B23t—28 to 37 inches; brown (10YR 4/3) silty clay loam; moderate medium subangular blocky structure; firm; few roots; many pores; thin patchy clay films on faces of peds and in pores and channels; thick patchy dark brown (10YR 3/3) clay films on faces of some peds and in some pores and channels; clean white (10YR 8/2 dry) silt grains coating faces of some peds; strongly acid; gradual wavy boundary.

B31t—37 to 47 inches; yellowish brown (10YR 5/4) silt loam; moderate medium subangular blocky structure; firm; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; thick patchy dark brown (10YR 3/3) clay films on faces of some peds and in some pores and channels; clean white (10YR 8/2 dry) silt grains coating faces of many peds; strongly acid; clear wavy boundary.

IIB32t—47 to 60 inches; dark yellowish brown (10YR 4/4) gravelly sandy loam; weak medium subangular blocky structure; friable; few roots; many pores; thin patchy clay films on faces of peds and in pores and channels; about 17 percent by volume pebbles; medium acid; gradual irregular boundary.

Solum thickness ranges from 45 to 65 inches. The loess mantle ranges from 40 to 60 inches in thickness. Depth to free carbonates ranges from 45 to 70 inches or more. Reaction ranges from strongly acid to slightly acid in the upper part of the subsoil and from medium acid to neutral in the lower part. The substratum is mildly alkaline or moderately alkaline.

The A1 horizon ranges from 3 to 5 inches in thickness. It has value of 2 or 3 and chroma of 1 to 3. Some pedons have an A2 horizon, and some have a B1 horizon. The B horizon has hue of 10YR or 7.5YR, value or 4 or 5, and chroma of 3 or 4. In some pedons the IIB3 horizon is loam or sandy clay loam. Where it occurs within a depth of 60 inches, the IIC horizon is gravelly sandy loam.

Shiffer series

The Shiffer series consists of somewhat poorly drained soils on stream terraces and valley fills. These soils are moderately permeable in the subsoil and rapidly permeable in the substratum. They formed in loamy and sandy alluvial sediments over outwash sand. Slope is 0 to 3 percent.

Shiffer soils are similar to Marshan soils and are near Marshan and Shiffer variant soils. Marshan soils have a mollic epipedon and are poorly drained or very poorly drained. Shiffer variant soils have a coarse-loamy subsoil.

Typical pedon of Shiffer loam, 0 to 3 percent slopes, in a cultivated field approximately 360 feet north and 1,290 feet west of the southeast corner NE1/4 sec. 29, T. 12 N., R. 6 E.

Ap—0 to 7 inches; very dark brown (10YR 2/2) loam, grayish brown (10YR 4/2) dry; weak medium subangular blocky structure; friable; few roots; few pores; mildly alkaline; abrupt smooth boundary.

B1t—7 to 11 inches; dark yellowish brown (10YR 3/4) loam; weak medium subangular blocky structure; firm; few roots; common pores; thin patchy clay films on faces of peds and in pores; some worm casts of very dark brown (10YR 2/2); some dark brown (10YR 3/3) coatings on faces of peds; slightly acid; clear wavy boundary.

B21t—11 to 14 inches; dark yellowish brown (10YR 4/4) loam; common medium distinct yellowish brown (10YR 5/6) and few fine distinct dark grayish brown (10YR 4/2) mottles; moderate fine subangular blocky structure; firm; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; few pebbles; slightly acid; clear smooth boundary.

B22t—14 to 24 inches; yellowish brown (10YR 5/4) loam; common medium distinct light brownish gray (10YR 6/2) and grayish brown (10YR 5/2) and many medium distinct yellowish brown (10YR 5/6) mottles; moderate fine subangular blocky structure; firm; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; few pebbles; strongly acid; clear wavy boundary.

IIB31t—24 to 27 inches; dark yellowish brown (10YR 4/4) sandy loam; common fine and medium distinct grayish brown (10YR 5/2) and common medium distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; few pebbles; strongly acid; clear wavy boundary.

IIB32—27 to 32 inches; dark yellowish brown (10YR 4/4) loamy sand; common medium distinct light brownish gray (10YR 6/2) and yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; very friable; few pebbles; medium acid; clear wavy boundary.

IIC—32 to 60 inches; yellowish brown (10YR 5/6) sand; common medium distinct yellowish brown (10YR 5/4) mottles; single grained; loose; medium acid.

Solum thickness ranges from 20 to 40 inches and is the same as the depth to sand. Reaction ranges from strongly acid to slightly acid in the subsoil and substratum.

The A horizon ranges from 6 to 9 inches in thickness. It has value of 2 or 3 and chroma of 1 or 2. In some pedons the B1 horizon is sandy loam. The B2t horizon has hue of 10YR or 7.5YR, value of 3 to 6, and chroma of 4 or 5. In some pedons it is sandy clay loam. In some pedons the IIB3 horizon is loam. The IIC horizon has hue of 10YR or 7.5YR, value of 5 to 8, and chroma of 2 to 6. In some pedons the IIC horizon is loamy sand.

Shiffer variant

The Shiffer variant consists of somewhat poorly drained, moderately rapidly permeable soils on outwash plains and stream terraces. These soils formed in loamy and sandy alluvial sediments over outwash sand. The slope ranges from 0 to 3 percent.

Shiffer variant soils are similar to Billett soils and are near Billett, Granby variant, and Shiffer soils. Billett soils are well drained and moderately well drained. Granby variant soils are poorly drained and very poorly drained. In addition they have a sandy subsoil and have a finer textured upper part of the substratum than Shiffer variant soils. Shiffer soils have a fine-loamy subsoil.

Typical pedon of Shiffer Variant sandy loam, 0 to 3 percent slopes, in a cultivated field approximately 60 feet north and 700 feet east of the southwest corner of sec. 9, T. 13 N., R. 5 E.

Ap—0 to 9 inches; very dark brown (10YR 2/2) sandy loam, dark grayish brown (10YR 4/2) dry; weak fine subangular blocky structure; friable; many roots; few pores; slightly acid; abrupt smooth boundary.

B1tg—9 to 12 inches; dark grayish brown (10YR 4/2) sandy loamy; few fine faint grayish brown (10YR 5/2) and common fine and medium prominent yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable; few roots; common pores; thin patchy coatings on faces of some peds; strongly acid; clear smooth boundary.

B21tg—12 to 25 inches; dark grayish brown (10YR 4/2) sandy loam; many fine and medium prominent yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable; few roots; common pores; thin patchy coatings on faces of peds and in pores and channels; strongly acid; gradual wavy boundary.

B22t—25 to 29 inches; brown (10YR 5/3) sandy loam; common fine faint grayish brown (10YR 5/2) and many fine and medium prominent yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable; few roots; common pores; thin patchy coatings on faces of some peds and in pores and channels; clay bridging between sand grains; strongly acid; clear wavy boundary.

B3—29 to 36 inches; brown (10YR 5/3) loamy sand; common fine and medium prominent yellowish brown (10YR 5/6) and strong brown (7.5YR 5/6) mottles; weak coarse subangular blocky strucutre; very friable; strongly acid; gradual wavy boundary.

C—36 to 60 inches; yellowish brown (10YR 5/4) sand; many medium and coarse distinct yellowish brown (10YR 5/6) and common fine and medium distinct strong brown (7.5YR 5/6) mottles; single grained; loose; strongly acid.

Solum thickness ranges from 20 to 40 inches and is the same as the depth to sand. Reaction ranges from strongly acid to slightly acid in the subsoil and substratum.

The A horizon ranges from 6 to 9 inches in thickness. It has value of 2 or 3 and chroma of 1 or 2. The B2t horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 to 4. The IIC horizon has hue of 10YR or 7.5YR, value of 5 to 8, and chroma of 2 to 6. In some pedons the IIC horizon has strata of loamy sand or sandy loam.

Sisson series

The Sisson series consists of well drained, moderately permeable soils in glacial lake basins. These soils formed in loamy deposits over stratified lacustrine silt, silt loam, fine sand, and very fine sand. The slope is 2 to 6 percent.

Sisson soils are near Colwood, Fox, and Mosel soils. Colwood soils formed in similar material but are poorly drained and very poorly drained. Fox soils formed in loamy deposits over stratified outwash sand and gravel. Mosel soils are somewhat poorly drained and formed in loamy deposits over finer textured lacustrine deposits.

Typical pedon of Sisson loam, 2 to 6 percent slopes, in a cultivated field approximately 60 feet south and 940 feet east of the northwest corner NE1/4 sec. 35, T. 11 N., R. 7 E.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) loam; weak fine subangular blocky structure; friable; common roots; few pores; some dark yellowish brown (10YR 4/4) soil in worm channels; slightly acid; abrupt smooth boundary.

B1t—8 to 11 inches; dark yellowish brown (10YR 4/4) loam; moderate medium subangular blocky structure; firm; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; some dark grayish brown (10YR 4/2) soil in worm and root channels; neutral; clear smooth boundary.

B21t—11 to 20 inches; brown (7.5YR 4/4) clay loam; weak fine prismatic structure parting to moderate

medium and fine subangular blocky; firm; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; some dark grayish brown (10YR 4/2) soil in worm and root channels; neutral; gradual wavy boundary.

B22t—20 to 27 inches; dark yellowish brown (10YR 4/4) clay loam; weak fine prismatic structure parting to moderate fine subangular blocky; firm; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; neutral; gradual smooth boundary.

B23t—27 to 37 inches; dark yellowish brown (10YR 4/4) clay loam; moderate medium subangular blocky structure; firm; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; neutral; abrupt smooth boundary.

IIB3t—37 to 39 inches; dark yellowish brown (10YR 4/4) silt loam; weak medium platy structure; friable; few pores; thin patchy clay films on faces of peds and in pores and channels; neutral; abrupt smooth boundary.

IIC—39 to 60 inches; pale brown (10YR 6/3) stratified fine sand, very fine sand, and common thin strata of yellowish brown (10YR 5/4) silt loam and silt; weak medium and thick platy structure; very friable; strong effervescence; mildly alkaline.

Solum thickness ranges from 24 to 42 inches. Reaction is slightly acid or neutral in the upper part of the subsoil and neutral or mildly alkaline in the lower part. The substratum is mildly alkaline or moderately alkaline.

The A1 horizon ranges from 1 to 3 inches in thickness. Some pedons have an A2 horizon. The B2t horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 3 to 6. In some pedons individual layers in the B2t horizon are loam or sandy clay loam. In some pedons the IIB3 horizon is silty clay loam, and in some it contains strata of fine sand, very fine sand, or fine sandy loam. The IIC horizon has hue of 10YR or 7.5YR, value or 4 to 6, and chroma of 3 or 4.

Sparta series

The Sparta series consists of excessively drained, rapidly permeable soils on outwash plains and stream terraces. These soils formed in sandy outwash. The slope ranges from 1 to 12 percent.

Sparta soils are similar to and are near Plainfield, Sparta variant, and Watseka soils. Plainfield soils do not have a mollic epipedon. Sparta variant soils are moderately well drained. Watseka soils are somewhat poorly drained.

Typical pedon of Sparta loamy sand, 1 to 6 percent slopes, in a cultivated field approximately 1,180 feet north and 330 feet east of the southwest corner of NW1/4 sec. 5, T. 8 N., R. 3 E.

Ap—0 to 9 inches; very dark brown (10YR 2/2) loamy sand, grayish brown (2.5Y 5/2) dry; weak fine subangular blocky structure; very friable; common roots; slightly acid; abrupt smooth boundary.

A12—9 to 13 inches; very dark brown (10YR 2/2) loamy sand, grayish brown (2.5Y 5/2) dry; weak medium subangular blocky structure; very friable; few roots; medium acid; clear smooth boundary.

A3—13 to 16 inches; very dark grayish brown (10YR 3/2) loamy sand; weak medium subangular blocky structure; very friable; few roots; strongly acid; clear wavy boundary.

B2—16 to 30 inches; dark yellowish brown (10YR 4/4) loamy sand; weak medium subangular blocky structure; very friable; few roots; strongly acid; gradual wavy boundary.

C1—30 to 48 inches; yellowish brown (10YR 5/4) sand; single grained; loose; few roots; medium acid; gradual wavy boundary.

C2—48 to 60 inches; light yellowish brown (10YR 6/4) sand; single grained; loose; medium acid.

Solum thickness ranges from 20 to 40 inches. Reaction is strongly acid or medium acid throughout.

The A horizon ranges from 10 to 24 inches in thickness. It has hue of 10YR or 7.5YR, value of 2 or 3, and chroma of 1 or 2. The B horizon has hue of 10YR or 7.5YR and value and chroma of 4 to 6. In some pedons the B horizon is sand. The C horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 3 to 6.

Sparta variant

The Sparta variant consists of moderately well drained, rapidly permeable soils on outwash plains and stream terraces. These soils formed in sandy outwash. The slope is 0 to 2 percent.

Sparta variant soils are similar to Brems, Sparta, and Watseka soils and are near Sparta and Watseka soils. Brems soils do not have a mollic epipedon. Sparta soils are excessively drained. Watseka soils are somewhat poorly drained.

Typical pedon of Sparta Variant loamy sand in a cultivated field approximately 900 feet south and 10 feet west of the northeast corner NW1/4 sec. 4, T. 8 N., R. 3 E.

Ap—0 to 8 inches; very dark brown (10YR 2/2) loamy sand, grayish brown (2.5Y 5/2) dry; weak fine subangular blocky structure; very friable; common roots; medium acid; abrupt smooth boundary.

A12—8 to 14 inches; very dark brown (10YR 2/2) loamy sand, grayish brown (2.5Y 5/2) dry; weak medium subangular blocky structure; very friable; few roots; strongly acid; clear smooth boundary.

B2—14 to 24 inches; dark yellowish brown (10YR 4/4) loamy sand; few fine prominent yellowish red (5YR 4/8) mottles; weak medium subangular blocky structure; very friable; few roots; some very dark brown (10YR 2/2) soil in old root channels; strongly acid; clear wavy boundary.

B3—24 to 32 inches; yellowish brown (10YR 5/4) loamy sand; common fine prominent yellowish red (5YR 4/8) mottles; weak medium subangular blocky structure; very friable; few roots; strongly acid; gradual wavy boundary.
C1—32 to 40 inches; mixed brownish yellow (10YR 6/6) and strong brown (7.5YR 5/6) sand; few fine distinct yellowish red (5YR 4/8) mottles; single grained; loose; few roots; strongly acid; clear smooth boundary.
C2—40 to 60 inches; light yellowish brown (10YR 6/4) sand; few fine prominent strong brown (7.5YR 5/8) mottles; single grained; loose; strongly acid.

Solum thickness ranges from 20 to 40 inches. Reaction is strongly acid or medium acid throughout.

The A horizon ranges from 10 to 24 inches in thickness. It has hue of 10YR or 7.5YR, value of 2 or 3, and chroma of 1 or 2. The B horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 4 to 8. In some pedons the B horizon is sand. The C horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 2 to 8.

Tama series

The Tama series consists of well drained, moderately permeable soils on unglaciated uplands. These soils formed in deep loess deposits. The slope ranges from 0 to 12 percent.

Tama soils are similar to Atterberry, Fayette, and Toddville soils. Atterberry soils have a mollic intergrade surface layer and are somewhat poorly drained. Fayette soils do not have a mollic epipedon. Toddville soils have a slightly thinner silty mantle than Tama soils and are moderately well drained.

Typical pedon of Tama silt loam, 2 to 6 percent slopes, in a cultivated field approximately 920 feet south and 1,140 feet east of the northwest corner NE1/4 sec. 19, T. 13 N., R. 5 E.

Ap—0 to 9 inches; very dark brown (10YR 2/2) silt loam, dark grayish brown (10YR 4/2) dry; weak fine subangular blocky structure; friable; few roots; few pores; some dark brown (10YR 3/3) soil in worm channels; neutral; abrupt smooth boundary.
A12—9 to 13 inches; very dark brown (10YR 2/2) silt loam, dark grayish brown (10YR 4/2) dry; weak fine subangular blocky structure; friable; few roots; common pores; some dark brown (10YR 3/3) soils in worm channels; slightly acid; clear wavy boundary.
B1—13 to 19 inches; dark brown (10YR 3/3) silt loam; weak fine subangular blocky structure; friable; few roots; many pores; some very dark brown (10YR 2/2) soil in worm channels; medium acid; gradual wavy boundary.
B21t—19 to 32 inches; brown (10YR 4/3) silty clay loam; moderate fine subangular blocky structure; firm; few roots; many pores; thin patchy clay films on faces of peds and in pores and channels; dark brown (10YR 3/3) clay coatings on faces of many peds; clean very pale brown (10YR 8/3 dry) silt grains in thin coatings on faces of many peds; strongly acid; clear wavy boundary.
B22t—32 to 38 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium subangular blocky structure; firm; few roots; many pores; thin patchy clay films on faces of peds and in pores and channels; thick patchy dark brown (10YR 3/3) clay coatings on faces of some peds; clean very pale brown (10YR 8/3 dry) silt grains in thin coatings on faces of some peds; strongly acid; clear smooth boundary.
B3t—38 to 48 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium prismatic structure parting to weak medium subangular blocky; firm; few roots; many pores; thin patchy clay films on faces of peds and in pores and channels; thick patchy dark brown (10YR 3/3) clay coatings on faces of some peds; clean very pale brown (10YR 8/3) silt grains in thin coatings on faces of some peds; medium acid; clear smooth boundary.
C—48 to 60 inches; yellowish brown (10YR 5/4) silt loam; massive; friable; few roots; many pores; some dark brown (10YR 3/3) clay flows in pores and channels; medium acid.

Solum thickness typically is 42 to 50 inches but ranges from 36 to 60 inches. The mollic epipedon ranges from 10 to 20 inches in thickness. Reaction is strongly acid or medium acid in the subsoil and ranges from medium acid to neutral in the substratum.

The A horizon ranges from 10 to 18 inches in thickness. It has value of 2 or 3 and chroma of 1 or 2. The B2t horizon has value of 4 or 5 and chroma of 3 or 4. The C horizon has value of 4 or 5 and chroma of 3 to 6.

In map unit TaC2, the dark colored surface layer is thinner than is defined as the range for the series, but this difference does not alter the use or behavior of the soil.

Tell series

The Tell series consists of well drained soils on outwash plains and stream terraces. These soils are moderately permeable in the subsoil and rapidly permeable in the substratum. They formed in silty and loamy sediments over outwash sand. The slope ranges from 0 to 20 percent.

Tell soils are similar to and are near Bertrand, Dells, and Jackson soils. Bertrand soils have a thicker silty mantle than Tell soils. Dells soils have a mollic intergrade surface layer and are somewhat poorly drained. Jackson soils have a thicker silty mantle than Tell soils and are moderately well drained.

Typical pedon of Tell silt loam, 2 to 6 percent slopes, in a cultivated field approximately 1,120 feet south and 1,050 feet east of the center of sec. 7, T. 11 N., R. 5 E.

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) silt loam; weak fine subangular blocky structure; friable; few roots; few pores; some brown (10YR 4/3) soil in worm channels; neutral; abrupt smooth boundary.

B21t—9 to 17 inches; brown (10YR 4/3) silt loam; moderate very fine subangular blocky structure; firm; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; some dark grayish brown (10YR 4/2) soil in worm and root channels; slightly acid; gradual wavy boundary.

B22t—17 to 24 inches; dark yellowish brown (10YR 4/4) silt loam; moderate medium and fine subangular blocky structure; firm; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; thick patchy dark brown (7.5YR 4/4) clay coatings on faces of some peds; clean white (10YR 8/2 dry) silt grains coating faces of many peds; medium acid; gradual wavy boundary.

B23t—24 to 30 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium prismatic structure parting to moderate medium and fine subangular blocky; firm; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; clean white (10YR 8/2 dry) silt grains coating faces of some peds; medium acid; clear wavy boundary.

IIB3t—30 to 34 inches; yellowish brown (10YR 5/4) loam; moderate medium subangular blocky structure; firm; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; clean white (10YR 8/2 dry) silt grains coating faces of peds; medium acid; abrupt wavy boundary.

IIC—34 to 60 inches; yellowish brown (10YR 5/4) sand with strata of dark yellowish brown (10YR 4/4) loamy sand up to 3 inches thick; single grained; loose; about 5 percent by volume fine pebbles; slightly acid.

Solum thickness ranges from 20 to 40 inches and is the same as the depth to sand. Thickness of the silty sediments ranges from 20 to 36 inches. Reaction ranges from strongly acid to slightly acid in the subsoil and from medium acid or slightly acid in the substratum.

The A1 horizon ranges from 2 to 5 inches in thickness. It has value of 2 or 3 and chroma of 1 to 3. Some pedons have an A2 horizon. Some pedons have a B1 horizon. The B2t horizon has hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 3 to 6. In some pedons it is sandy loam or sandy clay loam. The IIC horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 8.

Toddville series

The Toddville series consists of moderately well drained soils on outwash plains and stream terraces. These soils are moderately permeable in the subsoil and rapidly permeable in the substratum. They formed in mostly silty sediments over sand. The slope is 0 to 6 percent.

Toddville soils are similar to Richwood, Rowley, and Tama soils and are near Richwood and Rowley soils. Richwood soils are well drained. Rowley soils are somewhat poorly drained. Tama soils are well drained and have a thicker silty mantle than Toddville soils.

Typical pedon of Toddville silt loam, 0 to 2 percent slopes, in a cultivated field approximately 600 feet north and 25 feet west of the southeast corner SW1/4 sec. 34, T. 9 N., R. 3 E.

Ap—0 to 9 inches; black (10YR 2/1) silt loam, dark grayish brown (10YR 5/2) dry; weak very fine subangular blocky structure; friable; few roots; few pores; slightly acid; abrupt smooth boundary.

A12—9 to 11 inches; very dark brown (10YR 2/2) silt loam, grayish brown (10YR 5/2) dry; weak medium subangular blocky structure; friable; few roots; common pores; medium acid; abrupt smooth boundary.

B1—11 to 15 inches; dark brown (10YR 3/3) silt loam; moderate very fine subangular blocky structure; friable; few roots; many pores; very dark grayish brown (10YR 3/2) organic coatings on faces of some peds; medium acid; clear wavy boundary.

B21t—15 to 23 inches; brown (10YR 4/3) silty clay loam; moderate very fine subangular blocky structure; firm; few roots; many pores; thin patchy clay films on faces of peds and in pores and channels; medium acid; gradual wavy boundary.

B22t—23 to 36 inches; brown (10YR 4/3) silty clay loam; common medium prominent yellowish brown (10YR 5/6) mottles; weak medium prismatic structure parting to moderate fine subangular blocky; firm; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; strongly acid; gradual wavy boundary.

B23t—36 to 53 inches; brown (10YR 5/3) silty clay loam; common fine faint grayish brown (10YR 5/2), few fine prominent yellowish red (5YR 4/8), and common medium prominent yellowish brown (10YR 5/6) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; strongly acid; clear smooth boundary.

IIB3t—53 to 58 inches; mixed yellowish brown (10YR 5/6) and brown (10YR 5/3) stratified loam, sandy loam, and loamy sand; common fine faint grayish brown (10YR 5/2) mottles; weak medium subangular blocky structure; friable; common pores; thin patchy clay films on faces of peds and in pores and channels; medium acid; clear smooth boundary.

IIC—58 to 60 inches; brown (10YR 5/3) sand; common medium and coarse prominent yellowish brown (10YR 5/6) mottles; single grained; loose; medium acid.

Solum thickness ranges from 45 to 65 inches. Thickness of the silty mantle ranges from 40 to 60 inches. Thickness of the mollic epipedon ranges from 10 to 20 inches. Reaction ranges from strongly acid to neutral in the subsoil and from medium acid to neutral in the substratum.

The A horizon ranges from 10 to 18 inches in thickness. It has value of 2 or 3 and chroma of 1 through 3. The B1 horizon has value and chroma of 3 or 4. The B2t horizon has hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 3 or 4. In some pedons it is silt loam. Some pedons have a B3t horizon. The IIB3t horizon has hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 3 or 4. Mottles with chroma of 2 or less are lacking in the subsoil in some pedons. The IIC horizon has hue of 10YR or 7.5YR, value of 4 to 8, and chroma of 2 to 6.

Tustin series

The Tustin series consists of well drained soils in glacial lake basins. These soils are rapidly permeable in the upper part of the subsoil and slowly permeable in the lower part and in the substratum. They formed in sandy outwash over sandy, silty, and clayey lacustrine deposits. The slope is 1 to 6 percent.

Tustin soils are similar to Rimer soils and are near Briggsville and Rimer soils. Briggsville soils are silty and clayey throughout the solum. Rimer soils are somewhat poorly drained.

Typical pedon of Tustin loamy sand, 1 to 6 percent slopes, in a cultivated field approximately 1,300 feet south and 800 feet west of the northeast corner of sec. 1, T. 12 N., R. 5 E.

Ap—0 to 10 inches; dark grayish brown (10YR 4/2) loamy sand; weak medium subangular blocky structure; very friable; common roots; slightly acid; abrupt smooth boundary.

B11—10 to 16 inches; dark yellowish brown (10YR 4/4) sand; weak medium subangular blocky structure; very friable; few roots; slightly acid; clear wavy boundary.

B12—16 to 25 inches; yellowish brown (10YR 5/4) sand; weak medium subangular blocky structure; very friable; few roots; slightly acid; clear smooth boundary.

IIB21t—25 to 28 inches; dark yellowish brown (10YR 4/4) sandy loam; weak medium subangular blocky structure; friable; few roots; common pores; thin patchy clay films on faces of some peds but mostly clay bridging between sand grains; slightly acid; clear wavy boundary.

IIB22t—28 to 39 inches; reddish brown (5YR 4/4) silty clay; moderate fine and very fine prismatic structure parting to strong very fine angular blocky; firm; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; thick patchy dark reddish brown (5YR 3/2) organic clay coatings on vertical faces of many peds; clean sand grains coating faces of some peds; slightly acid; gradual wavy boundary.

IIB3—39 to 42 inches; brown (7.5YR 5/4) silty clay loam; weak thick platy structure parting to moderate fine subangular blocky; firm; few roots; few pores; thin patchy brown (7.5YR 4/4) clay films of faces of a few peds; strong effervescence; mildly alkaline; clear wavy boundary.

IIC—42 to 60 inches; brown (7.5YR 4/4) silty clay loam; moderate medium platy structure parting to moderate very fine angular blocky; firm; few roots; few pores; violent effervescence; mildly alkaline.

Solum thickness ranges from 30 to 50 inches. Thickness of the sandy mantle ranges from 20 to 40 inches. Reaction ranges from strongly acid to neutral in the sandy upper part of the subsoil and from slightly acid to moderately alkaline in the lower part. The substratum is mildly alkaline or moderately alkaline and contains free carbonates.

The Ap horizon has value of 2 to 4 and chroma of 2 or 3. The A1 horizon ranges from 1 to 4 inches in thickness and has colors similar to those in the Ap horizon. Some pedons have an A2 horizon. The B1 horizon has hue of 10YR or 7.5YR and value and chroma of 4 to 6. In some pedons the B1 horizon is loamy sand. The IIB21t horizon has hue of 10YR, 7.5YR or 5YR hue; value of 4 or 5; and chroma of 4 to 6. In some pedons it is loam or sandy clay loam. The IIB22t horizon has hue of 7.5YR or 5YR, value of 3 to 5, and chroma of 3 or 4. In some pedons it is silty clay loam. Some pedons do not have a IIB3 horizon. The IIC horizon has value and chroma of 4 or 5. In some pedons it is silty clay.

Urne series

The Urne series consists of somewhat excessively drained, moderately rapidly permeable soils on unglaciated sandstone uplands. These soils formed in residuum from the underlying fine grained glauconitic sandstone bedrock. The slope ranges from 2 to 30 percent.

Urne soils are similar to Eleva variant soils and are near Norden soils. Eleva variant soils are somewhat poorly drained. Norden soils are fine-loamy over fine grained glauconitic sandstone.

Typical pedon of Urne fine sandy loam, 2 to 6 percent slopes, in a cultivated field approximately 120 feet south and 150 feet west of the northeast corner NW1/4 sec. 15, T. 13 N., R. 5 E.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) fine sandy loam, light brownish gray (10YR 6/2) dry; weak medium subangular blocky structure; friable; few roots; few pores; slightly acid; abrupt smooth boundary.

B1—8 to 12 inches; dark yellowish brown (10YR 4/4) fine sandy loam; weak medium subangular blocky structure; friable; few roots; common pores; few

sandstone fragments; slightly acid; clear smooth boundary.

B2—12 to 21 inches; brown (7.5YR 4/4) fine sandy loam; weak fine subangular blocky structure; friable; few roots; many pores; common sandstone fragments; medium acid; clear wavy boundary.

B3—21 to 27 inches; yellowish brown (10YR 5/4) fine sandy loam; weak coarse subangular blocky structure; friable; few roots; many pores; many sandstone fragments; many grains of grayish green (5G 4/2) glauconite; strongly acid; gradual irregular boundary.

Cr1—27 to 33 inches; yellowish brown (10YR 5/4) soft fine grained platy sandstone; many grains of grayish green (5G 4/2) glauconite; clear smooth boundary.

Cr2—33 to 60 inches; thin interbedded layers of yellowish brown (10YR 5/6) and dark yellowish brown (10YR 4/4) soft fine grained glauconitic sandstone and reddish brown (5YR 4/3) soft siltstone; many grains of grayish green (5G 4/2) glauconite.

Solum thickness ranges from 20 to 40 inches. Reaction ranges from strongly acid to slightly acid in the subsoil and substratum.

The Ap horizon has value of 3 or 4 and chroma of 2 or 3. The A1 horizon ranges from 2 to 4 inches in thickness. It has value of 2 or 3 and chroma of 1 to 3. Some pedons have an A2 horizon. In some pedons the B horizon is fine sandy loam or very fine sandy loam.

Valton series

The Valton series consists of well drained soils on unglaciated uplands. These soils are moderately permeable in the loess mantle and slowly permeable in the cherty clay. They formed in loess and in cherty clay residuum from dolomite. The slope ranges from 2 to 30 percent.

Valton soils are similar to and are near Reedsburg and Wildale soils. Reedsburg soils are somewhat poorly drained. Wildale soils have a thinner loess mantle than Valton soils.

Typical pedon of Valton silt loam, 6 to 12 percent slopes, eroded, in a cultivated field approximately 75 feet south and 950 feet west of the northeast corner NW1/4 sec. 3, T. 11 N., R. 3 E.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam, brown (10YR 5/3) dry; weak fine subangular blocky structure; friable; common roots; few pores; some dark yellowish brown (10YR 4/4) soil mixed in by plowing and in worm channels; few chert fragments; neutral; abrupt smooth boundary.

B1—8 to 11 inches; dark yellowish brown (10YR 4/4) silt loam; moderate fine subangular blocky structure; friable; common roots; common pores; some dark grayish brown (10YR 4/2) soil in worm and root channels; few chert fragments; slightly acid; clear smooth boundary.

B21t—11 to 19 inches; dark yellowish brown (10YR 4/4) silt loam; moderate medium and fine subangular blocky structure; friable; common roots; common pores; thin patchy clay films on faces of peds and in pores and channels; a few chert fragments; strongly acid; gradual wavy boundary.

B22t—19 to 24 inches; brown (7.5YR 4/4) silty clay loam; moderate medium and fine subangular blocky structure; firm; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; thin very pale brown (10YR 7/3 dry) coatings of clean silt grains on faces of some peds; few chert fragments; strongly acid; clear wavy boundary.

IIB23t—24 to 29 inches; reddish brown (5YR 4/4) cherty clay; strong fine angular and subangular blocky structure; very firm; few roots; common pores; thin continuous clay films on faces of peds and in pores and channels; thick very pale brown (10YR 7/3 dry) coatings of clean silt grains and some clean sand grains on faces of many peds; few dark concretions and coatings (iron and manganese oxides); about 25 percent by volume angular chert fragments; very strongly acid; clear wavy boundary.

IIB24t—29 to 60 inches; yellowish red (5YR 4/8) cherty clay; strong very fine angular blocky structure; very firm; few roots; common pores; thick continuous clay films on faces of peds and in pores and channels; very pale brown (10YR 7/3 dry) coatings of clean silt grains on faces of some peds; few dark concretions and coatings (iron and manganese oxides); about 25 percent by volume angular chert fragments; very strongly acid.

Thickness of the solum and the depth to dolomite typically range from 7 to 15 or more feet, but in some pedons the dolomite is as shallow as 5 feet. Thickness of the loess mantle is dominantly 15 to 30 inches but ranges to 40 inches. The content of angular chert fragments is less than 15 percent by volume in the loess and dominantly 15 to 35 percent by volume in the clay residuum. Reaction ranges from strongly acid to neutral in the loess and from very strongly acid to medium acid in the clay residuum.

The A horizon ranges from 6 to 9 inches in thickness. It has value of 2 or 3 and chroma of 1 to 3. Some pedons have an A2 horizon. Some pedons do not have a B1 horizon. The B2t horizon has value of 3 to 5 and chroma of 3 or 4. The IIB horizon has hue of 2.5YR, 5YR or 7.5YR; value of 3 to 7; and chroma of 3 to 8. In some pedons individual layers in the IIB horizon have variegated colors.

Watseka series

The Watseka series consists of somewhat poorly drained, rapidly permeable soils on outwash plains and stream terraces. These soils formed in sandy outwash. The slope is 0 to 2 percent.

Watseka soils are similar to Brems, Sparta, and Sparta variant soils and are near Sparta and Sparta variant soils. Brems soils are moderately well drained and do not have a mollic epipedon. Sparta soils are excessively drained. Sparta variant soils are moderately well drained.

Typical pedon of Watseka loamy sand in a cultivated field approximately 525 feet south and 660 feet west of the center of sec. 1, T. 8 N., R. 3 E.

Ap—0 to 8 inches; very dark gray (10YR 3/1) loamy sand, dark grayish brown (10YR 4/2) dry; weak fine subangular blocky structure; very friable; many roots; neutral; abrupt smooth boundary.

A12—8 to 12 inches; very dark gray (10YR 3/1) loamy sand, dark grayish brown (10YR 4/2) dry; weak medium subangular blocky structure; very friable; common roots; neutral; clear wavy boundary.

B1—12 to 16 inches; dark grayish brown (10YR 4/2) loamy sand; weak medium subangular blocky structure; very friable; few roots; neutral; clear irregular boundary.

B21—16 to 22 inches; grayish brown (2.5Y 5/2) loamy sand; few fine prominent yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; very friable; few roots; some dark grayish brown (10YR 4/2) soil in old root channels; slightly acid; clear wavy boundary.

B22—22 to 29 inches; grayish brown (2.5Y 5/2) loamy sand; many medium and coarse prominent yellowish brown (10YR 5/6 and 5/8) mottles; weak coarse subangular blocky structure; very friable; few roots; slightly acid; clear wavy boundary.

C1—29 to 45 inches; pale brown (10YR 6/3) sand; common fine and medium prominent yellowish brown (10YR 5/6 and 5/8) mottles; single grained; loose; medium acid; clear wavy boundary.

C2—45 to 60 inches; brown (10YR 5/3) sand; common fine, prominent yellowish brown (10YR 5/6) and yellowish red (5YR 4/8) mottles; single grained; loose; medium acid.

Solum thickness ranges from 24 to 36 inches. Reaction ranges from strongly acid to neutral in the subsoil and from medium acid to neutral in the substratum.

The A horizon ranges from 10 to 20 inches in thickness. It has value of 2 or 3 and chroma of 1 or 2. The B horizon has hue of 10YR, 2.5Y, or 5Y; value of 4 to 7; and chroma of 2 to 4. In some pedons the B horizon is sand. The C horizon has colors similar to those of the B horizon.

Wildale series

The Wildale series consists of well drained, slowly permeable soils on unglaciated uplands. These soils formed in a thin layer of loess and in cherty clay residuum from dolomite. The slope ranges from 2 to 20 percent.

Wildale soils are similar to and are near Reedsburg and Valton soils. Reedsburg soils are somewhat poorly drained and have a thicker loess mantle than Wildale soils. Valton soils have a thicker loess mantle than Wildale soils.

Typical pedon of Wildale silt loam, 2 to 6 percent slopes, in a cultivated field approximately 525 feet north and 1,075 feet east of the center of sec. 23, T. 13 N., R. 2 E.

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine subangular blocky structure; friable; common roots; few pores; some brown (7.5YR 4/4) soil in worm channels; few chert fragments; neutral; abrupt smooth boundary.

B1—7 to 9 inches; brown (7.5YR 4/4) silt loam; moderate fine and very fine subangular blocky structure; friable; few roots; common pores; few chert fragments; neutral; abrupt smooth boundary.

IIB21t—9 to 12 inches; reddish brown (5YR 4/4) silty clay; moderate very fine subangular blocky structure; firm; few roots; common pores; thin patchy clay films on faces of peds and in pores and channels; clean very pale brown (10YR 8/3 dry) silt grains coating faces of some peds; about 5 percent by volume chert fragments; slightly acid; clear wavy boundary.

IIB22t—12 to 18 inches; reddish brown (5YR 4/4) cherty clay; strong very fine angular blocky structure; very firm; few roots; few pores; thin continuous clay films on faces of peds and in pores and channels; clean very pale brown (10YR 8/3 dry) silt grains coating faces of a few peds; about 15 percent by volume chert fragments; many fine dark concretions and coatings (iron and manganese oxides); slightly acid; gradual wavy boundary.

IIB23t—18 to 60 inches; yellowish red (5YR 4/8) cherty clay; strong very fine angular blocky structure; very firm; few roots; few pores; many thin and some thick continuous clay films on faces of peds and in pores and channels; about 20 percent by volume chert fragments; many fine dark concretions and coatings (iron and manganese oxides); very strongly acid.

Solum thickness ranges from 7 to 15 feet or more. Thickness of the loess mantle ranges from 5 to 15 inches. The content of angular chert fragments ranges from 2 to 20 percent by volume in the loess and from 15 to 35 percent by volume in the clay residuum. Reaction ranges from very strongly acid to slightly acid in the clayey subsoil.

The A horizon ranges from 6 to 9 inches in thickness. It has value of 2 or 3 and chroma of 1 to 3. Some pedons have an A2 horizon. Some pedons do not have a B1 horizon. The IIB horizon has hue of 2.5YR, 5YR, or 7.5YR; value of 3 to 6; and chroma of 4 to 8. In some pedons individual layers in the IIB horizon have variegated colors.

Wyocena series

The Wyocena series consists of well drained, moderately rapidly permeable soils on till plains and moraines. These soils formed in loamy material and sandy glacial till. The slope ranges from 2 to 30 percent.

Wyocena soils are near Gotham and Plainfield soils. Gotham soils are somewhat excessively drained and have a coarser textured argillic horizon than Wyocena soils. Plainfield soils are excessively drained, do not have an argillic horizon, and have a sandy B horizon.

Typical pedon of Wyocena sandy loam, 6 to 12 percent slopes, eroded, in a cultivated field approximately 1,270 feet north and 200 feet west of the southeast corner of sec. 27, T. 12 N., R. 7 E.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) sandy loam; weak fine granular structure; friable; common roots; few pores; some brown (7.5YR 4/4) soil mixed in by plowing; neutral; abrupt smooth boundary.

B21t—8 to 18 inches; brown (7.5YR 4/4) sandy loam; weak medium subangular blocky structure; friable; few roots; common pores; thin patchy clay films on faces of peds and on pebbles; about 10 percent by volume pebbles; some dark grayish brown (10YR 4/2) soil in worm and root channels; neutral; gradual wavy boundary.

B22t—18 to 24 inches; brown (7.5YR 4/4) sandy loam; weak medium and fine subangular blocky structure; friable; few roots; common pores; thin patchy clay films on faces of peds and on pebbles; about 10 percent by volume pebbles; some dark grayish brown (10YR 4/2) soil in root channels; slightly acid; clear smooth boundary.

B31t—24 to 32 inches; brown (7.5YR 4/4) loamy sand; weak medium and coarse subangular blocky structure; very friable; few roots; clay bridging between sand grains; about 7 percent by volume pebbles; slightly acid; gradual wavy boundary.

B32—32 to 35 inches; brown (7.5YR 4/4) loamy sand; weak coarse subangular blocky structure; very friable; few roots; about 5 percent by volume pebbles; slightly acid; clear smooth boundary.

C1—35 to 46 inches; dark yellowish brown (10YR 4/4) loamy sand; massive; very friable; few roots; about 5 percent by volume pebbles; neutral; gradual wavy boundary.

C2—46 to 60 inches; yellowish brown (10YR 5/4) sand; single grained; loose; about 5 percent by volume pebbles; slight effervescence; mildly alkaline.

Solum thickness ranges from 24 to 44 inches. Reaction ranges from strongly acid to neutral in the upper part of the subsoil and from strongly acid to slightly acid in the lower part.

Some pedons have an A1 horizon that ranges from 2 to 4 inches in thickness. This horizon has value of 2 or 3 and chroma of 1 to 3. Some pedons have an A2 horizon. Also, some pedons have a B1 horizon. The B2t horizon has value of 4 or 5 and chroma of 4 to 6. In some pedons the B2t horizon has thin subhorizons of sandy clay loam or loamy sand. The C horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6.

Formation of the soils

The factors that determine the kind of soil that forms at any given point are a combination of the parent material, the climate under which the soil material has accumulated and weathered, the plant and animal life on and in the soil, the relief, or lay of the land, and the length of time the forces of soil formation have acted on the soil material.

Climate and plant and animal life are active factors of soil formation. They alter the accumulated material and bring about the development of genetically related horizons. The effects of climate and plant and animal life are modified by relief. The parent material also affects the kind of profile that forms and, in extreme cases, determines it almost entirely. Finally, time is needed to change the parent material into a soil. Usually, a long time is required for the development of distinct horizons.

The factors of soil formation are so closely interrelated that few generalizations can be made regarding the effect of any one factor unless conditions are specified for the other four.

Parent material

Parent material, the unconsolidated mass from which a soil forms, largely determines the chemical and mineralogical composition of the soil.

Most of Sauk County is in the unglaciated area of Wisconsin. The upland soils in this part of the county formed in loess or residuum from bedrock or both. Atterberry, Fayette, and Tama soils formed entirely in loess deposits. Baraboo soils formed entirely in loess that is moderately deep over quartzite bedrock. Boone, Eleva, Eleva variant, Elkmound, Norden, and Urne soils formed entirely in sandy or loamy residuum from sandstone bedrock. Gale and La Farge soils formed partly in a loess mantle and partly in sandy or loamy residuum from the underlying sandstone bedrock. Reedsburg, Valton, and Wildale soils formed partly in a loess mantle and partly in clay residuum from dolomite bedrock.

The terrace and bottom land soils in the unglaciated part of the county formed mainly in loess or silty sediment and the underlying outwash. A few of these soils formed in loamy sediment and the underlying outwash, and a few formed entirely in the sandy outwash. Bertrand, Curran, Jackson, Richwood, Rowley, and Toddville soils formed mainly in loess or silty sediment over sandy outwash. Billett, Dakota, Dickinson, Marshan, Shiffer, and Shiffer variant soils formed in loamy sediment over

outwash sand. Brems, Gotham, Granby, Plainfield, Sparta, Sparta variant, and Watseka soils formed in deep sandy outwash deposits.

Many of the bottoms in the unglaciated area of the county are soils that formed entirely or partly in alluvial deposits of recent origin. These deposits, ranging from silty to sandy in texture, were laid down by flood water during periods of stream overflow. Chaseburg soils formed in light-colored recent silty alluvium. Arenzville and Orion soils formed in light-colored recent silty alluvium over an older buried soil. Fluvaquents and Fluvaquents, wet, are alluvial soils that formed in stratified silty, loamy, and sandy alluvium.

Organic matter is the parent material for a number of soils in the county. It consists mainly of sedges, reeds, and grasses in various stages of decomposition. Adrian and Palms soils formed in 16 to 50 inches of organic material over mineral soil material. Houghton soils formed in more than 50 inches of organic material. These soils are in seep areas and depressions in drainageways in the unglaciated area of the county. Organic soils also occur in depressions and glacial lake basins in the glaciated part of the county.

Loess, glacial till, glacial outwash, and lacustrine deposits are the most common parent materials in the glaciated part of Sauk County.

Glacial till is unstratified, unsorted glacial debris of clay, silt, sand, gravel, and boulders. There are two distinct till soil areas in Sauk County. The most extensive has a loess mantle over the till. McHenry, Ringwood, and St. Charles soils are examples of soils that formed in the loess mantle and the underlying gravelly sandy loam till. The other area of till soils lacks a loess mantle and the till is slightly coarser. Wyocena soil, for example, formed entirely in till underlain by loamy sand and sand till.

Glacial outwash is material deposited by water flowing from the melting glacier. The most valuable deposits are stratified sand and gravel. Much of the outwash in this county, however, is sandy and contains little gravel. Fox soils formed in a layer of loamy material underlain by stratified sand and gravel. Billett soils formed in a layer of loamy material and are underlain by outwash sand. Brems, Gotham, and Plainfield soils formed entirely in outwash sand.

Lacustrine deposits in Sauk County consist mostly of stratified silt, silt loam, and silty clay loam but some are stratified silt loam and fine sand or very fine sand. These are sedimentary deposits that were laid down in the still waters of glacial lakes. Briggsville soils formed mostly in the silty clay and silty clay loam lacustrine deposits. Mosel soils formed in a loamy mantle and in the underlying silty clay loam. Rimer and Tustin soils formed in a sandy mantle and the underlying silty clay loam lacustrine deposits. Colwood and Sisson soils formed in a loamy mantle and in the underlying silt loam, fine sand, and very fine sand lacustrine deposits.

Climate

Climate affects soil formation through the moisture and heat it contributes to an environment. It has a direct effect on the weathering of rocks and the alteration of parent material through the mechanical action of freezing and thawing and the chemical action generated by the leaching of water. Climate has an indirect effect through its influence on plant and animal life.

Differences in climate within the survey area are too small to have any great effect on differences in the soils. The area is within a climatic zone, however, where both prairie and woodland vegetation are competing for dominance in the soil-plant regime. Richwood, Dakota, Dickinson, and Sparta soils are representative of soils that formed under grassland vegetation. They have a thick, dark-colored surface layer. Gale, La Farge, and Norden soils formed under woodland vegetation. They lack the thick, dark-colored surface layer.

Plant and animal life

Plants and animals in and on the soil provide organic matter and mix the soil material. They bring plant nutrients from the lower horizons to the upper horizons.

The influence of different kinds of vegetation on the formation of soils is shown by the differences in color between soils that formed under trees and those that formed under prairie grasses. Norden soils, for example, formed under trees. They have a lighter colored or thinner surface layer than those formed under grass, and they are generally more acid. Richwood soils formed under grass. They have a thick, dark-colored surface layer. Soil that formed under grass accumulate more organic matter and retain it longer than soils that formed under trees. The humus contributes to their darker color. Soils that formed where the vegetation is a mixture of trees and grasses generally have characteristics of both woodland and prairie soils.

During the past 125 years, man has influenced the soils by disturbing and altering the natural soil-forming processes. He has altered the original condition of many soils by clearing, burning, and cultivating. He has contributed to accelerated erosion by repeatedly removing the plant cover from terraces and uplands. He has often contributed to loss of organic matter through overcultivation and has reduced the infiltration rate. He has changed the loose porous surface layer to clods through overcultivation and the use of heavy equipment.

Under good management and suitable crop rotations, the soil has not been harmed and crop yields have gradually increased. Additions of animal manure and the growth of grasses, such as bromegrass, have increased the organic-matter content of the surface layer and upper part of the subsoil beyond the level in virgin woodland soils.

Man has altered the natural acidity of the soils by liming. The lime not only has improved plant growth but

also has created a more favorable environment for soil bacteria. The increased bacterial action, in turn, has hastened the decomposition of organic matter that darkens the plow layer of many soils.

Man has also applied fertilizer to increase the supply of plant nutrients. He has grown alfalfa, which with its long taproot transfers calcium and other plant food elements from the lower part of the subsoil and the substratum to the surface layer.

Man has improved drainage by constructing waterways and building water control structures. Draining the wetlands has permitted cultivation of many high-potential soils but has contributed to a general lowering of the water table throughout the area.

Man's activity is evident in areas where the surface layer is now mostly brown subsoil exposed by erosion. This soil loss is also apparent in the over-thickened surface layer on foot slopes and along natural drainageways, where sediments washed from the surrounding soils are 2 to 3 feet thick or more. Arenzville and Orion soils formed in alluvial sediments over older buried soils.

Other changes caused by man's manipulation of the soil and landscape include the tendency towards more flash flooding where woodland cover is removed from the more sloping soils of the watershed; the rapid filling of lakes and reservoirs with sediments; the contamination of ground water with sewage effluent and fertilizer elements, especially nitrates; and the general effect of pesticides on soil organisms and ground water. All of man's activities affect the soil in some way, but some of the changes will not be evident for many years.

Relief

The hills, valleys, benches, and plains of Sauk County are the result of wind, rain, running water, glacial ice, and glacial melt water. Where bedrock controls the topography, the resistance or lack of resistance of the underlying rocks has determined the relief. Relief, in turn, influences soil formation by controlling drainage, runoff, and other direct or indirect effects of water, including erosion. In many places the relief of a given soil can be correlated closely with the drainage, the thickness and organic-matter content of the A1 horizon, the thickness of the solum, and the differentiation of horizons in the soil profile.

In Sauk County the surface layer is generally light colored on the more sloping soils and successively darker colored and thicker on the more gently sloping soils and in areas where the slope changes from convex to concave. Runoff is slower where the slopes are more gentle, and consequently more water soaks into the soil. As a result, plants grow better on the more gentle slopes and more organic matter accumulates in the A1 horizon.

Drainage characteristics are generally reflected in the color, degree, and kind of mottling or gleying in the soil profile. The well drained McHenry, Norden, and St. Charles soils are free of mottles throughout the solum. The moderately well drained Brems, Jackson, and Toddville soils have mottles in the lower part of the B horizon.

Curran, Rowley, and Shiffer soils are representative of the somewhat poorly drained soils in the county. They are mottled throughout the B and C horizons. Colwood, Ettrick, and Marshan soils are representative of the poorly drained and very poorly drained soils. They are generally mottled in the A horizon and gleyed in the B and C horizons.

Time

Time has had some effect on differences among the soils of the survey areas. Soils of the flood plains, for example, do not have distinct horizons, because the soil material has not been in place long enough for the soil-forming processes to take full effect. In soils, such as the Arenzville and Orion, along natural drainageways, new material is added to the surface from time to time and covers an older soil. This material has not been in place long enough for distinct horizons to have formed. Well drained soils that formed in glacial till and in loess, on the other hand, have well defined horizons as the result of processes that have been active for thousands of years.

References

(1) American Association of State Highway [and Transportation] Officials. 1970. Standard specifications for highway materials and methods of sampling and testing. Ed. 10, 2 vol., illus.

(2) American Society for Testing and Materials. 1974. Method for classification of soils for engineering purposes. ASTM Stand. D 2487-69. *In* 1974 Annual Book of ASTM Standards, Part 19, 464 pp., illus.

(3) Black, R. F., I. W. D. Dalziel, R. H. Dott, Jr., and J. H. Zimmerman. 1970. Geology of the Baraboo District Wisconsin. Inf. Circ. 14, Geol. and Nat. Hist. Surv., p. 7, illus.

(4) Hindall, S. M. and R. G. Borman. 1974. Water resources of Wisconsin: Lower Wisconsin River Basin. U.S. Dep. Inter., Geol. Surv. Hydrol. Invest. Atlas HA-479.

(5) Ostrom, Meredith E. 1967. Paleozoic stratigraphic nomenclature for Wisconsin. Univ. Wis. Geol. and Nat. Hist. Surv. Inf. Circ. 8, 1 page, illus.

(6) Shaw, Samuel P. and C. Gordon Fredine. 1956. Wetlands of the United States. U.S. Dep. Inter., Fish and Wildl. Serv. Circ. 39, 67 pp., illus.

(7) United States Department of Agriculture. 1951. Soil survey manual. U.S. Dep. Agric. Handb. 18, 503 pp., illus. [Supplements replacing pp. 173-188 issued May 1962]

(8) United States Department of Agriculture. 1961. Land capability classification. U.S. Dep. Agric. Handb. 210, 21 pp.

(9) United States Department of Agriculture. 1975. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. Soil Conserv. Serv., U.S. Dep. Agric. Handb. 436, 754 pp., illus.

Glossary

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

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—

	Inches
Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	More than 12

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Blowout. A shallow depression from which all or most of the soil material has been removed by wind. A blowout has a flat or irregular floor formed by a resistant layer or by an accumulation of pebbles or cobbles. In some blowouts the water table is exposed.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Coarse fragments. Mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter.

Coarse textured soil. Sand or loamy sand.

Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil 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 are somewhat similar in all areas.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Contour stripcropping (or contour farming). Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Depth to rock. Bedrock is too near the surface for the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drain-

age or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically for long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

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 the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes the surface.

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.

Fine textured soil. Sandy clay, silty clay, and clay.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Glacial drift (geology). Pulverized and other rock material transported by glacial ice and then deposited. Also the sorted and unsorted material deposited by streams flowing from glaciers.

Glacial outwash (geology). Gravel, sand, and silt, commonly stratified, deposited by glacial melt water.

Glacial till (geology). Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Glauconite. A name applied to a group of green minerals consisting of hydrous silicates of potassium and iron. It is found in marine sedimentary rocks from the Cambrian age to the present.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.5 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.5 centimeters) in diameter.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

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 upper case letter represents the major horizons. Numbers or lower case 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 at the surface of a mineral soil.

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.

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. The combined A and B horizons are generally called the solum, or true soil. If a soil does not have a B horizon, the A horizon alone is the solum.

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 A or B horizon. 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, the Roman numeral II precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Lacustrine deposit (geology). Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

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.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous areas. Areas that have little or no natural soil and support little or no vegetation.

Moraine (geology). An accumulation of earth, stones, and other debris deposited by a glacier. Some types are terminal, lateral, medial, and ground.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Muck. Dark colored, finely divided, well decomposed organic soil material.

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. A general term for plant and animal material in or on the soil, in all stages of decomposition. Readily decomposed organic matter is often distinguished from the more stable forms that have

already passed through the stage of rapid decomposition. Also see *Humus*.

	Percent
Very low	Less than 0.5
Low	0.5 to 1.0
Moderately low	1.0 to 2.0
Moderate	2.0 to 4.0
High	4.0 to 8.0
Very high	More than 8.0

Outwash, glacial. Stratified sand and gravel produced by glaciers and carried, sorted, and deposited by glacial melt water.

Outwash plain. A landform of mainly sandy or coarse textured material of glaciofluvial origin. An outwash plain is commonly smooth; where pitted, it is generally low in relief.

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 downward movement of water through the soil.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.20 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. For example, slope, differences in slope, stoniness, and thickness.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

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 degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	Below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly 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

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called groundwater runoff or seepage flow from ground water.

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-size particles.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by the horizontal distance, then multiplied by 100. Thus a slope of 20 percent is a drop of 20 feet

in 100 feet of horizontal distance. Slope groups for most soils are as follows:

	Percent
Nearly level	0 to 2
Gently sloping	2 to 6
Sloping	6 to 12
Moderately steep	12 to 20
Steep	20 to 30
Very steep	More than 30

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.

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 and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

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

Stripcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

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."

Terminal moraine. A belt of thick glacial drift that generally marks the termination of important glacial advances.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that it can soak into the soil or flow slowly to a prepared outlet without harm. A terrace in a field is generally 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, silt loam, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay.* The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Till plain. An extensive flat to undulating area underlain by glacial till.

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 (geology). Land at a higher elevation in general, than the alluvial plain or stream terrace; land above the low lands along streams.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new series name, but occurring in such a limited geographic area that creation of a new series is not justified.

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.

TABLES

TABLE 1.--TEMPERATURE AND PRECIPITATION

[All data from Richland Center, Wisconsin. Based on records 1930-59]

Month	Temperature				Precipitation				
	Average daily maximum	Average daily minimum	2 years in 10 will have monthly average of at least: Maximum temperature equal to or higher than--	2 years in 10 will have monthly average of at least: Minimum temperature equal to or lower than--	Average monthly total	1 year in 10 will have-- Less than--	1 year in 10 will have-- More than--	Days with 0.1 inch or more	Average precipitation in the form of snow and sleet
	°F	°F	°F	°F	In	In	In		In
January---	29.3	9.4	25	14	1.14	0.38	2.16	3	9.3
February--	33.2	12.5	27	20	1.10	0.17	2.28	3	6.3
March-----	43.4	22.6	37	29	2.07	0.71	3.52	6	9.9
April-----	59.9	34.9	51	45	2.58	0.95	5.20	5	0.7
May-------	72.0	46.0	62	57	3.45	1.14	4.76	8	0.2
June------	80.7	56.4	71	66	5.01	2.85	8.15	8	0
July------	86.1	60.0	74	71	3.75	1.04	8.11	5	0
August----	84.0	58.3	73	70	3.73	0.95	8.16	6	0
September-	75.5	49.8	65	61	3.70	0.79	7.34	6	0
October---	63.9	38.8	54	48	2.30	0.46	5.60	5	0.2
November--	45.5	26.2	39	33	2.19	0.52	4.18	5	2.5
December--	32.5	15.4	27	20	1.21	0.41	2.05	4	7.1
Year---	58.8	35.9	74	14	32.23	22.77	41.28	64	36.2

TABLE 2.--FREEZE DATES IN SPRING AND FALL

[All data from Richland Center, Wisconsin. Based on records 1930-59]

Probability	Temperature				
	16° F or lower	20° F or lower	24° F or lower	28° F or lower	32° F or lower
Spring:					
2 years in 10 later than--	Apr. 3	Apr. 14	Apr. 29	May 11	May 19
4 years in 10 later than--	Mar. 27	Apr. 7	Apr. 21	May 4	May 12
6 years in 10 later than--	Mar. 21	Mar. 31	Apr. 15	Apr. 28	May 6
8 years in 10 later than--	Mar. 13	Mar. 23	Apr. 7	Apr. 21	Apr. 30
Fall:					
2 years in 10 earlier than	Nov. 4	Oct. 23	Oct. 13	Sept. 28	Sept. 19
4 years in 10 earlier than	Nov. 12	Oct. 31	Oct. 20	Oct. 6	Sept. 25
6 years in 10 earlier than	Nov. 19	Nov. 6	Oct. 27	Oct. 12	Oct. 2
8 years in 10 earlier than	Nov. 26	Nov. 14	Nov. 4	Oct. 20	Oct. 9

TABLE 3.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
Ad	Adrian muck	1,460	0.3
ArA	Arenzville silt loam, 0 to 3 percent slopes	2,400	0.4
AtA	Atterberry silt loam, 0 to 2 percent slopes	220	*
AtB	Atterberry silt loam, 2 to 6 percent slopes	1,275	0.2
BaB	Baraboo silt loam, 2 to 6 percent slopes	2,670	0.5
BaC	Baraboo silt loam, 6 to 12 percent slopes	1,980	0.4
BbC	Baraboo stony silt loam, 2 to 12 percent slopes	11,745	2.2
BbD	Baraboo stony silt loam, 12 to 30 percent slopes	8,390	1.5
BcE	Baraboo-Rock outcrop complex, 12 to 60 percent slopes	2,280	0.4
BdB	Baraboo Variant stony silt loam, 1 to 6 percent slopes	865	0.2
BeB	Bertrand silt loam, 2 to 6 percent slopes	2,135	0.4
BeC2	Bertrand silt loam, 6 to 12 percent slopes, eroded	695	0.1
BlB	Billett sandy loam, 1 to 6 percent slopes	7,665	1.4
BlC2	Billett sandy loam, 6 to 12 percent slopes, eroded	2,040	0.4
BlD2	Billett sandy loam, 12 to 20 percent slopes, eroded	480	0.1
BmA	Billett fine sandy loam, moderately well drained, 0 to 3 percent slopes	1,915	0.4
BoB	Boone sand, 2 to 6 percent slopes	3,225	0.6
BoC	Boone sand, 6 to 12 percent slopes	3,455	0.6
BoD	Boone sand, 12 to 30 percent slopes	3,380	0.6
BrA	Brems loamy sand, 0 to 3 percent slopes	2,135	0.4
BtB	Briggsville silt loam, 2 to 6 percent slopes	2,650	0.5
ChA	Chaseburg silt loam, 0 to 3 percent slopes	3,460	0.6
Co	Colwood loam	885	0.2
CuA	Curran silt loam, 0 to 3 percent slopes	9,020	1.7
DaA	Dakota loam, 0 to 2 percent slopes	4,185	0.8
DaB	Dakota loam, 2 to 6 percent slopes	2,150	0.4
DeA	Dells silt loam, 0 to 3 percent slopes	1,010	0.2
DkB	Dickinson sandy loam, 1 to 6 percent slopes	8,645	1.6
DkC	Dickinson sandy loam, 6 to 12 percent slopes	400	0.1
ElB	Eleva sandy loam, 2 to 6 percent slopes	4,455	0.8
ElC2	Eleva sandy loam, 6 to 12 percent slopes, eroded	3,415	0.6
ElD2	Eleva sandy loam, 12 to 20 percent slopes, eroded	3,760	0.7
ElE	Eleva sandy loam, 20 to 30 percent slopes	5,060	0.9
EmA	Eleva Variant sandy loam, 0 to 3 percent slopes	2,180	0.4
EnB	Elkmound sandy loam, 2 to 6 percent slopes	1,165	0.2
EnC	Elkmound sandy loam, 6 to 12 percent slopes	385	0.1
EnD	Elkmound sandy loam, 12 to 20 percent slopes	300	0.1
Et	Ettrick silt loam	14,990	2.7
FaB	Fayette silt loam, 2 to 6 percent slopes	6,250	1.1
FaC2	Fayette silt loam, 6 to 12 percent slopes, eroded	9,350	1.7
FaD2	Fayette silt loam, 12 to 20 percent slopes, eroded	2,200	0.4
Fu	Fluvaquents	6,340	1.2
Fw	Fluvaquents, wet	16,740	3.1
FxB	Fox loam, 2 to 6 percent slopes	1,295	0.2
FxC2	Fox loam, 6 to 15 percent slopes, eroded	390	0.1
GaB	Gale silt loam, 2 to 6 percent slopes	2,625	0.5
GaC2	Gale silt loam, 6 to 12 percent slopes, eroded	7,160	1.3
GaD2	Gale silt loam, 12 to 20 percent slopes, eroded	8,150	1.5
GaE	Gale silt loam, 20 to 30 percent slopes	2,485	0.5
GoB	Gotham loamy sand, 1 to 6 percent slopes	8,595	1.6
GoC	Gotham loamy sand, 6 to 12 percent slopes	2,640	0.4
GoD	Gotham loamy sand, 12 to 25 percent slopes	1,080	0.2
Gr	Granby loamy sand	1,565	0.3
Gv	Granby Variant loamy sand	1,780	0.3
Ho	Houghton muck	4,800	0.9
JaA	Jackson silt loam, 0 to 2 percent slopes	1,835	0.3
JaB	Jackson silt loam, 2 to 6 percent slopes	6,110	1.1
KlA	Kendall silt loam, 0 to 3 percent slopes	570	0.1
LfB	La Farge silt loam, 2 to 6 percent slopes	1,580	0.3
LfC2	La Farge silt loam, 6 to 12 percent slopes, eroded	12,400	2.3
LfD2	La Farge silt loam, 12 to 20 percent slopes, eroded	31,285	5.6
LfE	La Farge silt loam, 20 to 30 percent slopes	12,235	2.2
Mc	Marshan loam	3,075	0.6
MdB	McHenry silt loam, 2 to 6 percent slopes	3,875	0.7
MdC2	McHenry silt loam, 6 to 12 percent slopes, eroded	7,055	1.3
MdD2	McHenry silt loam, 12 to 20 percent slopes, eroded	5,760	1.1
MdE	McHenry silt loam, 20 to 30 percent slopes	2,770	0.5

See footnote at end of table.

TABLE 3.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Acres	Percent
MsA	Mosel loam, 0 to 3 percent slopes	1,320	0.2
NlB	Norden loam, 2 to 6 percent slopes	2,135	0.4
NlC2	Norden loam, 6 to 12 percent slopes, eroded	1,525	0.3
NlD2	Norden loam, 12 to 20 percent slopes, eroded	5,430	1.0
NlE	Norden loam, 20 to 30 percent slopes	17,730	3.3
NrE	Norden and Eleva soils and Rock outcrop, 12 to 60 percent slopes	59,000	10.7
Or	Orion silt loam	4,860	0.9
Os	Ossian silt loam	1,220	0.2
Pa	Palms muck	2,255	0.4
PcA	Pillot silt loam, 0 to 2 percent slopes	1,715	0.3
PcB	Pillot silt loam, 2 to 6 percent slopes	720	0.1
Pd	Pits, gravel	540	0.1
Pe	Pits, quarries	400	0.1
PfB	Plainfield loamy sand, 1 to 6 percent slopes	7,645	1.4
PfC	Plainfield loamy sand, 6 to 12 percent slopes	4,765	0.9
PfD	Plainfield loamy sand, 12 to 30 percent slopes	2,595	0.5
RbB	Reedsburg silt loam, 2 to 6 percent slopes	4,160	0.8
RhA	Richwood silt loam, 0 to 2 percent slopes	2,515	0.5
RhB	Richwood silt loam, 2 to 6 percent slopes	2,320	0.4
RmA	Rimer loamy sand, 0 to 3 percent slopes	985	0.2
RnB	Ringwood silt loam, 2 to 6 percent slopes	2,410	0.4
RnC2	Ringwood silt loam, 6 to 12 percent slopes, eroded	420	0.1
Rt	Rock outcrop, quartzite	965	0.2
Ry	Rowley silt loam	1,675	0.3
ScB	St. Charles silt loam, 2 to 6 percent slopes	4,365	0.8
ScC2	St. Charles silt loam, 6 to 12 percent slopes, eroded	3,105	0.6
ScD2	St. Charles silt loam, 12 to 20 percent slopes, eroded	840	0.2
Se	Saprists and Aquents	1,050	0.2
SfA	Shiffer loam, 0 to 3 percent slopes	1,605	0.3
ShA	Shiffer Variant sandy loam, 0 to 3 percent slopes	1,395	0.3
SnB	Sisson loam, 2 to 6 percent slopes	1,280	0.2
SpB	Sparta loamy sand, 1 to 6 percent slopes	6,030	1.1
SpC	Sparta loamy sand, 6 to 12 percent slopes	350	0.1
St	Sparta Variant loamy sand	1,655	0.3
TaA	Tama silt loam, 0 to 2 percent slopes	500	0.1
TaB	Tama silt loam, 2 to 6 percent slopes	1,710	0.3
TaC2	Tama silt loam, 6 to 12 percent slopes, eroded	310	0.1
TeA	Tell silt loam, 0 to 2 percent slopes	260	*
TeB	Tell silt loam, 2 to 6 percent slopes	1,355	0.2
TeC2	Tell silt loam, 6 to 12 percent slopes, eroded	840	0.2
TeD2	Tell silt loam, 12 to 20 percent slopes, eroded	420	0.1
TvA	Toddville silt loam, 0 to 2 percent slopes	3,170	0.6
TvB	Toddville silt loam, 2 to 6 percent slopes	2,110	0.4
TwB	Tustin loamy sand, 1 to 6 percent slopes	845	0.2
UfB	Urne fine sandy loam, 2 to 6 percent slopes	2,065	0.4
UfC2	Urne fine sandy loam, 6 to 12 percent slopes, eroded	1,190	0.2
UfD2	Urne fine sandy loam, 12 to 20 percent slopes, eroded	1,315	0.2
UfE	Urne fine sandy loam, 20 to 30 percent slopes	2,600	0.5
VaB	Valton silt loam, 2 to 6 percent slopes	11,010	2.0
VaC2	Valton silt loam, 6 to 12 percent slopes, eroded	23,480	4.3
VaD2	Valton silt loam, 12 to 20 percent slopes, eroded	18,635	3.4
VaE	Valton silt loam, 20 to 30 percent slopes	1,590	0.3
Wt	Watseka loamy sand	670	0.1
WwB	Wildale silt loam, 2 to 6 percent slopes	460	0.1
WwC2	Wildale silt loam, 6 to 12 percent slopes, eroded	615	0.1
WwD2	Wildale silt loam, 12 to 20 percent slopes, eroded	220	*
WxB	Wyocena sandy loam, 2 to 6 percent slopes	3,550	0.7
WxC2	Wyocena sandy loam, 6 to 12 percent slopes, eroded	4,150	0.8
WxD2	Wyocena sandy loam, 12 to 20 percent slopes, eroded	2,270	0.4
WxE	Wyocena sandy loam, 20 to 30 percent slopes	1,075	0.2
	Water	6,725	1.2
	Total	544,640	100.0

* Less than 0.1 percent.

TABLE 4.--YIELDS PER ACRE OF CROPS AND PASTURE

[All yields were estimated for a high level of management. Absence of a yield figure indicates the crop is seldom grown or is not suited]

Soil name and map symbol	Corn	Corn silage	Oats	Grass-legume hay	Kentucky bluegrass	Soybeans
	Bu	Ton	Bu	Ton	AUM*	Bu
Ad---------- Adrian	100	20	70	---	3.0	35
ArA---------- Arenzville	120	20	80	5.0	5.0	40
AtA---------- Atterberry	130	22	80	5.0	5.0	45
AtB---------- Atterberry	125	20	75	5.0	5.0	40
BaB---------- Baraboo	100	18	75	4.5	3.6	36
BaC---------- Baraboo	100	16	70	4.3	3.4	34
BbC---------- Baraboo	---	---	---	---	3.0	---
BbD---------- Baraboo	---	---	---	---	2.4	---
BcE---------- Baraboo	---	---	---	---	---	---
BdB---------- Baraboo variant	---	---	---	---	3.5	---
BeB---------- Bertrand	125	21	80	5.5	4.0	42
BeC2---------- Bertrand	115	19	75	5.5	4.0	37
BlB---------- Billett	84	12	65	4.0	3.0	28
BlC2---------- Billett	72	10	54	3.0	2.5	22
BlD2---------- Billett	---	---	44	2.8	2.2	---
BmA---------- Billett	80	13	65	4.0	3.5	28
BoB---------- Boone	---	---	30	1.5	1.5	---
BoC---------- Boone	---	---	25	1.5	1.5	---
BoD---------- Boone	---	---	---	---	1.0	---
BrA---------- Brems	50	9	45	2.3	2.3	24
BtB---------- Briggsville	100	18	75	5.0	4.3	35

See footnote at end of table.

TABLE 4.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn	Corn silage	Oats	Grass-legume hay	Kentucky bluegrass	Soybeans
	Bu	Ton	Bu	Ton	AUM*	Bu
ChA---------- Chaseburg	130	22	80	5.5	5.0	42
Co---------- Colwood	110	18	75	4.5	4.0	38
CuA---------- Curran	115	19	80	5.0	5.0	38
DaA---------- Dakota	90	15	70	4.0	3.0	32
DaB---------- Dakota	85	12	65	4.0	3.0	30
DeA---------- Dells	90	15	75	4.5	4.0	32
DkB---------- Dickinson	81	12	65	4.0	3.3	31
DkC---------- Dickinson	67	10	55	3.5	2.8	25
ElB---------- Eleva	75	12	65	4.0	3.3	27
ElC2---------- Eleva	75	12	65	4.0	3.0	22
ElD2---------- Eleva	65	11	60	4.0	2.7	20
ElE---------- Eleva	---	---	40	3.5	2.4	---
EmA---------- Eleva variant	75	11	65	4.0	3.3	27
EnB---------- Elkmound	65	12	60	3.0	3.3	24
EnC---------- Elkmound	55	9	55	2.5	2.8	20
EnD---------- Elkmound	---	---	50	2.5	2.8	---
Et---------- Ettrick	140	24	85	5.5	5.0	45
FaB---------- Fayette	130	24	90	5.5	5.0	43
FaC2---------- Fayette	120	20	80	5.5	4.5	38
FaD2---------- Fayette	100	16	67	5.0	4.0	32
Fu**, Fw**. Fluvaquents						
FxB---------- Fox	95	15	75	4.5	4.0	30
FxC2---------- Fox	90	14	65	4.0	3.5	28

See footnote at end of table.

TABLE 4.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn	Corn silage	Oats	Grass-legume hay	Kentucky bluegrass	Soybeans
	Bu	Ton	Bu	Ton	AUM*	Bu
GaB---- Gale	95	16	75	4.5	4.0	34
GaC2---- Gale	90	15	75	4.5	4.0	32
GaD2---- Gale	80	13	65	4.0	3.6	28
GaE---- Gale	---	---	---	3.5	2.8	---
GoB, GoC---- Gotham	65	11	60	3.0	3.0	25
GoD---- Gotham	---	---	---	2.0	2.5	---
Gr---- Granby	75	10	55	3.0	3.0	26
Gv---- Granby variant	75	14	65	3.5	3.0	---
Ho---- Houghton	120	20	70	---	3.6	40
JaA---- Jackson	120	20	80	5.5	5.0	40
JaB---- Jackson	120	20	80	5.5	5.0	40
KlA---- Kendall	130	22	80	5.5	5.0	43
LfB---- La Farge	95	16	75	4.5	4.0	35
LfC2---- La Farge	90	15	70	4.5	4.0	32
LfD2---- La Farge	80	12	55	4.5	3.7	30
LfE---- La Farge	---	---	45	3.5	3.3	---
Mc---- Marshan	85	13	70	---	4.0	32
MdB---- McHenry	110	18	80	5.0	4.0	38
MdC2---- McHenry	100	16	75	4.5	3.6	34
MdD2---- McHenry	90	15	65	4.0	3.0	30
MdE---- McHenry	---	---	50	3.5	2.5	---
MsA---- Mosel	115	19	75	5.0	4.7	38
NlB---- Norden	90	16	75	4.5	4.0	33

See footnote at end of table.

TABLE 4.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn	Corn silage	Oats	Grass-legume hay	Kentucky bluegrass	Soybeans
	Bu	Ton	Bu	Ton	AUM*	Bu
NlC2---------- Norden	85	14	70	4.5	4.0	30
NlD2---------- Norden	75	12	60	4.5	3.8	27
NlE---------- Norden	---	---	50	4.0	3.3	---
NrE---------- Norden	---	---	---	---	---	---
Or---------- Orion	110	18	75	4.5	4.0	36
Os---------- Ossian	135	22	80	---	4.6	42
Pa---------- Palms	110	17	70	---	3.3	34
PcA---------- Pillot	95	15	70	4.5	4.0	32
PcB---------- Pillot	92	15	70	4.5	4.0	30
Pd**, Pe**. Pits						
PfB, PfC---------- Plainfield	45	7	45	2.5	2.3	18
PfD---------- Plainfield	---	---	35	2.0	2.0	---
RbB---------- Reedsburg	100	17	70	4.5	4.3	34
RhA---------- Richwood	130	21	80	5.5	5.0	40
RhB---------- Richwood	130	21	80	5.5	5.0	40
RmA---------- Rimer	75	12	65	4.0	4.0	26
RnB---------- Ringwood	105	17	75	4.6	4.0	39
RnC2---------- Ringwood	100	15	69	4.5	4.0	35
Rt**. Rock outcrop						
Ry---------- Rowley	135	23	80	5.5	4.6	44
ScB---------- St. Charles	112	19	80	5.0	4.0	38
ScC2---------- St. Charles	100	16	75	4.5	3.7	35
ScD2---------- St. Charles	90	13	65	4.0	3.0	30
Se---------- Saprists	---	---	---	---	---	---

See footnote at end of table.

TABLE 4.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn	Corn silage	Oats	Grass-legume hay	Kentucky bluegrass	Soybeans
	Bu	Ton	Bu	Ton	AUM*	Bu
SfA---- Shiffer	80	12	75	4.0	3.6	30
ShA---- Shiffer variant	70	10	50	2.5	3.5	---
SnB---- Sisson	100	17	80	5.0	4.3	35
SpB---- Sparta	55	8	50	2.5	2.0	26
SpC---- Sparta	---	---	40	2.5	2.0	---
St---- Sparta variant	55	8	50	2.5	2.0	26
TaA---- Tama	140	24	85	5.3	5.0	45
TaB---- Tama	140	24	85	5.2	5.0	45
TaC2---- Tama	120	20	80	4.7	4.5	40
TeA---- Tell	90	15	75	4.5	4.0	32
TeB---- Tell	90	15	75	4.0	4.0	32
TeC2---- Tell	85	13	70	3.5	4.0	30
TeD2---- Tell	80	12	65	3.0	3.7	27
TvA---- Toddville	135	21	80	5.5	5.0	44
TvB---- Toddville	130	20	70	5.5	5.0	44
TwB---- Tustin	70	11	60	4.0	3.5	24
UfB---- Urne	75	12	75	4.0	3.5	30
UfC2---- Urne	70	11	70	4.0	3.2	28
UfD2---- Urne	50	10	50	3.0	3.0	24
UfE---- Urne	---	---	40	2.7	2.8	---
VaB---- Valton	100	20	75	5.0	4.0	38
VaC2---- Valton	95	18	70	4.5	4.0	34
VaD2---- Valton	80	12	50	3.0	3.3	30
VaE---- Valton	---	---	40	2.5	3.0	---

See footnote at end of table.

TABLE 4.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn	Corn silage	Oats	Grass-legume hay	Kentucky bluegrass	Soybeans
	Bu	Ton	Bu	Ton	AUM*	Bu
Wt---------- Watseka	60	10	60	3.4	3.0	28
WwB---------- Wildale	90	14	80	4.8	3.6	30
WwC2---------- Wildale	85	13	75	4.5	3.6	28
WwD2---------- Wildale	75	11	65	4.2	3.0	24
WxB---------- Wyocena	75	13	60	3.5	3.0	27
WxC2---------- Wyocena	70	12	60	3.5	3.0	25
WxD2---------- Wyocena	---	---	50	3.0	3.0	---
WxE---------- Wyocena	---	---	---	2.5	2.5	---

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.
** See map unit description for composition and behavior characteristics of the map unit.

TABLE 5.--CAPABILITY CLASSES AND SUBCLASSES

[Miscellaneous areas are excluded. Dashes mean no acreage]

Class	Total acreage	Major management concerns (Subclass)		
		Erosion (e)	Wetness (w)	Soil problem (s)
		Acres	Acres	Acres
I	8,020	---	---	---
II	119,120	70,110	42,850	6,160
III	119,365	99,630	19,735	---
IV	117,265	84,520	3,695	29,050
V	16,740	---	16,740	---
VI	139,740	105,015	---	34,725
VII	14,710	8,735	---	5,975
VIII	1,050	---	1,050	---

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed in this table. Absence of an entry in a column means the information was not available]

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	
Ad---------- Adrian	3w	Slight	Severe	Severe	Severe	Tamarack---------- Red maple---------- Silver maple-------- White ash---------- Quaking aspen------- Green ash----------	45 --- --- 51 --- ---	
ArA---------- Arenzville	2o	Slight	Slight	Slight	Slight	Northern red oak---- White oak---------- Red maple----------	65 --- ---	Red pine, eastern white pine, white spruce.
AtA, AtB---------- Atterberry	2o	Slight	Slight	Slight	Slight	Northern red oak---- White oak---------- Silver maple-------- White ash---------- Green ash----------	65 65 90 65 65	Eastern white pine, red pine, Norway spruce, white spruce.
BaB, BaC---------- Baraboo	2o	Slight	Slight	Slight	Slight	Northern red oak---- White ash---------- American basswood--- White oak---------- Red maple---------- Shagbark hickory----	65 --- --- --- --- ---	Red pine, eastern white pine, white spruce.
BbC---------- Baraboo	2o	Slight	Slight	Slight	Slight	Northern red oak---- White ash---------- American basswood--- White oak---------- Red maple----------	65 --- --- --- ---	Red pine, eastern white pine, white spruce.
BbD---------- Baraboo	2r	Moderate	Moderate	Moderate	Slight	Northern red oak---- White ash---------- American basswood--- White oak---------- Red maple----------	65 --- --- --- ---	Red pine, eastern white pine, white spruce.
BcE*: Baraboo---------- Rock outcrop.	2r	Moderate	Moderate	Moderate	Slight	Northern red oak---- White ash---------- American basswood--- White oak---------- Red maple----------	65 --- --- --- ---	Red pine, eastern white pine, white spruce.
BdB---------- Baraboo variant	3o	Slight	Moderate	Slight	Slight	Northern red oak---- Red maple---------- Silver maple-------- White ash---------- Green ash---------- Quaking aspen-------	60 --- --- --- --- ---	Red maple, silver maple, white ash, green ash.
BeB, BeC2---------- Bertrand	1o	Slight	Slight	Slight	Slight	Northern red oak---- White ash---------- White oak---------- Bur oak---------- Black walnut--------	70+ --- --- --- ---	Red pine, eastern white pine, white spruce, black walnut.
BlB, BlC2---------- Billett	3o	Slight	Slight	Slight	Slight	Northern red oak---- Black oak---------- White oak---------- Northern pin oak---- Black cherry-------- Shagbark hickory----	60 --- --- --- --- ---	Red pine, eastern white pine, white spruce, Norway spruce.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	
BlD2--Billett	3r	Moderate	Moderate	Slight	Slight	Northern red oak White oak Black oak Northern pin oak Shagbark hickory	60 --- --- --- ---	Red pine, eastern white pine, white spruce, Norway spruce.
BmA--Billett	3o	Slight	Slight	Slight	Slight	Northern red oak White oak Black oak Northern pin oak Black cherry Shagbark hickory	60 --- --- --- --- ---	Red pine, eastern white pine, white spruce, Norway spruce.
BoB, BoC--Boone	4s	Slight	Slight	Severe	Slight	Jack pine Northern pin oak Black oak	49 --- ---	Red pine, jack pine.
BoD--Boone	4s	Moderate	Severe	Severe	Slight	Jack pine Northern pin oak Black oak	49 --- ---	Red pine, jack pine.
BrA--Brems	3s	Slight	Slight	Moderate	Slight	Northern pin oak Black oak White oak Eastern white pine Jack pine Red pine	59 --- --- --- --- ---	Eastern white pine, red pine, jack pine, black walnut.
BtB--Briggsville	2c	Slight	Slight	Moderate	Slight	Northern red oak Sugar maple White ash American basswood	65 60 65 65	Eastern white pine, white spruce, black spruce.
ChA--Chaseburg	2o	Slight	Slight	Slight	Slight	Northern red oak Sugar maple American basswood	65 --- ---	Red pine, eastern white pine, white spruce.
Co--Colwood	1w	Slight	Severe	Severe	Severe	White ash Red maple Northern red oak Silver maple Green ash	71 --- --- --- ---	White spruce, eastern white pine.
CuA--Curran	3o	Slight	Slight	Slight	Slight	Red maple White ash Quaking aspen	55 --- ---	White spruce, white ash, red maple.
DeA--Dells	3o	Slight	Slight	Slight	Slight	Silver maple Northern red oak White ash	80 55 ---	Silver maple, white ash, white spruce.
DkB, DkC--Dickinson	3o	Slight	Slight	Slight	Slight	Jack pine Northern pin oak	55 ---	Eastern white pine, red pine, jack pine.
ElB, ElC2--Eleva	4o	Slight	Slight	Slight	Slight	Black oak Jack pine Northern red oak Northern pin oak	45 --- --- ---	Jack pine, red pine, eastern white pine.
ElD2, ElE--Eleva	4r	Moderate	Moderate	Moderate	Slight	Black oak Jack oak Northern red oak	45 --- ---	Jack pine, red pine, eastern white pine.
EmA--Eleva variant	3o	Slight	Slight	Slight	Slight	Northern red oak Black oak Bur oak White oak Northern pin oak Black cherry Shagbark hickory	55 55 --- --- --- --- ---	Red pine, eastern white pine, white spruce.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	
EnB, EnC---------- Elkmound	4d	Slight	Slight	Moderate	Moderate	Northern red oak----	46	Red pine, jack pine, eastern redcedar.
						Black oak----------	---	
						White oak----------	---	
EnD---------- Elkmound	4d	Severe	Moderate	Moderate	Moderate	Northern red oak----	46	Red pine, jack pine, eastern redcedar.
						Black oak----------	---	
						White oak----------	---	
Et---------- Ettrick	4w	Slight	Severe	Severe	Moderate	Silver maple--------	80	Silver maple, red maple, white ash, green ash, white spruce.
						Green ash----------	---	
						American basswood---	---	
						Red maple----------	---	
						Northern red oak----	---	
FaB, FaC2---------- Fayette	1o	Slight	Slight	Slight	Slight	Northern red oak----	71	Eastern white pine, red pine, white spruce, black walnut.
						White oak----------	---	
						Sugar maple---------	---	
FaD2---------- Fayette	1r	Moderate	Moderate	Slight	Slight	Northern red oak----	71	Eastern white pine, red pine, white spruce, black walnut.
						White oak----------	---	
						Sugar maple---------	---	
FxB, FxC2---------- Fox	2o	Slight	Slight	Slight	Slight	Northern red oak----	65	Red pine, eastern white pine, white spruce, Norway spruce.
						White oak----------	---	
						Sugar maple---------	---	
GaB, GaC2---------- Gale	2o	Slight	Slight	Slight	Slight	Northern red oak----	65	Red pine, eastern white pine, white spruce.
						Sugar maple---------	---	
						White oak----------	---	
GaD2, GaE---------- Gale	2r	Moderate	Moderate	Moderate	Slight	Northern red oak----	65	Red pine, eastern white pine, white spruce.
						Sugar maple---------	---	
						White oak----------	---	
GoB, GoC---------- Gotham	3s	Slight	Slight	Moderate	Slight	Red pine-----------	53	Red pine, jack pine, eastern white pine.
						Jack pine----------	---	
						Northern red oak----	---	
GoD---------- Gotham	3s	Moderate	Moderate	Moderate	Slight	Red pine-----------	53	Red pine, jack pine, eastern white pine.
						Jack pine----------	---	
						Northern red oak----	---	
Gr---------- Granby	3w	Slight	Severe	Severe	Severe	Red maple----------	55	Eastern white pine, white spruce, silver maple, white ash.
						Silver maple--------	---	
Gv---------- Granby variant	3w	Slight	Severe	Moderate	Moderate	Red maple----------	55	Silver maple, red maple, white ash, green ash, white spruce, eastern white pine.
						Silver maple--------	80	
						Green ash----------	---	
Ho---------- Houghton	3w	Slight	Severe	Severe	Severe	Tamarack-----------	45	
						Red maple----------	---	
						Silver maple--------	---	
						White ash----------	---	
						Quaking aspen-------	---	
						Green ash----------	---	
						Northern white-cedar	---	
JaA, JaB---------- Jackson	1o	Slight	Slight	Slight	Slight	Northern red oak----	71	Red pine, eastern white pine, white spruce, black walnut.
						White ash----------	---	
						White oak----------	---	
						Bur oak------------	---	
						Black walnut--------	---	
						Sugar maple---------	---	

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	
K1A---------- Kendall	2o	Slight	Slight	Slight	Slight	Northern red oak---- White oak----------	65 ---	White spruce, green ash, eastern white pine, red pine.
LfB, LfC2---------- La Farge	2o	Slight	Slight	Slight	Slight	Northern red oak---- Black oak---------- White oak---------- Shagbark hickory---- American basswood---	65 --- --- --- ---	Eastern white pine, red pine, white spruce.
LfD2, LfE---------- La Farge	2r	Moderate	Moderate	Moderate	Slight	Northern red oak---- Black oak---------- White oak---------- Shagbark hickory---- American basswood---	65 --- --- --- ---	Eastern white pine, red pine.
MdB, MdC2---------- McHenry	2o	Slight	Slight	Slight	Slight	Northern red oak---- White oak---------- Green ash----------	65 --- ---	White spruce, green ash, eastern white pine, red pine.
MdD2, MdE---------- McHenry	2r	Moderate	Moderate	Slight	Slight	Northern red oak---- White oak---------- Green ash---------- Bur oak----------	65 --- --- ---	White spruce, green ash, eastern white pine, red pine.
MsA---------- Mosel	2o	Slight	Slight	Slight	Slight	Northern red oak---- American basswood--- Red maple----------	65 --- ---	Eastern white pine, red pine, white spruce.
N1B, N1C2---------- Norden	2o	Slight	Slight	Slight	Slight	Northern red oak---- Black oak---------- White oak---------- Sugar maple--------- Quaking aspen-------	62 --- --- --- ---	Red pine, eastern white pine, jack pine.
N1D2, N1E---------- Norden	2r	Moderate	Moderate	Moderate	Slight	Northern red oak---- Black oak---------- White oak---------- Sugar maple--------- Quaking aspen-------	62 --- --- --- ---	Red pine, eastern white pine, jack pine.
NrE*: Norden----------	2r	Severe	Severe	Severe	Slight	Northern red oak---- Black oak---------- White oak---------- Sugar maple--------- Quaking aspen-------	62 --- --- --- ---	Red pine, eastern white pine, jack pine.
Eleva----------	4r	Severe	Severe	Severe	Slight	Black oak---------- Jack pine---------- Northern red oak----	45 --- ---	Jack pine, red pine.
Rock outcrop.								
Or---------- Orion	3o	Slight	Slight	Slight	Slight	Northern red oak---- Silver maple-------- Eastern cottonwood-- White ash----------	55 80 --- ---	White spruce, silver maple, white ash.
Os---------- Ossian	3w	Slight	Severe	Severe	Severe	Red maple---------- White ash----------	55 ---	Red maple, white ash, white spruce.

See footnote at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	
Pa Palms	3w	Slight	Severe	Severe	Severe	Tamarack Red maple Silver maple White ash Quaking aspen Northern white-cedar Black ash	45 --- --- --- --- --- ---	
PfB, PfC Plainfield	3s	Slight	Slight	Severe	Slight	Red pine Eastern white pine Jack pine Northern pin oak	55 --- --- ---	Red pine, eastern white pine, jack pine.
PfD Plainfield	3s	Moderate	Severe	Severe	Slight	Red pine Eastern white pine Jack pine Northern pin oak	55 --- --- ---	Red pine, eastern white pine, jack pine.
RbB Reedsburg	2o	Slight	Slight	Slight	Slight	Northern red oak Black oak White oak	65 --- ---	Eastern white pine, red pine, white spruce.
RmA Rimer	2o	Slight	Slight	Slight	Slight	Northern red oak White oak Red maple	65 --- ---	White spruce, eastern white pine, red pine.
Ry Rowley	4o	Slight	Slight	Slight	Slight	Silver maple Red maple White ash	70 --- ---	Silver maple, white ash.
ScB, ScC2 St. Charles	2o	Slight	Slight	Slight	Slight	Northern red oak American basswood Red maple Sugar maple	65 --- --- ---	Red pine, eastern white pine, white spruce.
ScD2 St. Charles	2r	Moderate	Moderate	Slight	Slight	Northern red oak American basswood Red maple Sugar maple	65 --- --- ---	Red pine, eastern white pine, white spruce.
SfA Shiffer	3o	Slight	Slight	Slight	Slight	Silver maple Green ash American basswood Red maple Northern red oak	80 --- --- --- ---	Silver maple, red maple, white ash, green ash, white spruce.
ShA Shiffer variant	3o	Slight	Slight	Slight	Slight	Silver maple Red maple Green ash American basswood Northern red oak	80 --- --- --- ---	Silver maple, red maple, white ash, green ash, white spruce.
SnB Sisson	2o	Slight	Slight	Slight	Slight	Northern red oak White ash American basswood White oak Sugar maple	65 --- --- --- ---	Black walnut, eastern white pine, white spruce, red pine.
SpB, SpC Sparta	3s	Slight	Slight	Severe	Slight	Jack pine Northern pin oak Red pine	55 --- ---	Red pine, eastern white pine, jack pine.
St Sparta variant	3s	Slight	Slight	Moderate	Slight	Northern pin oak Red pine Jack pine	55 --- ---	Red pine, eastern white pine, jack pine, Norway spruce.
TeA, TeB, TeC2 Tell	2o	Slight	Slight	Slight	Slight	Northern red oak Sugar maple White oak	65 --- ---	Red pine, eastern white pine, white spruce.

See footnote at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	
TeD2---------- Tell	2r	Moderate	Moderate	Moderate	Slight	Northern red oak----	65	Red pine,
						Sugar maple----------	---	eastern white pine,
						White oak----------	---	white spruce.
TwB---------- Tustin	3o	Slight	Slight	Moderate	Slight	Black oak----------	55	Red pine,
						Red pine----------	---	eastern white pine.
						Eastern white pine--	---	
						Northern red oak----	---	
UfB, UfC2---------- Urne	3o	Slight	Slight	Slight	Slight	Northern red oak----	55	Red pine,
						White oak----------	---	eastern white pine.
UfD2, UfE---------- Urne	3r	Moderate	Moderate	Moderate	Slight	Northern red oak----	55	Red pine,
						White oak----------	---	eastern white pine.
VaB, VaC2---------- Valton	2o	Slight	Slight	Slight	Slight	Northern red oak----	65	Eastern white pine,
						Sugar maple----------	---	red pine,
						American basswood---	---	white spruce.
VaD2, VaE---------- Valton	2r	Moderate	Moderate	Moderate	Slight	Northern red oak----	65	Eastern white pine,
						Sugar maple----------	---	red pine,
						American basswood---	---	white spruce.
Wt---------- Watseka	3s	Slight	Slight	Moderate	Slight	Northern pin oak----	55	Eastern white pine,
						Jack pine----------	---	red pine.
						Black oak----------	---	
WwB, WwC2---------- Wildale	3o	Slight	Slight	Slight	Slight	Northern red oak----	55	Red pine,
						Red maple----------	---	eastern white pine,
						Sugar maple----------	---	white spruce,
								Norway spruce.
WwD2---------- Wildale	3r	Moderate	Moderate	Moderate	Slight	Northern red oak----	55	Red pine,
						Red maple----------	---	eastern white pine,
						Sugar maple----------	---	white spruce,
								Norway spruce.
WxB, WxC2---------- Wyocena	3o	Slight	Slight	Slight	Slight	Black oak----------	55	Red pine,
						Bur oak----------	---	eastern white pine,
						White oak----------	---	jack pine,
						Shagbark hickory----	---	Norway spruce.
						Northern pin oak----	---	
WxD2, WxE---------- Wyocena	3r	Moderate	Moderate	Moderate	Slight	Black oak----------	55	Red pine,
						Bur oak----------	---	eastern white pine,
						White oak----------	---	jack pine,
						Shagbark hickory----	---	Norway spruce.
						Northern pin oak----	---	

* See map unit description for composition and behavior characteristics of the map unit.

TABLE 7.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS

[The symbol < means less than; the symbol > means greater than. Absence of an entry means that trees of the height class do not normally grow on this soil]

Soil name and map symbol	Trees having predicted 20-year average heights, in feet, of--				
	<8	8-15	16-25	26-35	>35
Ad---------- Adrian	Silky dogwood, redosier dogwood.	Lilac----------	Japanese tree lilac.	---	Carolina poplar.
ArA---------- Arenzville	---	Northern white-cedar, lilac, common ninebark, silky dogwood.	White spruce, Norway spruce.	Eastern white pine, red pine.	---
AtA, AtB---------- Atterberry	Silky dogwood, gray dogwood.	Lilac----------	White spruce------	Eastern white pine, red pine.	Red maple, silver maple, green ash, white ash.
BaB, BaC, BbC, BbD---------- Baraboo	---	Lilac, common ninebark, silky dogwood.	White spruce, Norway spruce.	Eastern white pine, red pine.	---
BcE*: Baraboo----------	---	Northern white-cedar, lilac, common ninebark, silky dogwood.	White spruce, Norway spruce.	Eastern white pine, red pine.	---
Rock outcrop.					
BdB---------- Baraboo variant	---	Redosier dogwood	White spruce------	Eastern white pine	---
BeB, BeC2--------- Bertrand	---	Northern white-cedar, lilac, common ninebark, silky dogwood.	White spruce, Norway spruce.	Eastern white pine, red pine.	---
BlB, BlC2, BlD2, BmA---------- Billett	Manyflower cotoneaster.	Lilac----------	Siberian peashrub, Norway spruce.	Eastern white pine, jack pine, red pine.	---
BoB, BoC, BoD----- Boone	Manyflower cotoneaster, Siberian peashrub.	Lilac----------	Norway spruce, Siberian peashrub.	Eastern white pine, red pine, jack pine.	---
BrA---------- Brems	Manyflower cotoneaster, Siberian peashrub.	Lilac----------	Eastern redcedar, Norway spruce.	Eastern white pine, jack pine, Siberian crabapple.	Green ash.
BtB---------- Briggsville	---	Northern white-cedar, lilac, common ninebark, silky dogwood.	White spruce, Norway spruce.	Eastern white pine, red pine.	---
ChA---------- Chaseburg	---	Northern white-cedar, lilac, common ninebark, silky dogwood.	White spruce, Norway spruce.	Eastern white pine, red pine.	---
Co---------- Colwood	Redosier dogwood, silky dogwood.	Lilac----------	Northern white-cedar, white spruce.	Eastern white pine.	Carolina poplar, white ash, red maple.

See footnote at end of table.

TABLE 7.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average heights, in feet, of--				
	<8	8-15	16-25	26-35	>35
CuA---------- Curran	---	Northern white-cedar, redosier dogwood, nannyberry viburnum.	White spruce------	Eastern white pine, jack pine, silver maple.	White ash.
DaA, DaB---------- Dakota	Silky dogwood, gray dogwood.	Siberian crabapple, lilac.	White spruce------	Green ash, red pine, eastern white pine.	---
DeA---------- Dells	Silky dogwood, gray dogwood.	Northern white-cedar, lilac, common ninebark.	White spruce, Norway spruce.	Eastern white pine, red pine.	---
DkB, DkC---------- Dickinson	Gray dogwood, manyflower cotoneaster.	Lilac----------	Eastern redcedar, Amur maple.	Red pine, Norway spruce, eastern white pine.	Silver maple.
ElB, ElC2, ElD2, ElE---------- Eleva	Manyflower cotoneaster, Siberian peashrub.	Lilac----------	Norway spruce-----	Eastern white pine, red pine, jack pine.	---
EmA---------- Eleva variant	Manyflower cotoneaster, Siberian peashrub.	Lilac----------	Norway spruce-----	Eastern white pine, jack pine.	---
EnB, EnC, EnD----- Elkmound	Manyflower cotoneaster.	Lilac----------	Siberian peashrub, Norway spruce.	Eastern white pine, jack pine, red pine.	---
Et---------- Ettrick	Redosier dogwood--	Northern white-cedar, nannyberry viburnum.	Green ash, white spruce.	Eastern white pine, jack pine, silver maple.	---
FaB, FaC2, FaD2--- Fayette	Redosier dogwood, gray dogwood.	Lilac, common ninebark.	Norway spruce-----	Eastern white pine, red pine.	Silver maple.
Fu*, Fw*. Fluvaquents					
FxB, FxC2--------- Fox	Silky dogwood-----	Northern white-cedar, common ninebark, lilac.	White spruce, Norway spruce.	Eastern white pine, red pine.	---
GaB, GaC2, GaD2, GaE---------- Gale	Silky dogwood-----	Northern white-cedar, common ninebark, lilac.	White spruce, Norway spruce.	Eastern white pine, red pine.	---
GoB, GoC, GoD----- Gotham	Manyflower cotoneaster, Siberian peashrub.	Lilac, eastern redcedar.	Norway spruce-----	Eastern white pine, red pine, jack pine.	---
Gr---------- Granby	Silky dogwood, redosier dogwood.	Amur privet, lilac.	White spruce, tamarack.	Red maple, white ash.	---
Gv---------- Granby variant	Silky dogwood, redosier dogwood.	Nannyberry viburnum, lilac.	White spruce------	Silver maple, white ash.	---
Ho---------- Houghton	Silky dogwood, redosier dogwood.	Lilac----------	---	---	Carolina poplar.

See footnote at end of table.

TABLE 7.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average heights, in feet, of--				
	<8	8-15	16-25	26-35	>35
JaA, JaB---------- Jackson	---	Northern white-cedar, lilac, common ninebark, silky dogwood.	White spruce, Norway spruce.	Eastern white pine, red pine.	---
KlA---------- Kendall	Silky dogwood, redosier dogwood.	Lilac----------	White spruce------	Eastern white pine, red pine.	---
LfB, LfC2, LfD2, LfE---------- La Farge	Silky dogwood-----	Northern white-cedar, lilac, common ninebark.	White spruce, Norway spruce.	Eastern white pine, red pine.	---
Mc. Marshan					
MdB, MdC2, MdD2, MdE---------- McHenry	Gray dogwood, silky dogwood.	Lilac----------	Russian-olive, white spruce.	Eastern white pine, red pine.	---
MsA---------- Mosel	Silky dogwood, redosier dogwood.	Northern white-cedar, nannyberry viburnum, lilac.	White spruce------	Eastern white pine, red pine.	---
N1B, N1C2, N1D2, N1E---------- Norden	---	Northern white-cedar, lilac, common ninebark, silky dogwood.	White spruce, Norway spruce.	Eastern white pine, jack pine.	---
NrE*: Norden----------	---	Northern white-cedar, lilac, common ninebark, silky dogwood.	White spruce, Norway spruce.	Eastern white pine, jack pine.	---
Eleva---------- Rock outcrop.	Manyflower cotoneaster, Siberian peashrub.	Lilac----------	Norway spruce-----	Eastern white pine, red pine, jack pine.	---
Or---------- Orion	Redosier dogwood, silky dogwood.	Northern white-cedar, nannyberry viburnum.	White spruce, green ash.	Silver maple, jack pine, eastern white pine.	---
Os---------- Ossian	Silky dogwood, redosier dogwood.	Lilac----------	White spruce------	Silver maple, green ash.	Eastern cottonwood.
Pa. Palms					
PcA, PcB---------- Pillot	Gray dogwood, silky dogwood.	Amur maple, lilac	White spruce, Norway spruce.	Eastern white pine, red pine.	---
Pd*, Pe*. Pits					
PfB, PfC, PfD----- Plainfield	Manyflower cotoneaster, Siberian peashrub.	Lilac----------	Norway spruce-----	Eastern white pine, red pine, jack pine.	---
RbB---------- Reedsburg	Silky dogwood, redosier dogwood.	Northern white-cedar, common ninebark, lilac.	White spruce, Norway spruce.	Eastern white pine, red pine.	---

See footnote at end of table.

TABLE 7.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average heights, in feet, of--				
	<8	8-15	16-25	26-35	>35
RhA, RhB---------- Richwood	---	Northern white-cedar, lilac, common ninebark, silky dogwood.	White spruce, Norway spruce.	Eastern white pine, red pine.	---
RmA---------- Rimer	Silky dogwood, redosier dogwood.	Lilac----------	White spruce------	Red pine, eastern white pine.	---
RnB, RnC2--------- Ringwood	Silky dogwood, gray dogwood.	Common ninebark, lilac.	Norway spruce, white spruce.	Eastern white pine, red pine.	---
Rt*. Rock outcrop					
Ry---------- Rowley	---	Northern white-cedar, redosier dogwood, nannyberry viburnum.	Green ash, white spruce.	Eastern white pine, jack pine, silver maple.	---
ScB, ScC2, ScD2--- St. Charles	Silky dogwood-----	Northern white-cedar, American cranberrybush.	White spruce, black spruce, Norway spruce.	Eastern white pine, red pine.	Red maple, silver maple, green ash, white ash.
Se*: Saprists.					
Aquents.					
SfA---------- Shiffer	---	Northern white-cedar, redosier dogwood, nannyberry viburnum.	Green ash, white spruce.	Eastern white pine, jack pine, silver maple.	---
ShA---------- Shiffer variant	---	Northern white-cedar, redosier dogwood, nannyberry viburnum.	Green ash, white spruce.	Eastern white pine, silver maple, jack pine.	---
SnB---------- Sisson	Silky dogwood-----	Tatarian honeysuckle, Amur privet.	Laurel willow, red pine.	Eastern white pine	Green ash, Carolina poplar.
SpB, SpC---------- Sparta	Manyflower cotoneaster.	Lilac----------	Norway spruce, Siberian peashrub.	Red pine, eastern white pine, jack pine.	---
St---------- Sparta variant	Manyflower cotoneaster.	Lilac----------	Siberian peashrub, Norway spruce.	Eastern white pine, jack pine, red pine.	---
TaA, TaB, TaC2---- Tama	Redosier dogwood, gray dogwood.	Siberian dogwood, bloodtwig dogwood, Tatarian honeysuckle.	Eastern redcedar, Amur maple.	Red pine, Norway spruce, common hackberry.	Silver maple, eastern cottonwood.
TeA, TeB, TeC2, TeD2---------- Tell	---	Northern white-cedar, silky dogwood, common ninebark, lilac.	White spruce, Norway spruce.	Eastern white pine, red pine.	---
TvA, TvB---------- Toddville	---	Northern white-cedar, silky dogwood, common ninebark, lilac.	White spruce, Norway spruce.	Eastern white pine, red pine.	---

See footnote at end of table.

TABLE 7.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average heights, in feet, of--				
	<8	8-15	16-25	26-35	>35
TwB---------- Tustin	Manyflower cotoneaster.	Lilac----------	Norway spruce, Siberian peashrub.	Eastern white pine, red pine, jack pine.	---
UfB, UfC2, UfD2, UfE---------- Urne	Manyflower cotoneaster.	Lilac----------	Norway spruce, Siberian peashrub.	Eastern white pine, red pine, jack pine.	---
VaB, VaC2, VaD2, VaE---------- Valton	---	Northern white-cedar, common ninebark, silky dogwood, lilac.	White spruce, Norway spruce.	Eastern white pine, red pine.	---
Wt---------- Watseka	Silky dogwood, redosier dogwood, Siberian peashrub, manyflower cotoneaster.	Lilac----------	White spruce------	Eastern white pine, red pine.	---
WwB, WwC2, WwD2--- Wildale	Silky dogwood-----	Northern white-cedar, common ninebark, lilac.	White spruce, Norway spruce.	Eastern white pine, red pine.	---
WxB, WxC2, WxD2, WxE---------- Wyocena	Silky dogwood, manyflower cotoneaster, Siberian peashrub.	Northern white-cedar, common ninebark.	White spruce, Norway spruce.	Eastern white pine, red pine.	---

* See map unit description for composition and behavior characteristics of the map unit.

TABLE 8.--BUILDING SITE DEVELOPMENT

[Some of the terms used in this table to describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry means soil was not rated]

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
Ad Adrian	Severe: wetness, cutbanks cave, floods.	Severe: wetness, floods, low strength.	Severe: wetness, floods, low strength.	Severe: wetness, floods, low strength.	Severe: wetness, floods, low strength.	Severe: excess humus, floods, wetness.
ArA Arenzville	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods, frost action, low strength.	Severe: floods.
AtA, AtB Atterberry	Severe: wetness, floods.	Severe: low strength, wetness, floods.	Severe: wetness, low strength, floods.	Severe: wetness, low strength, floods.	Severe: frost action, low strength, floods.	Moderate: wetness, floods.
BaB Baraboo	Severe: depth to rock.	Moderate: wetness, shrink-swell, low strength.	Severe: wetness, depth to rock.	Moderate: wetness, shrink-swell, slope.	Severe: frost action, low strength.	Moderate: thin layer.
BaC Baraboo	Severe: depth to rock.	Moderate: wetness, shrink-swell, low strength.	Severe: wetness, depth to rock.	Severe: slope.	Severe: frost action, low strength.	Moderate: slope, thin layer.
BbC Baraboo	Severe: depth to rock.	Moderate: wetness, shrink-swell, low strength.	Severe: wetness, depth to rock.	Moderate: wetness, shrink-swell, slope.	Severe: frost action.	Moderate: thin layer.
BbD Baraboo	Severe: depth to rock, slope.	Severe: slope.	Severe: wetness, depth to rock, slope.	Severe: slope.	Severe: slope, frost action.	Severe: slope.
BcE*: Baraboo	Severe: depth to rock, slope.	Severe: slope.	Severe: wetness, depth to rock, slope.	Severe: slope.	Severe: slope, frost action.	Severe: slope.
Rock outcrop.						
BdB Baraboo variant	Severe: depth to rock, wetness, floods.	Severe: floods, wetness.	Severe: floods, wetness, depth to rock.	Severe: floods, wetness.	Severe: floods, frost action.	Severe: floods.
BeB Bertrand	Severe: cutbanks cave.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell, low strength.	Severe: frost action, low strength.	Slight.
BeC2 Bertrand	Severe: cutbanks cave.	Moderate: slope, shrink-swell.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: frost action, low strength.	Moderate: slope.
BlB Billett	Severe: cutbanks cave.	Slight	Slight	Slight	Moderate: frost action.	Slight.
BlC2 Billett	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
BlD2 Billett	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
BmA--- Billett	Severe: cutbanks cave.	Slight---	Moderate: wetness.	Slight---	Moderate: frost action.	Slight.
BoB--- Boone	Severe: cutbanks cave.	Slight---	Moderate: depth to rock.	Moderate: slope.	Slight---	Severe: too sandy.
BoC--- Boone	Severe: cutbanks cave.	Moderate: slope.	Moderate: depth to rock, slope.	Severe: slope.	Moderate: slope.	Severe: too sandy.
BoD--- Boone	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: too sandy, slope.
BrA--- Brems	Severe: cutbanks cave.	Slight---	Moderate: wetness.	Slight---	Slight---	Moderate: too sandy.
BtB--- Briggsville	Moderate: too clayey.	Severe: low strength.	Severe: low strength.	Severe: low strength.	Severe: low strength.	Slight.
ChA--- Chaseburg	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods, frost action.	Severe: floods.
Co--- Colwood	Severe: wetness, floods.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: wetness, floods, frost action.	Severe: wetness, floods.
CuA--- Curran	Severe: wetness, cutbanks cave, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: frost action, low strength, floods.	Moderate: wetness, floods.
DaA--- Dakota	Severe: cutbanks cave.	Slight---	Slight---	Slight---	Moderate: low strength.	Slight.
DaB--- Dakota	Severe: cutbanks cave.	Slight---	Slight---	Moderate: slope.	Moderate: low strength.	Slight.
DeA--- Dells	Severe: wetness.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: frost action, low strength.	Moderate: wetness.
DkB--- Dickinson	Severe: cutbanks cave.	Slight---	Slight---	Slight---	Moderate: frost action.	Slight.
DkC--- Dickinson	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
ElB--- Eleva	Moderate: depth to rock.	Slight---	Moderate: depth to rock.	Moderate: slope.	Moderate: low strength, frost action.	Moderate: thin layer.
ElC2--- Eleva	Moderate: slope, depth to rock.	Moderate: slope.	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope, low strength, frost action.	Moderate: slope, thin layer.
ElD2, ElE--- Eleva	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
EmA--- Eleva variant	Severe: cutbanks cave, wetness, floods.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, frost action.	Severe: floods.

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
EnB---------- Elkmound	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.	Moderate: depth to rock, low strength, frost action.	Severe: thin layer.
EnC---------- Elkmound	Severe: depth to rock.	Moderate: depth to rock, slope.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, low strength, slope.	Severe: thin layer.
EnD---------- Elkmound	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope, thin layer.
Et---------- Ettrick	Severe: cutbanks cave, wetness, floods.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: low strength, wetness, floods.	Severe: wetness, floods.
FaB---------- Fayette	Slight---------	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.	Moderate: slope, shrink-swell, low strength.	Severe: frost action, low strength.	Slight.
FaC2---------- Fayette	Moderate: slope.	Moderate: slope, shrink-swell, low strength.	Moderate: slope, low strength, shrink-swell.	Severe: slope.	Severe: frost action, low strength.	Moderate: slope.
FaD2---------- Fayette	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, low strength, slope.	Severe: slope.
Fu*, Fw*. Fluvaquents						
FxB---------- Fox	Severe: cutbanks cave.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: slope, shrink-swell, low strength.	Severe: low strength.	Slight.
FxC2---------- Fox	Severe: cutbanks cave.	Moderate: slope, shrink-swell, low strength.	Moderate: slope, shrink-swell, low strength.	Severe: slope.	Severe: low strength.	Moderate: slope.
GaB---------- Gale	Moderate: depth to rock.	Moderate: low strength, shrink-swell.	Moderate: depth to rock, shrink-swell.	Moderate: slope, low strength, shrink-swell.	Severe: frost action, low strength.	Moderate: thin layer.
GaC2---------- Gale	Moderate: depth to rock, slope.	Moderate: slope, low strength, shrink-swell.	Moderate: depth to rock, slope, shrink-swell.	Severe: slope.	Severe: frost action, low strength.	Moderate: slope, thin layer.
GaD2, GaE--------- Gale	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, slope, low strength.	Severe: slope.
GoB---------- Gotham	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Slight---------	Moderate: too sandy.
GoC---------- Gotham	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope, too sandy.

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
GoD---------- Gotham	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Gr---------- Granby	Severe: wetness, cutbanks cave, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.
Gv---------- Granby variant	Severe: cutbanks cave, wetness, floods.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: wetness, floods.	Severe: wetness, floods.
Ho---------- Houghton	Severe: wetness, floods, excess humus.	Severe: wetness, floods, low strength.	Severe: wetness, low strength, floods.	Severe: wetness, floods, low strength.	Severe: wetness, floods, low strength.	Severe: excess humus, wetness, floods.
JaA---------- Jackson	Severe: cutbanks cave.	Moderate: shrink-swell, low strength.	Moderate: wetness, shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Severe: frost action, low strength.	Slight.
JaB---------- Jackson	Severe: cutbanks cave.	Moderate: shrink-swell, low strength.	Moderate: wetness, shrink-swell, low strength.	Moderate: slope, shrink-swell, low strength.	Severe: frost action, low strength.	Slight.
KlA---------- Kendall	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: frost action, low strength, floods.	Moderate: wetness, floods.
LfB---------- La Farge	Moderate: depth to rock.	Moderate: shrink-swell, low strength.	Moderate: depth to rock, shrink-swell.	Moderate: slope, shrink-swell, low strength.	Severe: frost action, low strength.	Moderate: thin layer.
LfC2---------- La Farge	Moderate: slope, depth to rock.	Moderate: slope, shrink-swell, low strength.	Moderate: slope, depth to rock, shrink-swell.	Severe: slope.	Severe: frost action, low strength.	Moderate: thin layer, slope.
LfD2, LfE--------- La Farge	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action, low strength.	Severe: slope.
Mc---------- Marshan	Severe: cutbanks cave, wetness, floods.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: low strength, wetness, floods.	Severe: wetness, floods.
MdB---------- McHenry	Slight---------	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: slope, shrink-swell, low strength.	Severe: low strength.	Slight.
MdC2---------- McHenry	Moderate: slope.	Moderate: slope, shrink-swell, low strength.	Moderate: slope, shrink-swell, low strength.	Severe: slope.	Severe: low strength.	Moderate: slope.
MdD2, MdE--------- McHenry	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
MsA---------- Mosel	Severe: wetness, floods.	Severe: wetness, floods, low strength.	Severe: wetness, floods, low strength.	Severe: wetness, floods, low strength.	Severe: frost action, low strength, floods.	Severe: floods.
N1B---------- Norden	Moderate: depth to rock.	Moderate: shrink-swell, low strength.	Moderate: depth to rock, shrink-swell.	Moderate: slope, shrink-swell, low strength	Severe: low strength.	Moderate: thin layer.
N1C2---------- Norden	Moderate: slope, depth to rock.	Moderate: slope, shrink-swell, low strength.	Moderate: slope, depth to rock, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope, thin layer.
N1D2, N1E--------- Norden	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
NrE*: Norden----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Eleva----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop.						
Or---------- Orion	Severe: wetness, floods.	Severe: floods, wetness.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: floods, frost action, low strength.	Severe: floods.
Os---------- Ossian	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness, low strength.	Severe: floods, wetness.
Pa---------- Palms	Severe: wetness, excess humus, floods.	Severe: wetness, low strength, floods.	Severe: wetness, floods, low strength.	Severe: wetness, floods, low strength.	Severe: wetness, floods, low strength.	Severe: wetness, floods, excess humus.
PcA---------- Pillot	Severe: cutbanks cave.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.
PcB---------- Pillot	Severe: cutbanks cave.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: slope, shrink-swell, low strength.	Severe: low strength, frost action.	Slight.
Pd*, Pe*. Pits						
PfB---------- Plainfield	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Slight---------	Moderate: too sandy.
PfC---------- Plainfield	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: too sandy, slope.
PfD---------- Plainfield	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
RbB---------- Reedsburg	Severe: wetness.	Severe: wetness, shrink-swell, low strength.	Severe: wetness, shrink-swell, low strength.	Severe: wetness, shrink-swell.	Severe: low strength, frost action.	Moderate: wetness.
RhA---------- Richwood	Severe: cutbanks cave.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: frost action.	Slight.
RhB---------- Richwood	Severe: cutbanks cave.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Severe: frost action.	Slight.
RmA---------- Rimer	Severe: wetness, floods.	Severe: wetness, shrink-swell, floods.	Severe: wetness, shrink-swell, floods.	Severe: wetness, shrink-swell, floods.	Severe: frost action, floods.	Moderate: wetness, too sandy, floods.
RnB---------- Ringwood	Slight---------	Moderate: low strength.	Moderate: low strength.	Moderate: slope, low strength.	Severe: low strength.	Slight.
RnC2---------- Ringwood	Moderate: slope.	Moderate: low strength, slope.	Moderate: slope, low strength.	Severe: slope.	Severe: low strength.	Moderate: slope.
Rt*. Rock outcrop						
Ry---------- Rowley	Severe: wetness, cutbanks cave, floods.	Severe: floods, wetness.	Severe: wetness, floods.	Severe: floods, wetness.	Severe: low strength, frost action, floods.	Moderate: wetness, floods.
ScB---------- St. Charles	Slight---------	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: slope, shrink-swell, low strength.	Severe: frost action, low strength.	Slight.
ScC2---------- St. Charles	Moderate: slope.	Moderate: shrink-swell, slope, low strength.	Moderate: slope, shrink-swell, low strength.	Severe: slope.	Severe: frost action, low strength.	Moderate: slope.
ScD2---------- St. Charles	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: frost action, low strength, slope.	Severe: slope.
Se*: Saprists.						
Aquents.						
SfA---------- Shiffer	Severe: cutbanks cave, wetness, floods.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: low strength, floods, frost action.	Moderate: wetness, floods.
ShA---------- Shiffer variant	Severe: cutbanks cave, wetness, floods.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, frost action.	Moderate: wetness, floods.
SnB---------- Sisson	Severe: cutbanks cave.	Moderate: low strength.	Moderate: low strength.	Moderate: slope, low strength.	Severe: low strength.	Slight.

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
SpB---------- Sparta	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Slight---------	Moderate: too sandy.
SpC---------- Sparta	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: too sandy, slope.
St---------- Sparta variant	Severe: cutbanks cave.	Slight---------	Moderate: wetness.	Slight---------	Slight---------	Moderate: too sandy.
TaA---------- Tama	Slight---------	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.	Moderate: shrink-swell, low strength.	Severe: frost action, low strength.	Slight.
TaB---------- Tama	Slight---------	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.	Moderate: slope, shrink-swell, low strength.	Severe: frost action, low strength.	Slight.
TaC2---------- Tama	Moderate: slope.	Moderate: slope, low strength, shrink-swell.	Moderate: slope, low strength, shrink-swell.	Severe: slope.	Severe: frost action, low strength.	Moderate: slope.
TeA---------- Tell	Severe: cutbanks cave.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Severe: low strength, frost action.	Slight.
TeB---------- Tell	Severe: cutbanks cave.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, slope, low strength.	Severe: low strength, frost action.	Slight.
TeC2---------- Tell	Severe: cutbanks cave.	Moderate: shrink-swell, low strength, slope.	Moderate: slope, shrink-swell, low strength.	Severe: slope.	Severe: low strength, frost action.	Moderate: slope.
TeD2---------- Tell	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope, frost action.	Severe: slope.
TvA---------- Toddville	Severe: cutbanks cave.	Moderate: shrink-swell, low strength.	Moderate: wetness, shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Severe: low strength, frost action.	Slight.
TvB---------- Toddville	Severe: cutbanks cave.	Moderate: shrink-swell, low strength.	Moderate: wetness, shrink-swell, low strength.	Moderate: shrink-swell, slope, low strength.	Severe: low strength, frost action.	Slight.
TwB---------- Tustin	Moderate: too clayey.	Severe: low strength.	Severe: low strength.	Severe: low strength.	Moderate: frost action.	Moderate: too sandy.
UfB---------- Urne	Moderate: depth to rock.	Slight---------	Moderate: depth to rock.	Moderate: slope.	Moderate: frost action.	Moderate: thin layer.
UfC2---------- Urne	Moderate: depth to rock, slope.	Moderate: slope.	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope, frost action.	Moderate: thin layer, slope.
UfD2, UfE--------- Urne	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
VaB---------- Valton	Severe: too clayey.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.	Severe: low strength, frost action, shrink-swell.	Slight.
VaC2---------- Valton	Severe: too clayey.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.	Severe: low strength, slope, shrink-swell.	Severe: low strength, frost action, shrink-swell.	Moderate: slope.
VaD2, VaE--------- Valton	Severe: too clayey, slope.	Severe: low strength, slope, shrink-swell.	Severe: low strength, slope, shrink-swell.	Severe: low strength, slope, shrink-swell.	Severe: low strength, frost action, slope.	Severe: slope.
Wt---------- Watseka	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness, frost action.	Moderate: wetness, too sandy.
WwB---------- Wildale	Moderate: too clayey, slope.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: low strength, shrink-swell.	Severe: small stones.
WwC2---------- Wildale	Moderate: too clayey, slope.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, slope, low strength.	Severe: low strength, shrink-swell.	Severe: small stones.
WwD2---------- Wildale	Severe: slope.	Severe: shrink-swell, low strength, slope.	Severe: slope, shrink-swell, low strength.	Severe: shrink-swell, slope, low strength.	Severe: low strength, slope, shrink-swell.	Severe: small stones, slope.
WxB---------- Wyocena	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Moderate: frost action.	Slight.
WxC2---------- Wyocena	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
WxD2, WxE--------- Wyocena	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

* See map unit description for composition and behavior characteristics of the map unit.

TABLE 9.--SANITARY FACILITIES

[Some of the terms used in this table to describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good," "fair," and other terms used to rate soils. Absence of an entry means soil was not rated]

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Ad Adrian	Severe: wetness, floods.	Severe: wetness, seepage, floods.	Severe: wetness, floods, seepage.	Severe: wetness, floods, seepage.	Poor: hard to pack, wetness.
ArA Arenzville	Severe: floods, wetness.	Severe: wetness, floods.	Severe: floods, wetness.	Severe: floods, wetness.	Fair: wetness.
AtA, AtB Atterberry	Severe: wetness, percs slowly, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Poor: wetness.
BaB Baraboo	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Severe: depth to rock.	Moderate: wetness, depth to rock.	Poor: area reclaim.
BaC Baraboo	Severe: depth to rock, wetness.	Severe: depth to rock, slope, wetness.	Severe: depth to rock.	Moderate: wetness, slope, depth to rock.	Poor: area reclaim.
BbC Baraboo	Severe: depth to rock, wetness.	Severe: depth to rock, slope, wetness.	Severe: depth to rock.	Moderate: wetness.	Poor: area reclaim.
BbD Baraboo	Severe: depth to rock, wetness, slope.	Severe: depth to rock, slope, wetness.	Severe: depth to rock.	Severe: slope.	Poor: area reclaim, slope.
BcE*: Baraboo	Severe: depth to rock, wetness, slope.	Severe: depth to rock, slope, wetness.	Severe: depth to rock, slope.	Severe: slope.	Poor: area reclaim, slope.
Rock outcrop.					
BdB Baraboo variant	Severe: floods, depth to rock, wetness.	Severe: depth to rock, floods, wetness.	Severe: floods, depth to rock, wetness.	Severe: floods, wetness.	Poor: area reclaim, wetness.
BeB Bertrand	Moderate: percs slowly.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: too clayey.
BeC2 Bertrand	Moderate: slope, percs slowly.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: slope, too clayey.
BlB Billett	Slight**	Severe: seepage.	Severe: seepage.	Severe: seepage.	Good.
BlC2 Billett	Moderate:** slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: slope.
BlD2 Billett	Severe: slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage, slope.	Poor: slope.

See footnotes at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
BmA---------- Billett	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
BoB---------- Boone	Severe: depth to rock.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: seepage.	Poor: too sandy, seepage.
BoC---------- Boone	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: seepage.	Poor: too sandy, seepage.
BoD---------- Boone	Severe: slope, depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: seepage, slope.	Poor: slope, too sandy, seepage.
BrA---------- Brems	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, too sandy, wetness.	Severe: seepage, wetness.	Poor: too sandy, seepage.
BtB---------- Briggsville	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight----------	Poor: too clayey.
ChA---------- Chaseburg	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Fair: wetness.
Co---------- Colwood	Severe: floods, wetness.	Severe: wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Poor: wetness.
CuA---------- Curran	Severe: wetness, percs slowly, floods.	Severe: wetness, seepage.	Severe: seepage, wetness, floods.	Severe: wetness, floods.	Poor: wetness.
DaA, DaB---------- Dakota	Slight**---------	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
DeA---------- Dells	Severe: wetness.	Severe: wetness, seepage.	Severe: wetness, seepage.	Severe: wetness, seepage.	Poor: too sandy, seepage, wetness.
DkB---------- Dickinson	Slight**---------	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: seepage.
DkC---------- Dickinson	Moderate:** slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Poor: seepage.
ElB---------- Eleva	Severe: depth to rock.	Severe: seepage.	Severe: depth to rock, seepage.	Severe: seepage.	Poor: area reclaim.
ElC2---------- Eleva	Severe: depth to rock.	Severe: slope, seepage.	Severe: depth to rock, seepage.	Severe: seepage.	Poor: area reclaim.
ElD2---------- Eleva	Severe: depth to rock, slope.	Severe: slope, seepage.	Severe: depth to rock, seepage.	Severe: slope, seepage.	Poor: slope, area reclaim.

See footnotes at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
ElE---- Eleva	Severe: depth to rock, slope.	Severe: slope, seepage.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage.	Poor: slope, area reclaim.
EmA---- Eleva variant	Severe: floods, depth to rock, wetness.	Severe: seepage, wetness.	Severe: floods, depth to rock, seepage.	Severe: floods, wetness.	Poor: area reclaim, wetness.
EnB---- Elkmound	Severe: depth to rock.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: seepage.	Poor: area reclaim.
EnC---- Elkmound	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: seepage.	Poor: area reclaim.
EnD---- Elkmound	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: seepage, slope.	Poor: area reclaim, slope.
Et---- Ettrick	Severe: floods, wetness, percs slowly.	Severe: seepage, floods, wetness.	Severe: floods, seepage, wetness.	Severe: floods, wetness.	Poor: wetness.
FaB---- Fayette	Slight----	Moderate: slope, seepage.	Moderate: too clayey.	Slight----	Fair: too clayey.
FaC2---- Fayette	Moderate: slope.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Fair: slope, too clayey.
FaD2---- Fayette	Severe: slope.	Severe: slope.	Moderate: slope, too clayey.	Severe: slope.	Poor: slope.
Fu*, Fw*. Fluvaquents					
FxB---- Fox	Slight**----	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: too sandy, seepage.
FxC2---- Fox	Moderate:** slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Poor: too sandy, seepage.
GaB---- Gale	Severe: depth to rock.	Severe: seepage.	Severe: depth to rock, seepage.	Severe: seepage.	Poor: area reclaim.
GaC2---- Gale	Severe: depth to rock.	Severe: slope, seepage.	Severe: depth to rock, seepage.	Severe: seepage.	Poor: area reclaim.
GaD2---- Gale	Severe: depth to rock, slope.	Severe: slope, seepage.	Severe: depth to rock, seepage.	Severe: seepage, slope.	Poor: slope, area reclaim.
GaE---- Gale	Severe: depth to rock, slope.	Severe: slope, seepage.	Severe: depth to rock, slope, seepage.	Severe: seepage, slope.	Poor: slope, area reclaim.

See footnotes at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
GoB---------- Gotham	Slight**----------	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: seepage.
GoC---------- Gotham	Moderate:** slope.	Severe: slope, seepage.	Severe: seepage.	Severe: seepage.	Poor: seepage.
GoD---------- Gotham	Severe: slope.	Severe: slope, seepage.	Severe: seepage.	Severe: seepage, slope.	Poor: slope, seepage.
Gr---------- Granby	Severe: wetness, floods.	Severe: wetness, seepage.	Severe: wetness, seepage, floods.	Severe: wetness, seepage, floods.	Poor: wetness, too sandy, seepage.
Gv---------- Granby variant	Severe: floods, wetness, percs slowly.	Severe: seepage, floods, wetness.	Severe: floods, seepage, wetness.	Severe: floods, seepage, wetness.	Poor: seepage, too sandy, wetness.
Ho---------- Houghton	Severe: wetness, floods.	Severe: wetness, seepage, floods.	Severe: wetness, floods, seepage.	Severe: wetness, floods, seepage.	Poor: hard to pack, wetness.
JaA, JaB---------- Jackson	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Fair: too clayey, wetness.
KlA---------- Kendall	Severe: wetness, floods.	Severe: wetness.	Severe: wetness, floods.	Severe: wetness, floods.	Poor: wetness.
LfB---------- La Farge	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Moderate: depth to rock.	Poor: area reclaim.
LfC2---------- La Farge	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.	Poor: area reclaim.
LfD2---------- La Farge	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Poor: slope, area reclaim.
LfE---------- La Farge	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, area reclaim.
Mc---------- Marshan	Severe: wetness, floods.	Severe: wetness, seepage.	Severe: wetness, floods, seepage.	Severe: wetness, floods, seepage.	Poor: wetness, too sandy, seepage.
MdB---------- McHenry	Slight----------	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: too clayey, small stones.
MdC2---------- McHenry	Moderate: slope.	Severe: slope, seepage.	Severe: seepage.	Severe: seepage.	Fair: slope, small stones, too clayey.

See footnotes at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
MdD2, MdE McHenry	Severe: slope.	Severe: slope, seepage.	Severe: seepage.	Severe: slope, seepage.	Poor: slope.
MsA Mosel	Severe: wetness, percs slowly, floods.	Severe: wetness.	Severe: wetness, floods, too clayey.	Severe: wetness, floods.	Poor: too clayey, wetness.
NlB Norden	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Moderate: depth to rock.	Poor: area reclaim.
NlC2 Norden	Severe: depth to rock.	Severe: slope.	Severe: depth to rock.	Moderate: slope, depth to rock.	Poor: area reclaim.
NlD2 Norden	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock.	Severe: slope.	Poor: slope, area reclaim.
NlE Norden	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope, area reclaim.
NrE*: Norden	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope, area reclaim.
Eleva	Severe: depth to rock, slope.	Severe: slope, seepage.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage.	Poor: slope, area reclaim.
Rock outcrop.					
Or Orion	Severe: wetness, floods.	Severe: wetness, floods.	Severe: floods, wetness.	Severe: floods, wetness.	Poor: wetness.
Os Ossian	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Poor: wetness.
Pa Palms	Severe: wetness, floods.	Severe: wetness, seepage, floods.	Severe: wetness, floods, seepage.	Severe: wetness, floods, seepage.	Poor: wetness, hard to pack.
PcA, PcB Pillot	Slight**	Severe: seepage.	Severe: seepage.	Slight	Fair: thin layer.
Pd*, Pe*. Pits					
PfB Plainfield	Slight**	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: too sandy, seepage.
PfC Plainfield	Moderate:** slope.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: too sandy, seepage.

See footnotes at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
PfD---------- Plainfield	Severe: slope.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage, slope.	Poor: too sandy, slope, seepage.
RbB---------- Reedsburg	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, wetness.
RhA, RhB---------- Richwood	Slight----------	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: too clayey.
RmA---------- Rimer	Severe: wetness, floods, percs slowly.	Severe: wetness, seepage.	Severe: wetness, too clayey, floods.	Severe: wetness, seepage, floods.	Poor: wetness, too clayey.
RnB---------- Ringwood	Slight----------	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: too clayey.
RnC2---------- Ringwood	Moderate: slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: too clayey, slope.
Rt*. Rock outcrop					
Ry---------- Rowley	Severe: wetness, floods.	Severe: wetness, seepage, floods.	Severe: wetness, seepage, floods.	Severe: wetness, floods.	Poor: wetness.
ScB---------- St. Charles	Slight----------	Moderate: seepage, slope.	Moderate: too clayey.	Slight----------	Fair: too clayey.
ScC2---------- St. Charles	Moderate: slope.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Fair: too clayey, slope.
ScD2---------- St. Charles	Severe: slope.	Severe: slope.	Moderate: too clayey, slope.	Severe: slope.	Poor: slope.
Se*: Saprists.					
Aquents.					
SfA---------- Shiffer	Severe: floods, wetness.	Severe: seepage, wetness.	Severe: floods, seepage, wetness.	Severe: floods, seepage, wetness.	Poor: seepage, too sandy, wetness.
ShA---------- Shiffer variant	Severe: floods, wetness.	Severe: seepage, wetness.	Severe: floods, seepage, wetness.	Severe: floods, seepage, wetness.	Poor: wetness.
SnB---------- Sisson	Slight----------	Moderate: seepage, slope.	Slight----------	Slight----------	Good.

See footnotes at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
SpB---------- Sparta	Slight**---------	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: too sandy, seepage.
SpC---------- Sparta	Moderate:** slope.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: too sandy, seepage.
St---------- Sparta variant	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
TaA---------- Tama	Slight----------	Moderate: seepage.	Moderate: too clayey.	Slight----------	Fair: too clayey.
TaB---------- Tama	Slight----------	Moderate: slope, seepage.	Moderate: too clayey.	Slight----------	Fair: too clayey.
TaC2---------- Tama	Moderate: slope.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Fair: slope, too clayey.
TeA, TeB---------- Tell	Slight**---------	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
TeC2---------- Tell	Moderate:** slope.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
TeD2---------- Tell	Severe: slope.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage, slope.	Poor: seepage, slope, too sandy.
TvA, TvB---------- Toddville	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Fair: too clayey, wetness.
TwB---------- Tustin	Severe: percs slowly.	Severe: seepage.	Severe: too clayey.	Severe: seepage.	Poor: hard to pack.
UfB---------- Urne	Severe: depth to rock.	Severe: seepage, depth to rock.	Severe: seepage, depth to rock.	Severe: seepage.	Poor: area reclaim.
UfC2---------- Urne	Severe: depth to rock.	Severe: seepage, slope, depth to rock.	Severe: seepage, depth to rock.	Severe: seepage.	Poor: area reclaim.
UfD2---------- Urne	Severe: depth to rock, slope.	Severe: seepage, slope, depth to rock.	Severe: seepage, depth to rock.	Severe: seepage, slope.	Poor: slope, area reclaim.
UfE---------- Urne	Severe: depth to rock, slope.	Severe: seepage, slope, depth to rock.	Severe: depth to rock, seepage, slope.	Severe: seepage, slope.	Poor: slope, area reclaim.
VaB---------- Valton	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight----------	Poor: too clayey.
VaC2---------- Valton	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey.

See footnotes at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
VaD2---------- Valton	Severe: percs slowly, slope.	Severe: slope.	Severe: too clayey.	Severe: slope.	Poor: too clayey, slope.
VaE---------- Valton	Severe: percs slowly, slope.	Severe: slope.	Severe: too clayey, slope.	Severe: slope.	Poor: too clayey, slope.
Wt---------- Watseka	Severe: wetness.	Severe: seepage, wetness.	Severe: wetness, seepage, too sandy.	Severe: seepage, wetness.	Poor: too sandy, wetness, seepage.
WwB---------- Wildale	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight----------	Poor: too clayey.
WwC2---------- Wildale	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey.
WwD2---------- Wildale	Severe: percs slowly, slope.	Severe: slope.	Severe: too clayey.	Severe: slope.	Poor: too clayey, slope.
WxB---------- Wyocena	Slight**---------	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
WxC2---------- Wyocena	Moderate:** slope.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
WxD2---------- Wyocena	Severe: slope.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, slope.
WxE---------- Wyocena	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, slope.

* See map unit description for composition and behavior characteristics of the map unit.

** Excessive permeability rate may cause pollution of ground water.

TABLE 10.--CONSTRUCTION MATERIALS

[Some of the terms used in this table to describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," "poor," and "unsuited." Absence of an entry means soil was not rated]

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Ad Adrian	Poor: wetness, low strength.	Good	Unsuited: excess fines, excess humus.	Poor: wetness, excess humus.
ArA Arenzville	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
AtA, AtB Atterberry	Poor: low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
BaB Baraboo	Poor: low strength, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer, area reclaim.
BaC Baraboo	Poor: low strength, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer, slope, area reclaim.
BbC Baraboo	Poor: low strength, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: large stones, thin layer.
BbD Baraboo	Poor: low strength, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
BcE*: Baraboo	Poor: low strength, thin layer, slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
Rock outcrop.				
BdB Baraboo variant	Poor: thin layer, wetness, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: large stones, thin layer, area reclaim.
BeB Bertrand	Poor: low strength.	Fair: excess fines.	Unsuited: excess fines.	Fair: thin layer.
BeC2 Bertrand	Poor: low strength.	Fair: excess fines.	Unsuited: excess fines.	Fair: thin layer, slope.
BlB Billett	Good	Fair: excess fines.	Unsuited: excess fines.	Good.
BlC2 Billett	Good	Fair: excess fines.	Unsuited: excess fines.	Fair: slope.
BlD2 Billett	Fair: slope.	Fair: excess fines.	Unsuited: excess fines.	Poor: slope.
BmA Billett	Good	Fair: excess fines.	Unsuited: excess fines.	Good.
BoB, BoC Boone	Poor: thin layer, area reclaim.	Fair: excess fines.	Unsuited: excess fines.	Poor: too sandy.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
BoD---------- Boone	Poor: thin layer, area reclaim.	Fair: excess fines.	Unsuited: excess fines.	Poor: too sandy, slope.
BrA---------- Brems	Fair: wetness.	Fair: excess fines.	Unsuited: excess fines.	Fair: too sandy.
BtB---------- Briggsville	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
ChA---------- Chaseburg	Fair: low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
Co---------- Colwood	Poor: wetness, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
CuA---------- Curran	Poor: wetness, low strength.	Fair: excess fines.	Unsuited: excess fines.	Good.
DaA DaB---------- Dakota	Good----------	Good----------	Unsuited: excess fines.	Good.
DeA---------- Dells	Poor: wetness.	Good----------	Unsuited: excess fines.	Good.
DkB---------- Dickinson	Good----------	Fair: excess fines.	Unsuited: excess fines.	Good.
DkC---------- Dickinson	Good----------	Fair: excess fines.	Unsuited: excess fines.	Fair: slope.
ElB---------- Eleva	Poor: area reclaim, thin layer.	Poor: excess fines.	Unsuited: excess fines.	Fair: area reclaim.
ElC2---------- Eleva	Poor: area reclaim, thin layer.	Poor: excess fines.	Unsuited: excess fines.	Fair: slope, area reclaim.
ElD2---------- Eleva	Poor: area reclaim, thin layer.	Poor: excess fines.	Unsuited: excess fines.	Poor: slope.
ElE---------- Eleva	Poor: area reclaim, slope, thin layer.	Poor: excess fines.	Unsuited: excess fines.	Poor: slope.
EmA---------- Eleva variant	Poor: thin layer, wetness, area reclaim.	Poor: excess fines, thin layer.	Unsuited: excess fines.	Fair: area reclaim.
EnB, EnC---------- Elkmound	Poor: thin layer, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: area reclaim.
EnD---------- Elkmound	Poor: thin layer, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, area reclaim.
Et---------- Ettrick	Poor: low strength, wetness.	Poor: excess fines.	Unsuited: excess fines.	Poor: wetness.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
FaB---------- Fayette	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
FaC2---------- Fayette	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope, thin layer.
FaD2---------- Fayette	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
Fu*, Fw*. Fluvaquents				
FxB---------- Fox	Good----------	Good----------	Good----------	Fair: thin layer.
FxC2---------- Fox	Good----------	Good----------	Good----------	Fair: thin layer, slope.
GaB---------- Gale	Poor: area reclaim, thin layer.	Poor: thin layer.	Unsuited: excess fines.	Fair: area reclaim, thin layer.
GaC2---------- Gale	Poor: area reclaim, thin layer.	Poor: thin layer.	Unsuited: excess fines.	Fair: slope, area reclaim, thin layer.
GaD2---------- Gale	Poor: area reclaim, thin layer.	Poor: thin layer.	Unsuited: excess fines.	Poor: slope.
GaE---------- Gale	Poor: area reclaim, slope, thin layer.	Poor: thin layer.	Unsuited: excess fines.	Poor: slope.
GoB---------- Gotham	Good----------	Good----------	Unsuited: excess fines.	Fair: too sandy.
GoC---------- Gotham	Good----------	Good----------	Unsuited: excess fines.	Fair: slope, too sandy.
GoD---------- Gotham	Fair: slope.	Good----------	Unsuited: excess fines.	Poor: slope.
Gr---------- Granby	Poor: wetness.	Good----------	Unsuited: excess fines.	Poor: wetness.
Gv---------- Granby variant	Poor: wetness.	Fair: excess fines.	Unsuited: excess fines.	Poor: wetness.
Ho---------- Houghton	Poor: wetness, low strength.	Unsuited: excess humus.	Unsuited: excess humus.	Poor: wetness, excess humus.
JaA, JaB---------- Jackson	Poor: low strength.	Fair: excess fines.	Unsuited: excess fines.	Fair: thin layer.
KlA---------- Kendall	Poor: low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
LfB---------- La Farge	Poor: low strength, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer, area reclaim.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
LfC2 La Farge	Poor: low strength, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope, thin layer, area reclaim.
LfD2 La Farge	Poor: low strength, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
LfE La Farge	Poor: slope, low strength, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
Mc Marshan	Poor: wetness.	Good	Unsuited: excess fines.	Poor: wetness.
MdB McHenry	Good	Poor: excess fines.	Unsuited: excess fines.	Fair: thin layer.
MdC2 McHenry	Good	Poor: excess fines.	Unsuited: excess fines.	Fair: slope, thin layer.
MdD2 McHenry	Fair: slope.	Poor: excess fines.	Unsuited: excess fines.	Poor: slope.
MdE McHenry	Poor: slope.	Poor: excess fines.	Unsuited: excess fines.	Poor: slope.
MsA Mosel	Poor: low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
NlB Norden	Poor: thin layer, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: area reclaim.
NlC2 Norden	Poor: thin layer, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope, area reclaim.
NlD2 Norden	Poor: thin layer, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
NlE Norden	Poor: thin layer, area reclaim, slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
NrE*: Norden	Poor: thin layer, area reclaim, slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
Eleva	Poor: area reclaim, slope, thin layer.	Poor: excess fines.	Unsuited: excess fines.	Poor: slope.
Rock outcrop.				
Or Orion	Poor: wetness, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Os Ossian	Poor: low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
Pa Palms	Poor: wetness, low strength.	Unsuited: excess humus, excess fines.	Unsuited: excess humus, excess fines.	Poor: wetness, excess humus.
PcA, PcB Pillot	Good	Good	Unsuited	Fair: thin layer.
Pd*, Pe*. Pits				
PfB, PfC Plainfield	Good	Good	Unsuited: excess fines.	Poor: too sandy.
PfD Plainfield	Fair: slope.	Good	Unsuited: excess fines.	Poor: too sandy, slope.
RbB Reedsburg	Poor: low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
RhA, RhB Richwood	Good	Good	Unsuited: excess fines.	Good.
RmA Rimer	Poor: thin layer, wetness.	Poor: excess fines, thin layer.	Unsuited: excess fines.	Fair: too sandy.
RnB Ringwood	Poor: low strength.	Poor: excess fines.	Unsuited: excess fines.	Fair: thin layer.
RnC2 Ringwood	Poor: low strength.	Poor: excess fines.	Unsuited: excess fines.	Fair: slope, thin layer.
Rt*. Rock outcrop				
Ry Rowley	Poor: low strength, wetness.	Fair: excess fines.	Unsuited: excess fines.	Good.
ScB St. Charles	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
ScC2 St. Charles	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer, slope.
ScD2 St. Charles	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
Se*: Saprists. Aquents.				
SfA Shiffer	Poor: wetness.	Good	Unsuited: excess fines.	Good.
ShA Shiffer variant	Poor: wetness.	Good	Unsuited: excess fines.	Good.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
SnB---------- Sisson	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
SpB---------- Sparta	Good----------	Fair: excess fines.	Unsuited: excess fines.	Fair: too sandy.
SpC---------- Sparta	Good----------	Fair: excess fines.	Unsuited: excess fines.	Fair: too sandy, slope.
St---------- Sparta variant	Fair: wetness.	Good----------	Unsuited: excess fines.	Fair: too sandy.
TaA, TaB---------- Tama	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
TaC2---------- Tama	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer, slope.
TeA, TeB---------- Tell	Good----------	Good----------	Unsuited: excess fines.	Fair: thin layer.
TeC2---------- Tell	Good----------	Good----------	Unsuited: excess fines.	Fair: thin layer, slope.
TeD2---------- Tell	Fair: slope.	Good----------	Unsuited: excess fines.	Poor: slope.
TvA, TvB---------- Toddville	Poor: low strength.	Fair: excess fines.	Unsuited: excess fines.	Fair: thin layer.
TwB---------- Tustin	Poor: low strength, shrink-swell.	Poor: thin layer.	Unsuited: excess fines.	Fair: too sandy.
UfB---------- Urne	Poor: thin layer, area reclaim.	Poor: thin layer, excess fines.	Unsuited: excess fines.	Fair: area reclaim.
UfC2---------- Urne	Poor: thin layer, area reclaim.	Poor: thin layer, excess fines.	Unsuited: excess fines.	Fair: slope, area reclaim.
UfD2---------- Urne	Poor: thin layer, area reclaim.	Poor: thin layer, excess fines.	Unsuited: excess fines.	Poor: slope.
UfE---------- Urne	Poor: slope, thin layer, area reclaim.	Poor: thin layer, excess fines.	Unsuited: excess fines.	Poor: slope.
VaB---------- Valton	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
VaC2---------- Valton	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer, slope.
VaD2---------- Valton	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
VaE---------- Valton	Poor: low strength, shrink-swell, slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
Wt---------- Watseka	Poor: wetness.	Good----------	Unsuited: excess fines.	Fair: too sandy.
WwB, WwC2---------- Wildale	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones.
WwD2---------- Wildale	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones, slope.
WxB---------- Wyocena	Good----------	Fair: excess fines.	Unsuited: excess fines.	Good.
WxC2---------- Wyocena	Good----------	Fair: excess fines.	Unsuited: excess fines.	Fair: slope.
WxD2---------- Wyocena	Fair: slope.	Fair: excess fines.	Unsuited: excess fines.	Poor: slope.
WxE---------- Wyocena	Poor: slope.	Fair: excess fines.	Unsuited: excess fines.	Poor: slope.

* See map unit description for composition and behavior characteristics of the map unit.

TABLE 11.--WATER MANAGEMENT

[Some of the terms used in this table to describe restrictive soil features are defined in the Glossary. Absence of an entry means soil was not evaluated]

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
Ad Adrian	Seepage	Seepage, wetness.	Floods, frost action.	Wetness, fast intake, soil blowing.	Not needed	Wetness.
ArA Arenzville	Seepage	Piping	Not needed	Floods, erodes easily.	Not needed	Erodes easily.
AtA Atterberry	Favorable	Hard to pack, wetness.	Floods, frost action.	Wetness, floods.	Not needed	Wetness, erodes easily.
AtB Atterberry	Favorable	Hard to pack, wetness.	Frost action	Wetness	Wetness, erodes easily.	Wetness, erodes easily.
BaB Baraboo	Seepage, depth to rock.	Thin layer, wetness.	Depth to rock, frost action.	Wetness, rooting depth, erodes easily.	Wetness	Erodes easily, depth to rock.
BaC Baraboo	Seepage, depth to rock, slope.	Thin layer, wetness.	Depth to rock, frost action, slope.	Wetness, rooting depth, slope.	Wetness	Slope, erodes easily, depth to rock.
BbC Baraboo	Seepage, depth to rock, slope.	Thin layer, wetness.	Depth to rock, frost action, slope.	Wetness, rooting depth, slope.	Wetness	Erodes easily, depth to rock.
BbD Baraboo	Seepage, depth to rock, slope.	Thin layer, wetness.	Depth to rock, frost action, slope.	Wetness, rooting depth, slope.	Slope, wetness.	Slope, erodes easily, depth to rock.
BcE*: Baraboo	Seepage, depth to rock, slope.	Thin layer, wetness.	Depth to rock, frost action, slope.	Wetness, rooting depth, slope.	Slope, wetness.	Slope, erodes easily, depth to rock.
Rock outcrop.						
BdB Baraboo variant	Seepage, depth to rock.	Thin layer, wetness.	Depth to rock, floods, frost action.	Wetness, rooting depth, erodes easily.	Wetness	Wetness, erodes easily, depth to rock.
BeB Bertrand	Seepage	Piping	Not needed	Erodes easily	Too sandy	Erodes easily.
BeC2 Bertrand	Slope, seepage.	Piping	Not needed	Slope, erodes easily.	Too sandy	Slope, erodes easily.
BlB Billett	Seepage	Seepage	Not needed	Soil blowing	Too sandy, soil blowing.	Favorable.
BlC2 Billett	Slope, seepage.	Seepage	Not needed	Slope, soil blowing.	Too sandy, soil blowing.	Slope.
BlD2 Billett	Slope, seepage.	Seepage	Not needed	Slope, soil blowing.	Slope, too sandy, soil blowing.	Slope.
BmA Billett	Seepage	Seepage	Not needed	Soil blowing	Not needed	Favorable.
BoB Boone	Depth to rock, seepage.	Seepage, thin layer.	Not needed	Droughty, fast intake, soil blowing.	Depth to rock, too sandy.	Droughty, depth to rock.
BoC Boone	Slope, depth to rock, seepage.	Seepage, thin layer.	Not needed	Droughty, fast intake, soil blowing.	Depth to rock, too sandy.	Slope, droughty, depth to rock.

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
BoD---------- Boone	Slope, depth to rock, seepage.	Seepage, thin layer.	Not needed-----	Droughty, fast intake, soil blowing.	Slope, depth to rock, too sandy.	Slope, droughty, depth to rock.
BrA---------- Brems	Seepage--------	Seepage--------	Favorable------	Droughty, fast intake, soil blowing.	Not needed-----	Droughty.
BtB---------- Briggsville	Favorable------	Hard to pack---	Not needed-----	Erodes easily	Favorable------	Erodes easily.
ChA---------- Chaseburg	Seepage--------	Favorable------	Frost action, floods.	Erodes easily, floods.	Not needed-----	Erodes easily.
Co---------- Colwood	Seepage--------	Piping, wetness.	Floods, frost action.	Wetness, floods.	Not needed-----	Wetness.
CuA---------- Curran	Seepage--------	Wetness--------	Frost action, floods.	Wetness, floods.	Not needed-----	Wetness, erodes easily.
DaA---------- Dakota	Seepage--------	Seepage--------	Not needed-----	Favorable------	Not needed-----	Favorable.
DaB---------- Dakota	Seepage--------	Seepage--------	Not needed-----	Favorable------	Too sandy------	Favorable.
DeA---------- Dells	Seepage--------	Wetness--------	Frost action---	Wetness, erodes easily.	Not needed-----	Wetness, erodes easily.
DkB---------- Dickinson	Seepage--------	Seepage--------	Not needed-----	Soil blowing---	Soil blowing---	Favorable.
DkC---------- Dickinson	Slope, seepage.	Seepage--------	Not needed-----	Slope, soil blowing.	Soil blowing---	Slope, droughty.
ElB---------- Eleva	Depth to rock, seepage.	Thin layer-----	Not needed-----	Soil blowing, rooting depth.	Soil blowing, depth to rock.	Depth to rock.
ElC2---------- Eleva	Slope, depth to rock, seepage.	Thin layer-----	Not needed-----	Slope, soil blowing, rooting depth.	Soil blowing, depth to rock.	Slope, depth to rock.
ElD2, ElE--------- Eleva	Slope, depth to rock, seepage.	Thin layer-----	Not needed-----	Slope, soil blowing, rooting depth.	Slope, soil blowing, depth to rock.	Slope, depth to rock.
EmA---------- Eleva variant	Seepage, depth to rock.	Thin layer, seepage, wetness.	Depth to rock, floods, frost action.	Wetness, soil blowing, rooting depth.	Not needed-----	Wetness, depth to rock.
EnB---------- Elkmound	Seepage, depth to rock.	Thin layer-----	Not needed-----	Droughty, soil blowing, rooting depth.	Depth to rock, soil blowing.	Droughty, rooting depth, depth to rock.
EnC---------- Elkmound	Seepage, depth to rock, slope.	Thin layer-----	Not needed-----	Droughty, soil blowing, rooting depth.	Depth to rock, soil blowing.	Slope, droughty, rooting depth.
EnD---------- Elkmound	Seepage, depth to rock, slope.	Thin layer-----	Not needed-----	Droughty, soil blowing, rooting depth.	Slope, depth to rock, soil blowing.	Slope, droughty, rooting depth.
Et---------- Ettrick	Seepage--------	Seepage, wetness.	Floods, frost action.	Wetness, floods.	Not needed-----	Wetness.
FaB---------- Fayette	Seepage--------	Favorable------	Not needed-----	Erodes easily	Favorable------	Erodes easily.
FaC2---------- Fayette	Slope, seepage.	Favorable------	Not needed-----	Slope, erodes easily.	Favorable------	Slope, erodes easily.

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
FaD2---------- Fayette	Slope, seepage.	Favorable------	Not needed-----	Slope, erodes easily.	Slope----------	Slope, erodes easily.
Fu*, Fw*. Fluvaquents						
FxB---------- Fox	Seepage--------	Seepage--------	Not needed-----	Favorable------	Too sandy------	Favorable.
FxC2---------- Fox	Seepage, slope.	Seepage--------	Not needed-----	Slope----------	Too sandy------	Slope.
GaB---------- Gale	Seepage, depth to rock.	Thin layer-----	Not needed-----	Rooting depth, erodes easily.	Too sandy, depth to rock.	Depth to rock, erodes easily.
GaC2---------- Gale	Slope, seepage, depth to rock.	Thin layer-----	Not needed-----	Slope, erodes easily, rooting depth.	Too sandy, depth to rock.	Slope, depth to rock, erodes easily.
GaD2, GaE--------- Gale	Slope, seepage, depth to rock.	Thin layer-----	Not needed-----	Slope, erodes easily, rooting depth.	Slope, too sandy, depth to rock.	Slope, depth to rock, erodes easily.
GoB---------- Gotham	Seepage--------	Seepage, piping.	Not needed-----	Fast intake, soil blowing.	Too sandy, soil blowing.	Favorable.
GoC---------- Gotham	Slope, seepage.	Seepage, piping.	Not needed-----	Slope, fast intake, soil blowing.	Too sandy, soil blowing.	Slope.
GoD---------- Gotham	Slope, seepage.	Seepage, piping.	Not needed-----	Slope, fast intake, soil blowing.	Slope, too sandy, soil blowing.	Slope.
Gr---------- Granby	Seepage--------	Seepage, wetness.	Floods---------	Wetness, droughty, fast intake.	Not needed-----	Wetness, droughty.
Gv---------- Granby variant	Seepage--------	Seepage, wetness.	Floods---------	Wetness, fast intake, soil blowing.	Not needed-----	Wetness.
Ho---------- Houghton	Seepage--------	Excess humus, wetness.	Frost action, excess humus, floods.	Soil blowing, wetness, floods.	Not needed-----	Wetness.
JaA---------- Jackson	Seepage--------	Wetness--------	Frost action---	Erodes easily, wetness.	Not needed-----	Erodes easily.
JaB---------- Jackson	Seepage--------	Wetness--------	Frost action---	Erodes easily, wetness.	Too sandy, wetness.	Erodes easily.
KlA---------- Kendall	Seepage--------	Wetness--------	Frost action, floods.	Wetness, erodes easily, floods.	Not needed-----	Wetness, erodes easily.
LfB---------- La Farge	Depth to rock, seepage.	Thin layer-----	Not needed-----	Rooting depth, erodes easily.	Favorable------	Erodes easily, depth to rock.
LfC2---------- La Farge	Depth to rock, seepage, slope.	Thin layer-----	Not needed-----	Slope, rooting depth, erodes easily.	Favorable------	Slope, erodes easily, depth to rock.
LfD2, LfE--------- La Farge	Depth to rock, seepage, slope.	Thin layer-----	Not needed-----	Slope, rooting depth, erodes easily.	Slope----------	Slope, erodes easily, depth to rock.

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
Mc---------- Marshan	Seepage---------	Wetness, seepage.	Floods, frost action.	Wetness, floods.	Not needed-----	Wetness.
MdB---------- McHenry	Seepage---------	Favorable------	Not needed-----	Erodes easily	Favorable------	Erodes easily.
MdC2---------- McHenry	Slope, seepage.	Favorable------	Not needed-----	Erodes easily, slope.	Favorable------	Erodes easily, slope.
MdD2, MdE--------- McHenry	Slope, seepage.	Favorable------	Not needed-----	Erodes easily, slope.	Slope----------	Erodes easily, slope.
MsA---------- Mosel	Seepage---------	Wetness---------	Frost action, floods.	Wetness, floods.	Not needed-----	Wetness.
N1B---------- Norden	Depth to rock, seepage.	Thin layer-----	Not needed-----	Rooting depth	Depth to rock	Depth to rock.
N1C2---------- Norden	Depth to rock, seepage, slope.	Thin layer-----	Not needed-----	Slope, rooting depth.	Depth to rock	Slope, depth to rock.
N1D2, N1E--------- Norden	Depth to rock, seepage, slope.	Thin layer-----	Not needed-----	Slope, rooting depth.	Slope, depth to rock.	Slope, depth to rock.
NrE*: Norden-----------	Depth to rock, seepage, slope.	Thin layer-----	Not needed-----	Slope, rooting depth.	Slope, depth to rock.	Slope, depth to rock.
Eleva----------	Slope, depth to rock, seepage.	Thin layer-----	Not needed-----	Slope, soil blowing, rooting depth.	Slope, soil blowing, depth to rock.	Slope, depth to rock.
Rock outcrop.						
Or---------- Orion	Seepage---------	Wetness---------	Floods, frost action.	Floods, erodes easily, wetness.	Not needed-----	Wetness, erodes easily.
Os---------- Ossian	Seepage---------	Wetness---------	Floods, frost action.	Floods, wetness.	Not needed-----	Wetness.
Pa---------- Palms	Seepage---------	Excess humus, wetness.	Floods, frost action, excess humus.	Wetness, soil blowing, floods.	Not needed-----	Wetness.
PcA---------- Pillot	Seepage---------	Favorable------	Not needed-----	Favorable------	Not needed-----	Favorable.
PcB---------- Pillot	Seepage---------	Favorable------	Not needed-----	Erodes easily	Erodes easily	Erodes easily.
Pd* Pe* Pits						
PfB---------- Plainfield	Seepage---------	Seepage---------	Not needed-----	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
PfC---------- Plainfield	Seepage, slope.	Seepage---------	Not needed-----	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty, slope.
PfD---------- Plainfield	Seepage, slope.	Seepage---------	Not needed-----	Droughty, fast intake, soil blowing.	Slope, too sandy, soil blowing.	Droughty, slope.

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
RbB---- Reedsburg	Favorable----	Hard to pack, wetness.	Percs slowly, frost action.	Wetness, percs slowly.	Wetness, percs slowly.	Wetness, erodes easily.
RhA---- Richwood	Seepage----	Piping----	Not needed----	Favorable----	Not needed----	Erodes easily.
RhB---- Richwood	Seepage----	Piping----	Not needed----	Favorable----	Erodes easily, too sandy.	Erodes easily.
RmA---- Rimer	Seepage----	Hard to pack, wetness.	Frost action, floods.	Fast intake, wetness, soil blowing.	Not needed----	Wetness, percs slowly.
RnB---- Ringwood	Seepage----	No water----	Not needed----	Favorable----	Erodes easily	Erodes easily.
RnC2---- Ringwood	Seepage----	No water----	Not needed----	Slope----	Erodes easily	Slope, erodes easily.
Rt*. Rock outcrop						
Ry---- Rowley	Seepage----	Wetness----	Frost action, floods.	Wetness, floods.	Not needed----	Wetness.
ScB---- St. Charles	Seepage----	Favorable----	Not needed----	Erodes easily	Favorable----	Erodes easily.
ScC2---- St. Charles	Slope, seepage.	Favorable----	Not needed----	Slope, erodes easily.	Favorable----	Erodes easily, slope.
ScD2---- St. Charles	Slope, seepage.	Favorable----	Not needed----	Slope, erodes easily.	Slope----	Erodes easily, slope.
Se*: Saprists.						
Aquents.						
SfA---- Shiffer	Seepage----	Seepage, wetness.	Floods, frost action.	Wetness, floods.	Not needed----	Wetness.
ShA---- Shiffer variant	Seepage----	Thin layer, seepage, wetness.	Floods, frost action.	Wetness, soil blowing, floods.	Not needed----	Wetness.
SnB---- Sisson	Seepage----	Favorable----	Not needed----	Favorable----	Erodes easily	Erodes easily.
SpB---- Sparta	Seepage----	Piping, seepage.	Not needed----	Fast intake, droughty, soil blowing.	Too sandy, soil blowing.	Droughty.
SpC---- Sparta	Slope, seepage.	Piping, seepage.	Not needed----	Fast intake, droughty, soil blowing.	Too sandy, soil blowing.	Slope, droughty.
St---- Sparta variant	Seepage----	Seepage, piping.	Favorable----	Wetness, droughty, fast intake.	Not needed----	Droughty.
TaA---- Tama	Seepage----	Favorable----	Not needed----	Favorable----	Not needed----	Erodes easily.
TaB---- Tama	Seepage----	Favorable----	Not needed----	Favorable----	Erodes easily	Erodes easily.

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
TaC2---------- Tama	Slope, seepage.	Favorable------	Not needed-----	Slope----------	Erodes easily	Slope, erodes easily.
TeA---------- Tell	Seepage--------	Thin layer, seepage.	Not needed-----	Erodes easily	Not needed-----	Erodes easily.
TeB---------- Tell	Seepage--------	Thin layer, seepage.	Not needed-----	Erodes easily	Too sandy------	Erodes easily.
TeC2---------- Tell	Seepage, slope.	Thin layer, seepage.	Not needed-----	Slope, erodes easily.	Too sandy------	Slope, erodes easily.
TeD2---------- Tell	Seepage, slope.	Thin layer, seepage.	Not needed-----	Slope, erodes easily.	Slope, too sandy.	Slope, erodes easily.
TvA---------- Toddville	Seepage--------	Thin layer, wetness.	Frost action---	Wetness--------	Not needed-----	Favorable.
TvB---------- Toddville	Seepage--------	Thin layer, wetness.	Frost action---	Wetness--------	Wetness--------	Favorable.
TwB---------- Tustin	Seepage--------	Hard to pack---	Not needed-----	Fast intake, soil blowing.	Too sandy, soil blowing.	Percs slowly.
UfB---------- Urne	Depth to rock, seepage.	Thin layer, seepage, piping.	Not needed-----	Soil blowing, rooting depth.	Depth to rock, soil blowing.	Depth to rock.
UfC2---------- Urne	Depth to rock, slope, seepage.	Thin layer, seepage, piping.	Not needed-----	Soil blowing, rooting depth, slope.	Depth to rock, soil blowing.	Slope, depth to rock.
UfD2, UfE--------- Urne	Depth to rock, slope, seepage.	Thin layer, seepage, piping.	Not needed-----	Soil blowing, rooting depth, slope.	Depth to rock, slope, soil blowing.	Slope, depth to rock.
VaB---------- Valton	Favorable------	Hard to pack---	Not needed-----	Erodes easily	Favorable------	Erodes easily.
VaC2---------- Valton	Slope----------	Hard to pack---	Not needed-----	Slope, erodes easily.	Favorable------	Erodes easily, slope.
VaD2, VaE--------- Valton	Slope----------	Hard to pack---	Not needed-----	Slope, erodes easily.	Slope----------	Erodes easily, slope.
Wt---------- Watseka	Seepage--------	Piping, seepage.	Favorable------	Wetness, droughty, fast intake.	Not needed-----	Wetness, droughty.
WwB---------- Wildale	Favorable------	Hard to pack---	Not needed-----	Percs slowly, erodes easily.	Percs slowly---	Erodes easily, percs slowly.
WwC2---------- Wildale	Slope----------	Hard to pack---	Not needed-----	Percs slowly, slope, erodes easily.	Percs slowly---	Slope, erodes easily, percs slowly.
WwD2---------- Wildale	Slope----------	Hard to pack---	Not needed-----	Percs slowly, slope, erodes easily.	Slope, percs slowly.	Slope, erodes easily, percs slowly.
WxB---------- Wyocena	Seepage--------	Thin layer, seepage.	Not needed-----	Soil blowing---	Soil blowing, too sandy.	Favorable.
WxC2---------- Wyocena	Seepage, slope.	Thin layer, seepage.	Not needed-----	Soil blowing, slope.	Soil blowing, too sandy.	Slope.
WxD2, WxE--------- Wyocena	Seepage, slope.	Thin layer, seepage.	Not needed-----	Soil blowing, slope.	Slope, soil blowing.	Slope.

* See map unit description for composition and behavior characteristics of the map unit.

TABLE 12.--RECREATIONAL DEVELOPMENT

[Some of the terms used in this table to describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry means soil was not rated]

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Ad Adrian	Severe: wetness, floods, excess humus.	Severe: wetness, excess humus.	Severe: wetness, floods, excess humus.	Severe: wetness, excess humus.	Severe: excess humus, floods, wetness.
ArA Arenzville	Severe: floods.	Moderate: floods.	Severe: floods.	Moderate: floods.	Severe: floods.
AtA, AtB Atterberry	Severe: wetness, floods.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, floods.
BaB Baraboo	Moderate: wetness.	Moderate: wetness.	Moderate: slope, wetness, depth to rock.	Slight	Moderate: thin layer.
BaC Baraboo	Moderate: slope, wetness.	Moderate: slope, wetness.	Severe: slope.	Slight	Moderate: slope, thin layer.
BbC Baraboo	Moderate: wetness.	Moderate: wetness.	Severe: slope.	Slight	Moderate: thin layer.
BbD Baraboo	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
BcE*: Baraboo	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop.					
BdB Baraboo variant	Severe: floods, wetness.	Moderate: wetness.	Moderate: large stones, slope, wetness.	Moderate: wetness.	Severe: floods.
BeB Bertrand	Slight	Slight	Moderate: slope.	Slight	Slight.
BeC2 Bertrand	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
BlB Billett	Slight	Slight	Moderate: slope.	Slight	Slight.
BlC2 Billett	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
BlD2 Billett	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
BmA Billett	Slight	Slight	Slight	Slight	Slight.
BoB Boone	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.
BoC Boone	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Severe: too sandy.

See footnote at end of table.

TABLE 12.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
BoD---- Boone	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Severe: too sandy, slope.
BrA---- Brems	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.
BtB---- Briggsville	Moderate: percs slowly.	Slight----	Moderate: slope, percs slowly.	Slight----	Slight.
ChA---- Chaseburg	Severe: floods.	Moderate: floods.	Severe: floods.	Moderate: floods.	Severe: floods.
Co---- Colwood	Severe: floods, wetness.	Severe: wetness.	Severe: floods, wetness.	Severe: wetness.	Severe: wetness, floods.
CuA---- Curran	Severe: wetness, floods.	Moderate: floods, wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, floods.
DaA---- Dakota	Slight----	Slight----	Slight----	Slight----	Slight.
DaB---- Dakota	Slight----	Slight----	Moderate: slope.	Slight----	Slight.
DeA---- Dells	Severe: floods, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
DkB---- Dickinson	Slight----	Slight----	Moderate: slope.	Slight----	Slight.
DkC---- Dickinson	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----	Moderate: slope.
ElB---- Eleva	Slight----	Slight----	Moderate: depth to rock, slope.	Slight----	Moderate: thin layer.
ElC2---- Eleva	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----	Moderate: slope, thin layer.
ElD2---- Eleva	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
ElE---- Eleva	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
EmA---- Eleva variant	Severe: floods, wetness.	Moderate: floods, wetness.	Severe: wetness, floods.	Moderate: wetness, floods.	Severe: floods.
EnB---- Elkmound	Slight----	Slight----	Severe: depth to rock.	Slight----	Severe: thin layer.
EnC---- Elkmound	Moderate: slope.	Moderate: slope.	Severe: slope, depth to rock.	Slight----	Severe: thin layer.
EnD---- Elkmound	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Moderate: slope.	Severe: slope, thin layer.

See footnote at end of table.

TABLE 12.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Et Ettrick	Severe: floods, wetness.	Severe: wetness.	Severe: wetness, floods.	Severe: wetness.	Severe: wetness, floods.
FaB Fayette	Slight	Slight	Moderate: slope.	Slight	Slight.
FaC2 Fayette	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
FaD2 Fayette	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Fu*, Fw*. Fluvaquents					
FxB Fox	Slight	Slight	Moderate: slope.	Slight	Slight.
FxC2 Fox	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
GaB Gale	Slight	Slight	Moderate: slope, depth to rock.	Slight	Moderate: thin layer.
GaC2 Gale	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope, thin layer.
GaD2 Gale	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
GaE Gale	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
GoB Gotham	Moderate: too sandy.	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.	Moderate: too sandy.
GoC Gotham	Moderate: slope, too sandy.	Moderate: slope, too sandy.	Severe: slope.	Moderate: too sandy.	Moderate: slope, too sandy.
GoD Gotham	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, too sandy.	Severe: slope.
Gr Granby	Severe: floods, wetness.	Severe: wetness.	Severe: wetness, floods.	Severe: wetness.	Severe: wetness, floods.
Gv Granby variant	Severe: floods, wetness.	Severe: wetness.	Severe: wetness, floods.	Severe: wetness.	Severe: wetness, floods.
Ho Houghton	Severe: wetness, floods, excess humus.	Severe: wetness, excess humus.	Severe: wetness, floods, excess humus.	Severe: wetness, excess humus.	Severe: excess humus, wetness, floods.
JaA Jackson	Slight	Slight	Slight	Slight	Slight.
JaB Jackson	Slight	Slight	Moderate: slope.	Slight	Slight.

See footnote at end of table.

TABLE 12.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
KlA---------- Kendall	Severe: wetness, floods.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, floods.
LfB---------- La Farge	Slight----------	Slight----------	Moderate: slope, depth to rock.	Slight----------	Moderate: thin layer.
LfC2--------- La Farge	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: thin layer, slope.
LfD2--------- La Farge	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
LfE---------- La Farge	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Mc----------- Marshan	Severe: floods, wetness.	Severe: wetness.	Severe: floods, wetness.	Severe: wetness.	Severe: floods, wetness.
MdB---------- McHenry	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
MdC2--------- McHenry	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
MdD2--------- McHenry	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
MdE---------- McHenry	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
MsA---------- Mosel	Severe: floods, wetness.	Moderate: wetness, floods.	Severe: wetness, floods.	Moderate: wetness, floods.	Severe: floods.
NlB---------- Norden	Slight----------	Slight----------	Moderate: slope, depth to rock.	Slight----------	Moderate: thin layer.
NlC2--------- Norden	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope, thin layer.
NlD2--------- Norden	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
NlE---------- Norden	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
NrE*: Norden----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Eleva----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop.					
Or----------- Orion	Severe: floods, wetness.	Moderate: wetness, floods.	Severe: wetness, floods.	Moderate: wetness, floods.	Severe: floods.
Os----------- Ossian	Severe: floods, wetness.	Severe: wetness.	Severe: floods, wetness.	Severe: wetness.	Severe: floods, wetness.
Pa----------- Palms	Severe: wetness, floods, excess humus.	Severe: wetness, excess humus.	Severe: wetness, floods, excess humus.	Severe: wetness, excess humus.	Severe: wetness, floods, excess humus.

See footnote at end of table.

TABLE 12.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
PcA---------- Pillot	Slight----------	Slight----------	Slight----------	Slight----------	Slight.
PcB---------- Pillot	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
Pd*, Pe*. Pits					
PfB---------- Plainfield	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy, slope.	Moderate: too sandy.	Moderate: too sandy.
PfC---------- Plainfield	Moderate: too sandy, slope.	Moderate: too sandy, slope.	Severe: slope.	Moderate: too sandy.	Moderate: too sandy, slope.
PfD---------- Plainfield	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: too sandy, slope.	Severe: slope.
RbB---------- Reedsburg	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
RhA---------- Richwood	Slight----------	Slight----------	Slight----------	Slight----------	Slight.
RhB---------- Richwood	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
RmA---------- Rimer	Severe: wetness, floods.	Moderate: wetness, too sandy.	Severe: wetness.	Moderate: wetness, too sandy.	Moderate: wetness, too sandy. floods.
RnB---------- Ringwood	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
RnC2---------- Ringwood	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
Rt*. Rock outcrop					
Ry---------- Rowley	Severe: floods, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, floods.
ScB---------- St. Charles	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
ScC2---------- St. Charles	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
ScD2---------- St. Charles	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Se*: Saprists. Aquents.					
SfA---------- Shiffer	Severe: floods, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, floods.
ShA---------- Shiffer variant	Severe: floods, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, floods.
SnB---------- Sisson	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.

See footnote at end of table.

TABLE 12.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
SpB---------- Sparta	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy, slope.	Moderate: too sandy.	Moderate: too sandy.
SpC---------- Sparta	Moderate: too sandy, slope.	Moderate: too sandy, slope.	Severe: slope.	Moderate: too sandy.	Moderate: too sandy, slope.
St---------- Sparta variant	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.
TaA---------- Tama	Slight----------	Slight----------	Slight----------	Slight----------	Slight.
TaB---------- Tama	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
TaC2---------- Tama	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
TeA---------- Tell	Slight----------	Slight----------	Slight----------	Slight----------	Slight.
TeB---------- Tell	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
TeC2---------- Tell	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
TeD2---------- Tell	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
TvA---------- Toddville	Slight----------	Slight----------	Slight----------	Slight----------	Slight.
TvB---------- Toddville	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
TwB---------- Tustin	Moderate: too sandy.	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.	Moderate: too sandy.
UfB---------- Urne	Slight----------	Slight----------	Moderate: slope, depth to rock.	Slight----------	Moderate: thin layer.
UfC2---------- Urne	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: thin layer, slope.
UfD2---------- Urne	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
UfE---------- Urne	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
VaB---------- Valton	Moderate: percs slowly.	Slight----------	Moderate: slope, percs slowly.	Slight----------	Slight.
VaC2---------- Valton	Moderate: slope, percs slowly.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
VaD2---------- Valton	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
VaE---------- Valton	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 12.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Wt Watseka	Severe: wetness.	Moderate: wetness, too sandy.	Severe: wetness.	Moderate: wetness, too sandy.	Moderate: too sandy, wetness.
WwB Wildale	Moderate: percs slowly.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.	Severe: small stones.
WwC2 Wildale	Moderate: percs slowly, slope.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: small stones.	Severe: small stones.
WwD2 Wildale	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, small stones.	Severe: small stones, slope.
WxB Wyocena	Slight	Slight	Moderate: slope.	Slight	Slight.
WxC2 Wyocena	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
WxD2 Wyocena	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
WxE Wyocena	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

* See map unit description for composition and behavior characteristics of the map unit.

TABLE 13.--WILDLIFE HABITAT POTENTIALS

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates the soil was not rated]

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Ad--Adrian	Poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
ArA--Arenzville	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
AtA--Atterberry	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
AtB--Atterberry	Fair	Good	Good	Good	Good	Fair	Poor	Good	Good	Poor.
BaB--Baraboo	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
BaC--Baraboo	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
BbC--Baraboo	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
BbD--Baraboo	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
BcE*:										
Baraboo	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Rock outcrop.										
BdB--Baraboo variant	Poor	Fair	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
BeB--Bertrand	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
BeC2--Bertrand	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
BlB--Billett	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
BlC2--Billett	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
BlD2--Billett	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
BmA--Billett	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
BoB, BoC--Boone	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
BoD--Boone	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
BrA--Brems	Poor	Fair	Fair	Poor	Poor	Poor	Very poor.	Fair	Good	Very poor.
BtB--Briggsville	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.

See footnote at end of table.

TABLE 13.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
ChA---- Chaseburg	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Co---- Colwood	Good	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
CuA---- Curran	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
DaA, DaB---- Dakota	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
DeA---- Dells	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
DkB---- Dickinson	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
DkC---- Dickinson	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
ElB, ElC2---- Eleva	Good	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Fair	Very poor.
ElD2---- Eleva	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
ElE---- Eleva	Poor	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
EmA---- Eleva variant	Poor	Fair	Fair	Good	Good	Fair	Fair	Fair	Good	Fair.
EnB---- Elkmound	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
EnC, EnD---- Elkmound	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Et---- Ettrick	Fair	Fair	Fair	Good	Fair	Good	Good	Fair	Fair	Good.
FaB---- Fayette	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
FaC2---- Fayette	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
FaD2---- Fayette	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Fu*, Fw*. Fluvaquents										
FxB, FxC2---- Fox	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
GaB---- Gale	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
GaC2---- Gale	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
GaD2---- Gale	Poor	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.

See footnote at end of table.

TABLE 13.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
GaE---- Gale	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
GoB, GoC, GoD---- Gotham	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Gr---- Granby	Poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Gv---- Granby variant	Poor	Fair	Fair	Fair	Fair	Fair	Good	Fair	Fair	Fair.
Ho---- Houghton	Fair	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
JaA, JaB---- Jackson	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
KlA---- Kendall	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
LfB---- La Farge	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
LfC2---- La Farge	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
LfD2---- La Farge	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
LfE---- La Farge	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Mc---- Marshan	Good	Good	Fair	Fair	Fair	Good	Good	Good	Fair	Good.
MdB---- McHenry	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
MdC2, MdD2---- McHenry	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
MdE---- McHenry	Very poor.	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor.
MsA---- Mosel	Good	Good	Good	Good	Good	Good	Fair	Good	Good	Fair.
NlB---- Norden	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
NlC2---- Norden	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
NlD2, NlE---- Norden	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
NrE*: Norden----	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Eleva----	Poor	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Rock outcrop.										
Or---- Orion	Fair	Fair	Good	Good	Good	Good	Fair	Good	Good	Fair.

See footnote at end of table.

TABLE 13.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Os---- Ossian	Good	Good	Good	Fair	Fair	Good	Good	Good	Fair	Good.
Pa---- Palms	Good	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
PcA, PcB---- Pillot	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Pd*, Pe*. Pits										
PfB---- Plainfield	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
PfC, PfD---- Plainfield	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
RbB---- Reedsburg	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
RhA, RhB---- Richwood	Good	Good	Good	Fair	Fair	Poor	Very poor.	Good	Good	Very poor.
RmA---- Rimer	Poor	Fair	Good	Good	Good	Fair	Fair	Fair	Good	Fair.
RnB, RnC2---- Ringwood	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Rt*. Rock outcrop										
Ry---- Rowley	Good	Good	Good	Good	Good	Fair	Poor	Good	Good	Poor.
ScB---- St. Charles	Good	Good	Good	Good	Good	Very poor.	Poor	Good	Good	Very. poor.
ScC2---- St. Charles	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
ScD2---- St. Charles	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Se*: Saprists. Aquents.										
SfA---- Shiffer	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
ShA---- Shiffer variant	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
SnB---- Sisson	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
SpB---- Sparta	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
SpC---- Sparta	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
St---- Sparta variant	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.

See footnote at end of table.

TABLE 13.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
TaA, TaB---------- Tama	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
TaC2---------- Tama	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
TeA, TeB---------- Tell	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
TeC2---------- Tell	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
TeD2---------- Tell	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
TvA, TvB---------- Toddville	Good	Good	Good	Poor	Poor	Poor	Very poor.	Good	Poor	Very poor.
TwB---------- Tustin	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
UfB, UfC2---------- Urne	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
UfD2---------- Urne	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
UfE---------- Urne	Very poor.	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
VaB---------- Valton	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
VaC2---------- Valton	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
VaD2---------- Valton	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
VaE---------- Valton	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Wt---------- Watseka	Fair	Fair	Good	Good	Good	Fair	Poor	Fair	Good	Poor.
WwB---------- Wildale	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
WwC2---------- Wildale	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
WwD2---------- Wildale	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
WxB---------- Wyocena	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
WxC2---------- Wyocena	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
WxD2---------- Wyocena	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
WxE---------- Wyocena	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.

* See map unit description for composition and behavior characteristics of the map unit.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS

[The symbol < means less than; > means greater than. Absence of an entry means data were not estimated]

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Ad	0-30	Sapric material	Pt	A-8	---	---	---	---	---	---	---
Adrian	30-60	Sand, loamy sand, fine sand.	SP, SM	A-2, A-3, A-1	0	80-100	60-100	35-75	0-30	---	NP
ArA	0-60	Silt loam	ML, CL-ML, CL	A-4	0	100	100	95-100	80-90	25-35	5-10
Arenzville											
AtA, AtB	0-18	Silt loam	CL-ML, CL	A-4, A-6	0	100	100	95-100	95-100	25-40	5-15
Atterberry	18-55	Silty clay loam, silt loam.	CL, CH	A-7	0	100	100	95-100	95-100	40-55	20-30
	55-60	Silt loam	CL	A-6	0	100	100	95-100	95-100	30-40	10-20
BaB, BaC	0-14	Silt loam	CL, CL-ML	A-4	0-2	95-100	95-100	90-100	85-95	20-30	5-10
Baraboo	14-34	Silty clay loam, silt loam.	CL	A-6, A-7	0-15	85-100	80-95	80-90	75-90	25-50	10-30
	34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
BbC, BbD	0-6	Stony silt loam	CL, CL-ML	A-4	3-25	95-100	90-100	90-95	85-95	20-30	5-10
Baraboo	6-34	Stony silt loam, stony silty clay loam.	CL	A-6, A-7	3-25	85-100	80-95	80-90	75-90	25-50	10-30
	34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
BcE*:											
Baraboo	0-6	Stony silt loam	CL, CL-ML	A-4	3-25	95-100	90-100	90-95	85-95	20-30	5-10
	6-26	Stony silt loam, stony silty clay loam.	CL	A-6, A-7	3-25	85-100	80-95	80-90	75-90	25-50	10-30
	26	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
BdB	0-6	Stony silt loam	CL, CL-ML	A-4	3-25	95-100	90-100	90-95	85-95	20-30	5-10
Baraboo variant	6-26	Stony silty clay loam, stony silt loam.	CL	A-6, A-7	3-25	85-100	80-95	80-90	75-90	25-50	10-30
	26	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
BeB, BeC2	0-8	Silt loam	ML, CL, CL-ML	A-4	0	100	100	90-100	75-90	15-25	3-10
Bertrand	8-46	Silt loam, silty clay loam.	CL	A-6	0	100	100	90-100	75-95	25-40	10-25
	46-60	Stratified silt loam to loamy sand.	ML, SM, CL, SC	A-4	0	100	100	80-95	35-75	10-25	2-10
BlB, BlC2, BlD2	0-15	Sandy loam	SM, SM-SC	A-2, A-4	0	100	95-100	85-100	25-50	12-23	NP-5
Billett	15-30	Sandy loam	SM, SC, SM-SC	A-2, A-4, A-6	0	100	95-100	85-100	25-50	<25	NP-15
	30-37	Sandy loam, gravelly sandy loam, loamy sand.	SM, SM-SC, SC	A-2, A-4	0-5	95-100	80-95	75-90	25-45	<25	NP-10
	37-60	Sand, fine sand	SM, SP-SM	A-2, A-3	0	95-100	85-100	60-90	5-30	---	NP

See footnote at end of table.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
BmA---------- Billett	0-8	Fine sandy loam	SM, SM-SC, ML, CL-ML	A-4	0	100	95-100	70-85	40-55	<20	2-7
	8-30	Sandy loam------	SM, SM-SC, ML, CL-ML	A-4	0	95-100	85-100	65-85	35-55	<20	2-7
	30-36	Loamy sand------	SM, SM-SC	A-2, A-4	0	95-100	85-100	65-90	30-45	<20	NP-7
	36-60	Fine sand, sand	SM, SP-SM	A-2, A-3	0	95-100	85-100	60-90	5-30	---	NP
BoB, BoC, BoD------ Boone	0-7	Sand----------	SM, SP-SM	A-2	0	100	100	65-80	5-35	---	NP
	7-28	Fine sand, sand	SM, SP-SM	A-2, A-3	0	100	100	50-75	5-30	---	NP
	28-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---
BrA---------- Brems	0-10	Loamy sand------	SM, SP-SM	A-2-4	0	100	85-100	50-85	10-30	---	NP
	10-60	Sand, fine sand, loamy sand.	SM, SP-SM	A-3, A-2-4	0	100	80-100	50-85	5-25	---	NP
BtB---------- Briggsville	0-7	Silt loam-------	CL, CL-ML	A-4, A-6	0	100	100	85-100	60-90	20-40	5-15
	7-39	Silty clay, silty clay loam.	CH, CL	A-6, A-7	0	100	100	95-100	95-100	35-65	15-40
	39-60	Stratified silt to clay.	CL, CH	A-6, A-7	0	100	100	95-100	90-100	30-60	10-35
ChA---------- Chaseburg	0-60	Silt loam-------	ML, CL-ML	A-4	0	100	100	90-100	85-100	<25	NP-5
Co---------- Colwood	0-12	Loam----------	ML	A-4, A-6	0	100	100	85-100	60-90	30-40	2-12
	12-37	Loam, silty clay loam, sandy loam.	CL, CL-ML, SC, SM-SC	A-6, A-4, A-2	0	100	100	60-100	30-90	20-40	6-20
	37-60	Stratified silt loam to very fine sand.	SM, ML	A-2, A-4	0	100	95-100	70-100	30-80	<35	NP-10
CuA---------- Curran	0-8	Silt loam-------	ML, CL-ML, CL	A-4	0	100	100	95-100	85-95	20-30	3-10
	8-50	Silty clay loam, silt loam.	CL, CL-ML	A-4, A-5, A-6, A-7	0	100	100	90-100	70-95	20-45	5-20
	50-59	Stratified silt loam to sand.	ML, CL, SM, SC	A-4	0	100	100	80-95	35-75	<25	2-10
	59-60	Stratified sand to loamy fine sand.	SM, SP-SM	A-2, A-3	0	100	95-100	50-75	5-30	---	NP
DaA, DaB---------- Dakota	0-12	Loam----------	ML, CL, CL-ML	A-4	0	95-100	95-100	80-95	50-85	25-35	5-10
	12-30	Loam, sandy clay loam, clay loam.	CL	A-4, A-6	0	95-100	85-100	80-95	50-80	30-40	8-15
	30-34	Loamy sand, gravelly loamy coarse sand.	SM, SP-SM, SM-SC	A-2	0-3	60-100	50-100	50-80	10-30	<20	NP-5
	34-60	Sand, coarse sand, gravelly coarse sand.	SP, SP-SM	A-1	0-3	55-100	50-100	30-50	2-5	---	NP

See footnote at end of table.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
DeA---------- Dells	0-8	Silt loam-------	CL, CL-ML	A-4	0	100	100	95-100	90-95	20-30	5-10
	8-24	Silty clay loam, silt loam.	CL	A-6	0	100	100	90-100	85-95	30-40	15-20
	24-27	Loam, sandy loam	ML, CL-ML, SM, SM-SC	A-4	0	100	100	60-70	40-55	15-25	2-7
	27-60	Sand, loamy sand	SP-SM, SM	A-3, A-2	0	100	95-100	45-55	0-15	---	NP
DkB, DkC---------- Dickinson	0-18	Sandy loam------	SM, SC, SM-SC	A-4, A-2	0	100	100	85-95	30-50	15-30	NP-10
	18-26	Fine sandy loam, sandy loam.	SM, SC, SM-SC	A-4	0	100	100	85-95	35-50	15-30	NP-10
	26-31	Loamy sand, loamy fine sand.	SM, SP-SM, SM-SC	A-2, A-3	0	100	100	80-95	5-20	10-20	NP-5
	31-60	Sand, fine sand	SM, SP-SM	A-3, A-2	0	100	100	70-90	5-20	---	NP
E1B, E1C2, E1D2, E1E---------- Eleva	0-9	Sandy loam------	SM	A-2, A-4	0	100	95-100	60-90	25-50	<20	2-7
	9-27	Loam, sandy loam, fine sandy loam.	ML, CL-ML, SM, SM-SC	A-2, A-4	0	100	90-100	60-95	25-65	<25	NP-7
	27-36	Sand, fine sand, loamy sand.	SM, SP-SM	A-2, A-3	0	100	80-100	50-85	5-35	<20	NP-4
	36-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---
EmA---------- Eleva variant	0-8	Sandy loam------	SM, SM-SC	A-2, A-4	0	100	95-100	60-70	25-50	<20	2-7
	8-20	Sandy loam------	SM, SM-SC	A-2, A-4	0	100	90-100	60-70	25-50	<20	2-7
	20-26	Loamy sand, loamy fine sand, sand.	SM, SP-SM	A-2, A-3	0	100	80-100	50-75	5-35	---	NP
	26	Weathered bedrock, unweathered bedrock.	---	---	---	---	---	---	---	---	---
EnB, EnC, EnD------ Elkmound	0-8	Sandy loam------	SM, SM-SC	A-2, A-4	0	100	95-100	60-70	30-40	<20	2-7
	8-18	Sandy loam, loam	SM, SC, ML, CL	A-2, A-4, A-6	0	100	80-100	60-90	30-70	10-30	2-13
	18	Weathered bedrock, unweathered bedrock.	---	---	---	---	---	---	---	---	---
Et---------- Ettrick	0-11	Silt loam-------	CL, ML, CL-ML	A-4	0	100	100	90-100	70-90	20-30	3-10
	11-37	Silt loam, silty clay loam.	CL	A-6, A-7	0	100	100	90-100	70-100	25-50	10-32
	37-46	Stratified silt loam to fine sand.	CL, CL-ML, SC, SM-SC	A-4, A-6	0	100	100	60-95	35-85	15-40	5-20
	46-60	Stratified silt loam to fine sand.	CL, ML, SM, SC	A-2, A-4, A-6	0	100	100	60-95	30-85	10-40	1-20
FaB, FaC2, FaD2---- Fayette	0-8	Silt loam-------	CL-ML, CL	A-4, A-6	0	100	100	100	95-100	25-35	5-15
	8-36	Silty clay loam	CL	A-6, A-7	0	100	100	100	95-100	35-45	15-25
	36-60	Silt loam-------	CL	A-6	0	100	100	100	95-100	30-40	10-20
Fu*, Fw*. Fluvaquents											

See footnote at end of table.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
FxB, FxC2---------- Fox	0-12	Loam----------	ML, CL, CL-ML	A-4	0	95-100	85-100	75-95	55-90	20-30	3-10
	12-37	Clay loam, sandy clay loam, gravelly sandy loam.	CL, SC, ML, SM	A-2, A-6, A-7	0-5	75-100	60-95	50-95	20-70	15-45	3-25
	37-60	Sand and gravel	SP, GP, GP-GM, SP-SM	A-1, A-2	0-10	40-75	35-70	15-45	2-10	---	NP
GaB, GaC2, GaD2, GaE---------- Gale	0-7	Silt loam-------	CL-ML, CL	A-4	0	100	100	90-100	70-90	20-30	5-10
	7-31	Loam, silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	100	100	85-100	60-95	20-30	5-12
	31-35	Loamy sand, sand	SM, SP-SM	A-3, A-2	0	100	100	50-75	5-30	---	NP
	35-60	Weathered bedrock, unweathered bedrock.	---	---	---	---	---	---	---	---	---
GoB, GoC, GoD------ Gotham	0-9	Loamy sand------	SM, SP-SM	A-2	0	100	95-100	35-75	5-25	---	NP
	9-34	Loamy fine sand, loamy sand.	SM, SP-SM	A-2	0	95-100	75-100	35-75	5-25	---	NP
	34-60	Sand, fine sand, loamy sand.	SM, SP-SM, SP	A-2, A-3	0	95-100	75-100	35-75	1-20	---	NP
Gr---------- Granby	0-11	Loamy sand------	SM	A-2	0	100	100	50-75	15-30	---	NP
	11-60	Sand, fine sand	SP, SP-SM	A-3, A-2	0	100	95-100	50-70	0-5	---	NP
Gv---------- Granby variant	0-10	Loamy sand------	SM	A-2	0	100	100	50-75	15-30	---	NP
	10-28	Loamy sand, loamy fine sand, sand.	SM, SP-SM	A-2, A-3	0	100	100	50-75	5-30	---	NP
	28-36	Stratified sandy loam to silty clay loam.	CL, ML, SM, SC	A-2, A-4, A-6	0	100	100	60-100	30-90	10-40	2-30
	36-60	Sand, fine sand, loamy fine sand.	SM, SP-SM	A-2, A-3	0	100	95-100	50-80	5-30	---	NP
Ho---------- Houghton	0-60	Sapric material	PT	A-8	0	---	---	---	---	---	---
JaA, JaB---------- Jackson	0-8	Silt loam-------	ML, CL, CL-ML	A-4	0	100	100	90-100	75-90	15-25	3-10
	8-13	Silt loam-------	CL, CL-ML	A-4, A-6	0	100	100	90-100	75-90	20-35	5-15
	13-47	Silt loam, silty clay loam.	CL	A-6	0	100	100	90-100	75-95	25-40	10-25
	47-56	Stratified silt loam to loamy sand.	ML, SM, CL, SC	A-4	0	100	100	80-95	35-75	10-25	2-10
	56-60	Sand, fine sand, loamy sand.	SP-SM, SM	A-2, A-3	0	100	100	70-80	5-30	---	NP
KlA---------- Kendall	0-15	Silt loam-------	CL-ML, CL	A-4, A-6	0	100	100	95-100	90-100	20-35	5-15
	15-32	Silty clay loam	CL	A-6	0	100	100	95-100	90-100	25-40	10-20
	32-60	Stratified sandy loam to silt loam.	CL, ML, SM, SC	A-2, A-4	0-5	90-100	80-90	60-90	30-70	8-25	4-10

See footnote at end of table.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
LfB, LfC2, LfD2, LfE---------- La Farge	0-12	Silt loam-------	CL, CL-ML	A-4	0	100	100	90-100	85-95	20-30	5-10
	12-27	Silt loam, silty clay loam.	CL	A-6	0	100	100	90-100	75-95	25-40	10-25
	27-33	Loam, sandy clay loam, clay loam.	CL, SC	A-6	0	100	100	85-100	45-65	20-35	10-20
	33-60	Unweathered bedrock, weathered bedrock.	---	---	---	---	---	---	---	---	---
Mc---------- Marshan	0-10	Loam----------	ML, CL	A-6, A-4	0	95-100	95-100	95-100	70-90	30-40	5-15
	10-26	Silty clay loam, clay loam.	CL	A-7	0	95-100	95-100	95-100	80-95	40-50	25-30
	26-30	Loam, sandy loam	CL, ML, SM, SC	A-2, A-4 A-6	0	95-100	95-100	60-90	30-75	15-40	3-20
	30-60	Sand----------	SP, SP-SM	A-1, A-2, A-3	0	100	100	45-70	2-5	---	NP
MdB, MdC2, MdD2, MdE---------- McHenry	0-8	Silt loam-------	CL, CL-ML	A-4, A-6	0	100	95-100	90-100	70-90	20-40	5-15
	8-47	Silty clay loam, clay loam, sandy clay loam.	CL	A-7, A-6	0	95-100	90-100	80-100	55-90	35-50	20-35
	47-60	Sandy loam, gravelly sandy loam.	SM, SC, SM-SC	A-2, A-4	0-5	85-100	65-90	55-80	20-45	<25	NP-10
MsA---------- Mosel	0-9	Loam----------	ML, CL-ML, CL	A-4	0	95-100	95-100	85-100	60-80	20-30	3-10
	9-31	Loam, clay loam, sandy clay loam.	SC, CL	A-6	0	75-100	70-100	45-95	40-90	20-40	11-25
	31-60	Silty clay loam, silty clay, clay.	CL, CH	A-7, A-6	0-5	90-100	85-100	80-100	70-95	30-70	15-45
N1B, N1C2, N1D2, N1E---------- Norden	0-7	Loam----------	ML, CL, CL-ML	A-4, A-6	0	100	100	75-85	55-85	20-30	3-12
	7-22	Loam, clay loam, silty clay loam.	CL	A-6	0	100	100	90-100	65-85	25-40	10-25
	22-28	Loam, sandy loam, gravelly loam.	SM, SC, ML, CL	A-2, A-4, A-6	0-5	95-100	75-100	55-90	30-85	15-30	2-12
	28-60	Unweathered bedrock, weathered bedrock.	---	---	---	---	---	---	---	---	---
NrE*: Norden----------	0-7	Loam----------	ML, CL, CL-ML	A-4, A-6	0	100	100	75-85	55-85	20-30	3-12
	7-22	Loam, clay loam, silty clay loam.	CL	A-6	0	100	100	90-100	65-85	25-40	10-25
	22-28	Loam, sandy loam, gravelly loam.	SM, SC, ML, CL	A-2, A-4, A-6	0-5	95-100	75-100	55-90	30-85	15-30	2-12
	28-60	Unweathered bedrock, weathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
NrE*:											
Eleva	0-9	Sandy loam	SM	A-2, A-4	0	100	95-100	60-90	25-50	<20	2-7
	9-27	Loam, sandy loam, fine sandy loam.	ML, CL-ML, SM, SM-SC	A-2, A-4	0	100	90-100	60-95	25-65	<25	NP-7
	27-36	Sand, fine sand, loamy sand.	SM, SP-SM	A-2, A-3	0	100	80-100	50-85	5-35	<20	NP-4
	36-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
Or	0-36	Silt loam	CL, CL-ML	A-4, A-6	0	100	100	85-100	80-100	20-30	5-15
Orion	36-48	Silt loam, silty clay loam.	CL, CL-ML	A-6, A-7	0	100	100	85-100	85-100	20-30	5-15
	48-60	Silt loam	CL, CL-ML	A-4, A-6	0	80-100	80-100	80-100	80-100	20-30	5-15
Os	0-16	Silt loam	ML, CL, OL	A-6, A-7	0	100	100	100	95-100	35-50	10-25
Ossian	16-60	Silt loam, silty clay loam.	CL	A-6	0	100	100	100	95-100	30-40	10-20
Pa	0-37	Sapric material	Pt	---	---	---	---	---	---	---	---
Palms	37-60	Silt loam, silty clay loam, fine sandy loam.	CL-ML, CL	A-4, A-6	0	85-100	80-100	70-95	50-90	25-40	5-20
PcA, PcB	0-15	Silt loam	CL-ML, CL	A-4, A-6	0	100	90-100	85-100	85-100	25-40	5-15
Pillot	15-37	Silty clay loam, clay loam, loam.	CL	A-6, A-7	0	100	90-100	70-100	50-100	25-45	10-30
	37-60	Loamy sand, sand, sandy loam.	SM-SC, SM, SP-SM	A-2, A-1, A-3	0-5	75-100	75-100	25-70	5-25	<25	NP-5
Pd*, Pe*.											
Pits											
PfB, PfC, PfD	0-7	Loamy sand	SM	A-4, A-2	0	100	100	55-95	15-40	---	NP
Plainfield	7-60	Sand	SP	A-3, A-1, A-2	0	75-100	75-100	45-70	1-4	---	NP
RbB	0-9	Silt loam	CL, CL-ML	A-4	0	75-100	75-100	55-100	50-90	20-30	5-10
Reedsburg	9-31	Silt loam, silty clay loam.	CL	A-6, A-7	0-2	75-100	75-100	55-100	50-95	25-45	10-20
	31-60	Cherty clay, clay.	CH, SC	A-7	0-10	55-85	50-75	45-75	40-70	60-90	33-60
RhA, RhB	0-13	Silt loam	ML	A-4	0	100	100	90-100	85-95	25-35	3-10
Richwood	13-49	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	100	100	90-100	85-95	20-35	5-15
	49-56	Stratified silt loam to loamy sand.	CL, ML, SC, SM	A-4	0	100	100	85-95	35-75	<25	2-10
	56-60	Fine sand, sand	SM, SP-SM	A-2, A-3	0	100	100	50-80	5-35	---	NP
RmA	0-30	Loamy sand	SM	A-2, A-4	0	100	95-100	75-90	20-40	---	NP
Rimer	30-37	Fine sandy loam, sandy loam.	SM, SM-SC, SC	A-4	0	100	95-100	60-80	35-50	15-30	NP-10
	37-60	Silty clay loam, silt loam.	CL, CL-ML	A-7, A-6	0	100	95-100	90-100	80-95	30-45	5-15
RnB, RnC2	0-16	Silt loam	CL	A-4, A-6	0	100	100	95-100	70-90	28-40	8-20
Ringwood	16-23	Silty clay loam	CL	A-6, A-7	0	100	100	95-100	60-95	30-50	15-35
	23-40	Sandy clay loam, clay loam, loam.	SC, CL	A-6	0	100	90-100	85-95	45-70	25-40	11-25
	40-60	Sandy loam, gravelly sandy loam.	SM, SC, SM-SC	A-2, A-4	0	85-95	60-90	50-80	30-50	<20	NP-10

See footnote at end of table.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Rt*. Rock outcrop											
Ry---------- Rowley	0-16	Silt loam-------	ML, CL, CL-ML	A-4	0	100	100	90-100	70-90	20-30	3-10
	16-50	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-95	20-40	5-20
	50-56	Stratified silt loam to sand.	CL, ML, SM, SC	A-4	0	100	100	80-95	35-75	<25	2-10
	56-60	Sand, fine sand	SM, SP-SM	A-2, A-3	0	100	100	50-80	5-35	---	NP
ScB, ScC2, ScD2---- St. Charles	0-8	Silt loam-------	CL-ML, CL, ML	A-4, A-6	0	100	100	95-100	95-100	20-35	3-15
	8-47	Silty clay loam, silt loam.	CL	A-6	0	100	100	95-100	90-100	25-40	10-25
	47-60	Sandy loam, gravelly sandy loam.	SM, SC, SM-SC	A-2, A-4	0-5	85-100	65-90	55-80	20-45	<25	NP-10
Se*: Saprists.											
Aquents.											
SfA---------- Shiffer	0-7	Loam----------	CL, ML, CL-ML	A-4	0	100	100	85-95	60-75	<25	2-10
	7-24	Loam, sandy clay loam.	CL, SC	A-6	0	100	100	80-95	35-75	20-35	10-20
	24-32	Loam, sandy loam, loamy sand.	CL, ML, SM, SC	A-2, A-4	0	100	100	50-95	15-65	<20	NP-10
	32-60	Loamy sand, sand	SM, SP-SM, SP	A-2, A-3	0	100	100	50-90	3-30	---	NP
ShA---------- Shiffer variant	0-9	Sandy loam------	SM, SM-SC	A-2, A-4	0	100	100	60-70	30-40	10-20	2-7
	9-29	Sandy loam------	SM, SM-SC	A-2, A-4	0	100	100	60-70	30-40	10-20	2-7
	29-60	Sand, loamy sand	SP, SM, SP-SM	A-2, A-3	0	100	100	50-70	3-25	---	NP
SnB---------- Sisson	0-8	Loam----------	CL, CL-ML	A-4, A-6	0	100	100	85-95	60-85	<30	5-15
	8-37	Loam, clay loam, silt loam.	CL	A-4, A-6	0	100	100	85-100	60-90	18-40	7-25
	37-60	Stratified silt loam to very fine sand.	CL, ML, SM, SC	A-2, A-4, A-6	0	100	95-100	65-95	25-90	<35	NP-15
SpB, SpC---------- Sparta	0-16	Loamy sand------	SM, ML	A-2, A-4	0	100	100	60-95	20-55	---	NP
	16-30	Loamy sand, fine sand, sand.	SP-SM, SM	A-2, A-3, A-4	0	100	100	60-95	5-50	---	NP
	30-60	Sand, fine sand	SP-SM, SM	A-2, A-3	0	100	100	60-95	10-30	---	NP
St---------- Sparta variant	0-14	Loamy sand------	SM	A-2, A-4	0	100	100	60-95	20-50	---	NP
	14-32	Loamy sand, sand, loamy fine sand.	SM, SP-SM	A-2, A-3, A-4	0	100	100	60-95	5-50	---	NP
	32-60	Sand, fine sand	SP, SM, SP-SM	A-2, A-3	0	100	100	60-95	1-30	---	NP
TaA, TaB, TaC2----- Tama	0-19	Silt loam-------	ML, OL	A-6, A-7	0	100	100	100	95-100	35-50	10-20
	19-48	Silty clay loam	CL	A-7	0	100	100	100	95-100	40-50	15-25
	48-60	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	100	95-100	35-45	15-25

See footnote at end of table.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
TeA, TeB, TeC2, TeD2, Tell	0-9	Silt loam	ML, CL-ML, CL	A-4	0	100	100	90-100	85-95	20-30	3-10
	9-30	Silty clay loam, silt loam.	CL	A-6, A-4	0	100	100	90-100	85-95	25-40	8-20
	30-34	Loam, sandy loam, sandy clay loam.	CL, ML, SM, SC	A-4, A-6	0	100	90-100	60-95	35-75	10-29	2-13
	34-60	Sand, loamy sand	SM, SP-SM, SP	A-2, A-3	0	100	90-100	50-75	0-15	---	NP
TvA, TvB, Toddville	0-11	Silt loam	ML, CL, CL-ML	A-4	0	100	100	90-100	85-95	25-35	3-10
	11-53	Silt loam, silty clay loam.	CL, CL-ML	A-6	0	100	100	90-100	85-95	20-40	5-15
	53-58	Stratified silt loam to sand.	ML, SM, CL, SC	A-4	0	100	100	85-95	35-75	<25	2-10
	58-60	Sand, fine sand	SM, SP-SM	A-2, A-3	0	100	100	50-80	5-35	---	NP
TwB, Tustin	0-25	Loamy sand, sand	SM	A-2	0	100	100	60-100	5-35	---	NP
	25-28	Sandy clay loam, loam, sandy loam.	SC, CL	A-6	0-5	90-100	90-100	80-90	45-55	20-30	7-13
	28-60	Silty clay, silty clay loam, clay.	CL, CH	A-7, A-6	0-5	90-100	90-100	85-100	65-100	30-80	15-50
UfB, UfC2, UfD2, UfE, Urne	0-8	Fine sandy loam	SM, ML, CL-ML, SM-SC	A-2, A-4	0	90-100	90-100	50-95	30-65	<20	2-7
	8-27	Very fine sandy loam, fine sandy loam, sandy loam.	SM, ML, CL-ML, SM-SC	A-2, A-4	0	70-100	65-100	50-95	25-65	<20	2-7
	27-60	Weathered bedrock, unweathered bedrock.	---	---	---	---	---	---	---	---	10-15
VaB, VaC2, VaD2, VaE, Valton	0-8	Silt loam	ML, CL, CL-ML	A-4	0	95-100	95-100	90-100	70-90	20-30	3-10
	8-24	Silt loam, silty clay loam.	CL	A-6	0-2	85-100	85-100	75-95	65-90	25-40	10-20
	24-60	Cherty clay, clay.	CH	A-7	0-5	65-85	65-85	60-80	55-80	60-70	33-40
Wt, Watseka	0-12	Loamy sand	SM	A-2	0	100	95-100	80-100	17-35	<25	NP-5
	12-60	Fine sand, sand, loamy sand.	SP, SM	A-3, A-2	0	90-100	90-100	60-80	3-25	---	NP
WwB, WwC2, WwD2, Wildale	0-9	Silt loam	ML, CL, SM, SC	A-4	0-15	65-100	65-95	65-100	45-95	20-30	3-10
	9-60	Clay, cherty clay, silty clay.	CH	A-7	0-15	65-85	50-75	45-75	40-70	60-90	30-60

See footnote at end of table.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
WxB, WxC2, WxD2, WxE---------- Wyocena	0-8	Sandy loam------	SM, SM-SC, ML, CL-ML	A-2, A-4	0-5	90-100	90-100	60-85	30-55	<20	2-7
	8-35	Sandy loam, sandy clay loam, loamy sand.	SM, SC, SM-SC	A-2, A-4	0-5	90-100	90-100	50-85	15-50	<25	2-10
	35-60	Sand, loamy sand	SM, SP-SM	A-1, A-2, A-3	0-5	85-100	80-100	40-65	5-25	---	NP

* See map unit description for composition and behavior characteristics of the map unit.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS

[The symbol < means less than; > means greater than. The erosion tolerance factor (T) is for the entire profile. Wind erodibility group is for the surface layer. Absence of an entry means data were not available or were not estimated]

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group
						K	T	
	In	In/hr	In/in	pH				
Ad	0-30	2.0-6.0	0.35-0.45	5.1-7.8		---	---	3
Adrian	30-60	6.0-20	0.03-0.08	6.1-8.4	Low	---		
ArA	0-60	0.6-2.0	0.20-0.24	5.6-7.8	Low	0.37	5	5
Arenzville								
AtA, AtB	0-18	0.6-2.0	0.22-0.24	5.6-6.5	Low	0.32	5	6
Atterberry	18-55	0.2-0.6	0.18-0.20	5.1-6.0	Moderate	0.43		
	55-60	0.6-2.0	0.20-0.22	5.6-7.8	Low	0.43		
BaB, BaC	0-14	0.6-2.0	0.22-0.24	6.1-7.3	Low	0.37	4	5
Baraboo	14-34	0.6-2.0	0.18-0.22	5.1-6.5	Moderate	0.37		
	34	---	---	---	---	---		
BbC, BbD	0-6	0.6-2.0	0.22-0.24	6.1-7.3	Low	0.28	4	8
Baraboo	6-34	0.6-2.0	0.18-0.22	5.1-6.5	Moderate	0.28		
	34	---	---	---	---	---		
BcE*:								
Baraboo	0-6	0.6-2.0	0.22-0.24	6.1-7.3	Low	0.28	4	8
	6-26	0.6-2.0	0.18-0.22	5.1-6.5	Moderate	0.28		
	26	---	---	---	---	---		
Rock outcrop.								
BdB	0-6	0.6-2.0	0.22-0.24	6.1-7.3	Low	0.28	3	8
Baraboo variant	6-26	0.6-2.0	0.18-0.22	4.5-6.5	Moderate	0.28		
	26	---	---	---	---	---		
BeB, BeC2	0-8	0.6-2.0	0.22-0.24	5.6-7.3	Low	0.37	5	5
Bertrand	8-46	0.6-2.0	0.18-0.22	5.1-7.3	Moderate	0.37		
	46-60	0.6-6.0	0.09-0.22	5.1-6.5	Low	0.37		
BlB, BlC2, BlD2	0-15	2.0-6.0	0.13-0.17	5.1-6.0	Low	0.20	5	3
Billett	15-30	2.0-6.0	0.12-0.14	5.1-7.3	Low	0.20		
	30-37	2.0-6.0	0.12-0.14	5.1-7.3	Low	0.20		
	37-60	6.0-20	0.02-0.08	5.1-8.4	Low	0.10		
BmA	0-8	2.0-6.0	0.20-0.22	6.1-7.8	Low	0.20	4	3
Billett	8-30	2.0-6.0	0.17-0.19	5.1-7.3	Low	0.24		
	30-36	2.0-6.0	0.10-0.12	5.1-7.3	Low	0.24		
	36-60	6.0-20	0.05-0.07	5.1-8.4	Low	0.10		
BoB, BoC, BoD	0-7	6.0-20	0.07-0.09	5.1-6.5	Low	0.15	4	1
Boone	7-28	6.0-20	0.06-0.08	5.1-6.5	Low	0.15		
	28-60	---	---	---	---	---		
BrA	0-10	6.0-20	0.10-0.12	5.1-6.5	Low	0.17	5	2
Brems	10-60	6.0-20	0.05-0.08	4.5-7.8	Low	0.17		
BtB	0-7	0.6-2.0	0.20-0.24	5.1-7.3	Low	0.37	5	5
Briggsville	7-39	0.2-0.6	0.11-0.20	5.1-8.4	Moderate	0.37		
	39-60	0.2-0.6	0.08-0.20	7.4-8.4	Moderate	0.37		
ChA	0-60	0.6-2.0	0.22-0.24	5.6-7.3	Low	0.37	5	5
Chaseburg								
Co	0-12	0.6-2.0	0.20-0.24	6.1-7.8	Low	0.28	5	5
Colwood	12-37	0.6-2.0	0.17-0.22	6.1-8.4	Moderate	0.43		
	37-60	0.6-2.0	0.12-0.22	7.4-8.4	Low	0.43		

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group
						K	T	
	In	In/hr	In/in	pH				
CuA----------	0-8	0.6-2.0	0.22-0.24	5.6-7.3	Low----------	0.32	5	5
Curran	8-50	0.2-0.6	0.18-0.22	4.5-6.5	Moderate------	0.43		
	50-59	0.6-2.0	0.06-0.22	4.5-6.5	Low----------	0.43		
	59-60	2.0-20	0.05-0.10	5.1-6.5	Low----------	0.15		
DaA, DaB---------	0-12	0.6-2.0	0.20-0.22	5.6-7.3	Low----------	0.28	4	5
Dakota	12-30	0.6-2.0	0.17-0.19	5.1-7.3	Low----------	0.28		
	30-34	6.0-20	0.08-0.10	5.1-7.3	Low----------	0.17		
	34-60	6.0-20	0.02-0.04	5.1-7.3	Low----------	0.17		
DeA----------	0-8	0.6-2.0	0.22-0.24	5.6-7.3	Low----------	0.37	4	5
Dells	8-24	0.6-2.0	0.18-0.22	5.1-6.0	Moderate------	0.37		
	24-27	0.6-2.0	0.12-0.19	5.1-6.0	Low----------	0.37		
	27-60	6.0-20	0.05-0.10	5.1-6.0	Low----------	0.15		
DkB, DkC---------	0-18	2.0-6.0	0.12-0.15	5.1-7.3	Low----------	0.20	4	3
Dickinson	18-26	2.0-6.0	0.12-0.15	5.1-7.3	Low----------	0.20		
	26-31	6.0-20	0.08-0.10	5.1-7.3	Low----------	0.20		
	31-60	6.0-20	0.02-0.04	5.1-7.3	Low----------	0.15		
ElB, ElC2, ElD2,								
ElE----------	0-9	2.0-6.0	0.13-0.18	5.1-7.3	Low----------	0.24	4	3
Eleva	9-27	2.0-6.0	0.12-0.19	5.1-6.5	Low----------	0.24		
	27-36	2.0-20	0.05-0.10	5.1-6.5	Low----------	0.10		
	36-60	---	---	---	----------	---		
EmA----------	0-8	2.0-6.0	0.13-0.15	3.6-7.3	Low----------	0.24	4	3
Eleva variant	8-20	2.0-6.0	0.12-0.14	3.6-6.0	Low----------	0.24		
	20-26	2.0-20	0.05-0.11	3.6-6.0	Low----------	0.15		
	26	---	---	---	----------	---		
EnB, EnC, EnD----	0-8	2.0-6.0	0.13-0.15	4.5-6.5	Low----------	0.24	2	3
Elkmound	8-18	2.0-6.0	0.12-0.19	4.5-6.5	Low----------	0.24		
	18	---	---	---	----------	---		
Et----------	0-11	0.6-2.0	0.22-0.24	6.1-7.8	Low----------	0.28	5	5
Ettrick	11-37	0.2-0.6	0.18-0.20	6.1-8.4	Moderate------	0.28		
	37-46	0.6-2.0	0.06-0.22	6.1-8.4	Low----------	0.28		
	46-60	0.6-6.0	0.05-0.22	6.1-8.4	Low----------	0.28		
FaB, FaC2, FaD2--	0-8	0.6-2.0	0.20-0.22	5.1-7.3	Low----------	0.37	5	6
Fayette	8-36	0.6-2.0	0.18-0.20	4.5-6.0	Moderate------	0.37		
	36-60	0.6-2.0	0.18-0.20	5.1-6.5	Moderate------	0.37		
Fu*, Fw*.								
Fluvaquents								
FxB, FxC2--------	0-12	0.6-2.0	0.20-0.24	5.1-7.3	Low----------	0.32	4	5
Fox	12-37	0.6-2.0	0.15-0.19	5.1-7.8	Moderate------	0.32		
	37-60	>20	0.02-0.04	7.4-8.4	Low----------	0.10		
GaB, GaC2, GaD2,								
GaE----------	0-7	0.6-2.0	0.22-0.24	5.1-7.3	Low----------	0.37	4	5
Gale	7-31	0.6-2.0	0.17-0.22	5.1-6.5	Moderate------	0.37		
	31-35	6.0-20	0.06-0.11	5.1-6.5	Low----------	0.15		
	35-60	---	---	---	----------	---		
GoB, GoC, GoD----	0-9	2.0-6.0	0.10-0.12	5.6-7.3	Low----------	0.17	5	2
Gotham	9-34	6.0-20	0.09-0.11	5.1-7.3	Low----------	0.17		
	34-60	6.0-20	0.05-0.10	5.1-7.3	Low----------	0.17		
Gr----------	0-11	6.0-20	0.10-0.12	5.6-7.3	Low----------	0.17	5	2
Granby	11-60	6.0-20	0.05-0.09	5.6-8.4	Low----------	0.17		
Gv----------	0-10	2.0-6.0	0.10-0.12	6.1-7.3	Low----------	0.17	5	2
Granby variant	10-28	2.0-20	0.06-0.11	5.6-7.3	Low----------	0.17		
	28-36	0.2-2.0	0.12-0.22	5.6-7.3	Moderate------	0.43		
	36-60	6.0-20	0.05-0.10	5.6-7.3	Low----------	0.17		

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group
						K	T	
	In	In/hr	In/in	pH				
Ho----------	0-60	2.0-6.0	0.35-0.45	5.1-7.8	----------	---	---	3
Houghton								
JaA, JaB----------	0-8	0.6-2.0	0.22-0.24	5.6-7.3	Low----------	0.37	5	5
Jackson	8-13	0.6-2.0	0.20-0.22	5.6-7.3	Low----------	0.37		
	13-47	0.6-2.0	0.18-0.22	5.6-7.3	Moderate------	0.37		
	47-56	0.6-2.0	0.06-0.22	5.1-6.5	Low----------	0.37		
	56-60	6.0-20	0.05-0.07	5.1-6.5	Low----------	0.15		
KlA----------	0-15	0.6-2.0	0.22-0.24	6.1-7.3	Low----------	0.37	5	6
Kendall	15-32	0.6-2.0	0.18-0.20	5.1-7.3	Moderate------	0.37		
	32-60	0.6-2.0	0.11-0.22	6.6-8.4	Low----------	0.37		
LfB, LfC2, LfD2, LfE----------	0-12	0.6-2.0	0.22-0.24	6.1-7.3	Low----------	0.37	4	5
La Farge	12-27	0.6-2.0	0.18-0.22	5.1-7.3	Moderate------	0.37		
	27-33	0.6-2.0	0.15-0.19	5.1-7.3	Moderate------	0.37		
	33-60	---	---	---	----------	---		
Mc----------	0-10	0.6-2.0	0.20-0.24	6.1-7.3	Low----------	0.28	4	6
Marshan	10-26	0.6-2.0	0.20-0.22	5.6-7.3	Moderate------	0.28		
	26-30	0.6-2.0	0.12-0.19	5.6-7.3	Moderate------	0.28		
	30-60	6.0-20	0.02-0.05	6.1-7.3	Low----------	0.15		
MdB, MdC2, MdD2, MdE----------	0-8	0.6-2.0	0.22-0.24	5.6-7.3	Low----------	0.37	5	5
McHenry	8-47	0.6-2.0	0.15-0.20	5.1-7.8	Moderate------	0.37		
	47-60	0.6-6.0	0.05-0.07	7.4-8.4	Low----------	0.28		
MsA----------	0-9	0.6-2.0	0.20-0.24	5.6-7.8	Low----------	0.28	5	5
Mosel	9-31	0.6-2.0	0.15-0.19	5.6-7.8	Low----------	0.28		
	31-60	0.2-0.6	0.08-0.20	7.4-8.4	Moderate------	0.28		
N1B, N1C2, N1D2, N1E----------	0-7	0.6-2.0	0.20-0.24	5.1-7.3	Low----------	0.32	4	5
Norden	7-22	0.6-2.0	0.15-0.20	5.1-6.5	Moderate------	0.32		
	22-28	0.6-2.0	0.09-0.19	4.5-6.5	Low----------	0.32		
	28-60	---	---	---	----------	---		
NrE*:								
Norden----------	0-7	0.6-2.0	0.20-0.24	5.1-7.3	Low----------	0.32	4	5
	7-22	0.6-2.0	0.15-0.20	5.1-6.0	Moderate------	0.32		
	22-28	0.6-2.0	0.09-0.19	4.5-6.5	Low----------	0.32		
	28-60	---	---	---	----------	---		
Eleva----------	0-9	2.0-6.0	0.13-0.18	5.1-7.3	Low----------	0.24	4	3
	9-27	0.6-6.0	0.12-0.19	5.1-6.5	Low----------	0.24		
	27-36	2.0-20	0.05-0.10	5.1-6.5	Low----------	0.10		
	36-60	---	---	---	----------	---		
Rock outcrop.								
Or----------	0-36	0.6-2.0	0.22-0.24	5.6-7.8	Low----------	0.37	5	5
Orion	36-48	0.6-2.0	0.18-0.22	5.6-7.8	Low----------	0.37		
	48-60	0.6-2.0	0.20-0.22	5.6-7.8	Low----------	0.37		
Os----------	0-16	0.6-2.0	0.22-0.24	6.6-7.3	Moderate------	0.28	5	6
Ossian	16-60	0.6-2.0	0.20-0.22	6.6-7.8	Moderate------	0.28		
Pa----------	0-37	2.0-6.0	0.35-0.45	5.1-8.4	----------	0.10	5	3
Palms	37-60	0.6-2.0	0.14-0.22	6.1-8.4	Low----------	0.10		

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group
						K	T	
	In	In/hr	In/in	pH				
PcA, PcB--------- Pillot	0-15 15-37 37-60	0.6-2.0 0.6-2.0 6.0-20	0.22-0.24 0.16-0.18 0.05-0.12	5.6-6.5 5.6-7.3 5.6-7.3	Low---------- Moderate------ Low----------	0.32 0.43 0.17	4	6
Pd*, Pe*. Pits								
PfB, PfC, PfD---- Plainfield	0-7 7-60	2.0-6.0 6.0-20	0.07-0.09 0.05-0.07	4.5-7.3 4.5-6.5	Low---------- Low----------	0.17 0.17	5	1
RbB-------------- Reedsburg	0-9 9-31 31-60	0.6-2.0 0.6-2.0 0.06-0.2	0.20-0.24 0.16-0.22 0.05-0.09	5.6-7.3 4.5-6.5 4.5-6.0	Low---------- Moderate------ High----------	0.37 0.37 0.28	4	5
RhA, RhB--------- Richwood	0-13 13-49 49-56 56-60	0.6-2.0 0.6-2.0 0.6-6.0 6.0-20	0.22-0.24 0.18-0.22 0.10-0.22 0.05-0.07	5.6-7.3 5.6-7.3 5.6-7.3 6.1-7.3	Low---------- Moderate------ Low---------- Low----------	0.28 0.43 0.43 0.15	5	5
RmA-------------- Rimer	0-30 30-37 37-60	6.0-20.0 2.0-6.0 0.06-2.0	0.08-0.14 0.12-0.17 0.08-0.18	5.1-7.8 5.1-7.3 6.1-8.4	Low---------- Low---------- Moderate------	0.17 0.17 0.32	3	2
RnB, RnC2-------- Ringwood	0-16 16-23 23-40 40-60	0.6-2.0 0.6-2.0 0.6-2.0 2.0-6.0	0.22-0.24 0.16-0.20 0.07-0.10 0.05-0.07	5.6-7.3 5.6-7.3 6.1-8.4 7.4-8.4	Low---------- Moderate------ Low---------- Low----------	0.28 0.43 0.32 0.32	5	5
Rt*. Rock outcrop								
Ry--------------- Rowley	0-16 16-50 50-56 56-60	0.6-2.0 0.6-2.0 0.6-2.0 6.0-20	0.22-0.24 0.18-0.22 0.12-0.16 0.05-0.07	6.1-7.3 5.1-7.3 5.1-7.3 5.6-7.3	Low---------- Low---------- Low---------- Low----------	0.32 0.43 0.43 0.15	5	5
ScB, ScC2, ScD2-- St. Charles	0-8 8-47 47-60	0.6-2.0 0.6-2.0 0.6-6.0	0.22-0.24 0.18-0.20 0.11-0.22	5.1-6.5 5.1-7.3 5.6-7.8	Low---------- Moderate------ Low----------	0.37 0.37 0.37	5	6
Se*: Saprists. Aquents.								
SfA-------------- Shiffer	0-7 7-24 24-32 32-60	0.6-2.0 0.6-2.0 0.6-6.0 6.0-20	0.20-0.22 0.16-0.19 0.09-0.19 0.05-0.10	6.1-7.8 5.1-6.5 5.1-6.5 5.1-6.5	Low---------- Moderate------ Low---------- Low----------	0.28 0.28 0.28 0.15	4	5
ShA-------------- Shiffer variant	0-9 9-29 29-60	2.0-6.0 2.0-6.0 6.0-20	0.13-0.15 0.12-0.14 0.05-0.07	5.6-7.3 5.1-6.5 5.1-6.5	Low---------- Low---------- Low----------	0.24 0.24 0.15	4	3
SnB-------------- Sisson	0-8 8-37 37-60	0.6-2.0 0.6-2.0 0.6-2.0	0.20-0.24 0.15-0.22 0.05-0.22	6.1-7.3 6.1-7.8 7.4-8.4	Low---------- Moderate------ Low----------	0.32 0.43 0.43	5	5
SpB, SpC--------- Sparta	0-16 16-30 30-60	2.0-6.0 6.0-20 6.0-20	0.10-0.12 0.06-0.11 0.05-0.07	5.1-7.3 5.1-6.0 5.1-6.0	Low---------- Low---------- Low----------	0.17 0.17 0.17	5	2
St--------------- Sparta variant	0-14 14-32 32-60	2.0-6.0 6.0-20 6.0-20	0.10-0.12 0.06-0.11 0.05-0.07	5.1-7.3 5.1-6.0 5.1-6.0	Low---------- Low---------- Low----------	0.17 0.17 0.17	5	2

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group
						K	T	
	In	In/hr	In/in	pH				
TaA, TaB, TaC2--- Tama	0-19 19-48 48-60	0.6-2.0 0.6-2.0 0.6-2.0	0.22-0.24 0.18-0.20 0.18-0.20	5.1-7.3 5.1-6.0 5.6-7.3	Moderate------ Moderate------ Moderate------	0.32 0.43 0.43	5	7
TeA, TeB, TeC2, TeD2---------- Tell	0-9 9-30 30-34 34-60	0.6-2.0 0.6-2.0 0.6-2.0 6.0-20	0.22-0.24 0.18-0.22 0.12-0.19 0.05-0.07	5.1-7.3 5.1-6.5 5.1-6.5 5.1-6.5	Low---------- Moderate------ Low---------- Low----------	0.37 0.37 0.37 0.15	4	5
TvA, TvB--------- Toddville	0-11 11-53 53-58 58-60	0.6-2.0 0.6-2.0 0.6-2.0 6.0-20	0.22-0.24 0.18-0.22 0.12-0.16 0.05-0.07	5.6-7.3 5.1-7.3 5.1-7.3 5.6-7.3	Low---------- Moderate------ Low---------- Low----------	0.32 0.43 0.43 0.15	5	5
TwB-------------- Tustin	0-25 25-28 28-60	6.0-20 0.6-2.0 0.06-0.2	0.10-0.12 0.16-0.18 0.10-0.16	5.1-7.3 6.1-7.3 6.1-8.4	Low---------- Low---------- High----------	0.17 0.32 0.32	5	2
UfB, UfC2, UfD2, UfE-------------- Urne	0-8 8-27 27-60	2.0-6.0 2.0-6.0 ---	0.13-0.22 0.12-0.19 ---	5.1-7.3 5.1-7.8 ---	Low---------- Low---------- ---	0.24 0.24 ---	4	3
VaB, VaC2, VaD2, VaE-------------- Valton	0-8 8-24 24-60	0.6-2.0 0.6-2.0 0.06-0.2	0.22-0.24 0.18-0.22 0.09-0.11	5.1-7.3 5.1-7.3 3.6-6.0	Low---------- Moderate------ High----------	0.37 0.37 0.24	4	5
Wt--------------- Watseka	0-12 12-60	6.0-20 6.0-20	0.07-0.12 0.05-0.10	6.1-7.3 5.1-7.3	Low---------- Low----------	0.17 0.10	5	2
WwB, WwC2, WwD2-- Wildale	0-9 9-60	0.6-2.0 0.06-0.2	0.22-0.24 0.06-0.10	5.6-7.3 4.5-6.5	Low---------- High----------	0.37 0.28	3	5
WxB, WxC2, WxD2, WxE-------------- Wyocena	0-8 8-35 35-60	2.0-6.0 2.0-6.0 6.0-20	0.13-0.18 0.09-0.18 0.05-0.10	5.1-7.3 5.1-7.3 6.6-7.8	Low---------- Low---------- Low----------	0.17 0.17 0.17	5	3

* See map unit description for composition and behavior characteristics of the map unit.

TABLE 16.--SOIL AND WATER FEATURES

[Absence of an entry indicates the feature is not a concern. See text for descriptions of symbols and such terms as "rare," "brief," and "perched." The symbol < means less than; > means greater than]

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
Ad---------- Adrian	A/D	Frequent----	Long------	Nov-May	0-1.0	Apparent	Nov-May	>60	---	High-----	High-----	Moderate.
ArA---------- Arenzville	B	Frequent----	Brief-----	Nov-Jun	3.0-6.0	Apparent	Nov-Jun	>60	---	High-----	Moderate	Moderate.
AtA, AtB---------- Atterberry	B	Occasional	Brief-----	Mar-May	1.0-3.0	Apparent	Mar-Jun	>60	---	High-----	High-----	Moderate.
BaB, BaC, BbC, BbD---------- Baraboo	B	None--------	---	---	2.0-3.0	Perched	Mar-Jun	24-40	Hard	High-----	Moderate	Moderate.
BcE*: Baraboo----------	B	None--------	---	---	2.0-3.0	Perched	Mar-Jun	24-40	Hard	High-----	Moderate	Moderate.
Rock outcrop.												
BdB---------- Baraboo variant	C	Occasional	Brief-----	Mar-May	1.0-3.0	Perched	Nov-Jun	24-40	Hard	High-----	Moderate	Moderate.
BeB, BeC2---------- Bertrand	B	None--------	---	---	>6.0	---	---	>60	---	High-----	Low------	Moderate.
BlB, BlC2, BlD2--- Billett	A	None--------	---	---	>6.0	---	---	>60	---	Moderate	Low------	Moderate.
BmA---------- Billett	B	None--------	---	---	3.0-6.0	Apparent	Nov-Apr	>60	---	Moderate	Low------	Moderate.
BoB, BoC, BoD----- Boone	A	None--------	---	---	>6.0	---	---	20-40	Rippable	Low------	Low------	Moderate.
BrA---------- Brems	A	None--------	---	---	2.5-5.0	Apparent	Jan-Apr	>60	---	Low------	Low------	High.
BtB---------- Briggsville	C	None--------	---	---	>6.0	---	---	>60	---	Moderate	High-----	Moderate.
ChA---------- Chaseburg	B	Frequent----	Very brief	Nov-Jun	3.0-5.0	Apparent	Nov-Apr	>60	---	High-----	Moderate	Moderate.
Co---------- Colwood	B/D	Frequent----	Brief-----	Mar-Apr	0-1.0	Apparent	Oct-May	>60	---	High-----	High-----	Low.
CuA---------- Curran	C	Occasional	Brief-----	Mar-May	1.0-3.0	Apparent	Sep-Apr	>60	---	High-----	High-----	High.
DaA, DaB---------- Dakota	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Low------	Moderate.

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
DeA--- Dells	C	Rare---	---	---	1.0-3.0	Apparent	Nov-May	>60	---	High---	High---	Moderate.
DkB, DkC--- Dickinson	B	None---	---	---	>6.0	---	---	>60	---	Moderate	Low---	Moderate.
ElB, ElC2, ElD2, ElE--- Eleva	B	None---	---	---	>6.0	---	---	20-40	Rippable	Moderate	Low---	Moderate.
EmA--- Eleva variant	C	Frequent---	Brief---	Mar-May	1.0-3.0	Perched	Nov-Jun	20-40	Rippable	High---	Moderate	High.
EnB, EnC, EnD--- Elkmound	D	None---	---	---	>6.0	---	---	10-20	Rippable	Moderate	Moderate	Moderate.
Et--- Ettrick	B/D	Frequent---	Brief to long.	Nov-May	0-1.0	Apparent	Nov-Jun	>60	---	High---	High---	Low.
FaB, FaC2, FaD2--- Fayette	B	None---	---	---	>6.0	---	---	>60	---	High---	Moderate	Moderate.
Fu*, Fw*. Fluvaquents												
FxB, FxC2--- Fox	B	None---	---	---	>6.0	---	---	>60	---	Moderate	Low---	Moderate.
GaB, GaC2, GaD2, GaE--- Gale	B	None---	---	---	>6.0	---	---	20-40	Rippable	High---	Moderate	Moderate.
GoB, GoC, GoD--- Gotham	A	None---	---	---	>6.0	---	---	>60	---	Low---	Low---	Moderate.
Gr--- Granby	A/D	Frequent---	Brief---	Mar-Apr	0-1.0	Apparent	Nov-Jun	>60	---	Moderate	High---	Low.
Gv--- Granby variant	A/D	Frequent---	Brief---	Mar-May	0-1.0	Apparent	Nov-Jun	>60	---	Moderate	High---	Low.
Ho--- Houghton	A/D	Frequent---	Long---	Nov-May	0-1.0	Apparent	Sep-Jun	>60	---	High---	High---	Low.
JaA, JaB--- Jackson	B	None---	---	---	2.5-5.0	Apparent	Nov-Apr	>60	---	High---	Moderate	Moderate.
KlA--- Kendall	B	Occasional	Brief---	Mar-May	1.0-3.0	Apparent	Mar-Jun	>60	---	High---	High---	Moderate.
LfB, LfC2, LfD2, LfE--- La Farge	B	None---	---	---	>6.0	---	---	24-40	Rippable	High---	Moderate	Moderate.

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
Mc---------- Marshan	B/D	None to common.	Very brief	Mar-Nov	0-1.0	Apparent	Jan-Dec	>60	---	High-----	High-----	Moderate.
MdB, MdC2, MdD2, MdE---------- McHenry	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	High-----	Moderate.
MsA---------- Mosel	C	Occasional	Brief-----	Mar-Apr	1.0-3.0	Perched	Nov-May	>60	---	High-----	High-----	Low.
N1B, N1C2, N1D2, N1E---------- Norden	B	None--------	---	---	>6.0	---	---	20-40	Rippable	Moderate	Low------	Moderate.
NrE*: Norden----------	B	None--------	---	---	>6.0	---	---	20-40	Rippable	Moderate	Low------	Moderate.
Eleva----------	B	None--------	---	---	>6.0	---	---	20-40	Rippable	Moderate	Low------	Moderate.
Rock outcrop.												
Or---------- Orion	C	Frequent----	Brief-----	Mar-Nov	1.0-3.0	Apparent	Nov-May	>60	---	High-----	High-----	Low.
Os---------- Ossian	B/D	Frequent----	Very brief	Feb-Nov	0-1.0	Apparent	Nov-Jul	>60	---	High-----	High-----	Low.
Pa---------- Palms	A/D	Frequent----	Long------	Nov-May	0-1.0	Apparent	Nov-May	>60	---	High-----	High-----	Moderate.
PcA, PcB---------- Pillot	B	None--------	---	---	>6.0	---	---	>60	---	High-----	Moderate	Moderate.
Pd*, Pe*. Pits												
PfB, PfC, PfD----- Plainfield	A	None--------	---	---	>6.0	---	---	>60	---	Low------	Low------	High.
RbB---------- Reedsburg	B	None--------	---	---	1.0-3.0	Perched	Nov-May	>60	---	High-----	High-----	High.
RhA, RhB---------- Richwood	B	None--------	---	---	>6.0	---	---	>60	---	High-----	Moderate	Moderate.
RmA---------- Rimer	C	Occasional	Brief-----	Mar-May	1.0-3.0	Perched	Jan-Apr	>60	---	High-----	High-----	Moderate.
RnB, RnC2--------- Ringwood	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Low.

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
Rt*. Rock outcrop												
Ry---------- Rowley	B/C	Occasional	Brief-----	Mar-May	1.0-3.0	Apparent	Nov-May	>60	---	High-----	High-----	Moderate.
ScB, ScC2, ScD2--- St. Charles	B	None--------	---	---	>6.0	---	---	>60	---	High-----	Moderate	Moderate.
Se*: Saprists. Aquents.												
SfA---------- Shiffer	B/C	Occasional	Brief-----	Mar-May	1.0-3.0	Apparent	Nov-May	>60	---	High-----	High-----	Moderate.
ShA---------- Shiffer variant	B	Occasional	Brief-----	Mar-May	1.0-3.0	Apparent	Nov-Jun	>60	---	High-----	Moderate	Moderate.
SnB---------- Sisson	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Low------	Low.
SpB, SpC---------- Sparta	A	None--------	---	---	>6.0	---	---	>60	---	Low------	Low------	Moderate.
St---------- Sparta variant	A	None--------	---	---	2.5-5.0	Apparent	Nov-May	>60	---	Low------	Low------	Moderate.
TaA, TaB, TaC2---- Tama	B	None--------	---	---	>6.0	---	---	>60	---	High-----	Moderate	Moderate.
TeA, TeB, TeC2, TeD2---------- Tell	B	None--------	---	---	>6.0	---	---	>60	---	High-----	Moderate	Moderate.
TvA, TvB---------- Toddville	B	None--------	---	---	2.5-5.0	Apparent	Nov-Apr	>60	---	High-----	Moderate	Moderate.
TwB---------- Tustin	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	High-----	Low.
UfB, UfC2, UfD2, UfE---------- Urne	B	None--------	---	---	>6.0	---	---	20-40	Rippable	Moderate	Low------	Moderate.
VaB, VaC2, VaD2, VaE---------- Valton	B	None--------	---	---	>6.0	---	---	>60	---	High-----	Moderate	High.
Wt---------- Watseka	B	None--------	---	---	1.0-3.0	Apparent	Feb-May	>60	---	Moderate	Low------	High.

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
WwB, WwC2, WwD2--- Wildale	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	High-----	Moderate.
WxB, WxC2, WxD2, WxE---------- Wyocena	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Low------	Moderate.

* See map unit description for composition and behavior characteristics of the map unit.

TABLE 17.--ENGINEERING TEST DATA

[Tests were made by the Wisconsin Department of Transportation, Division of Highways, in cooperation with the Federal Highway Administration, Department of Transportation. Absence of an entry indicates that no determination was made]

Soil name and location	Parent material	Report number	Depth	Moisture density		Percentage passing sieve--[1]				Percentage smaller than--[1]				Liquid limit	Plasticity index	Classification	
				Maximum dry	Optimum moisture	No. 4	No. 10	No. 40	No. 200	0.05 mm	0.02 mm	0.005 mm	0.002 mm			AASHTO	Unified
			In	Lb/cu ft	Pct									Pct			
Baraboo silt loam: SW1/4SW1/4NW1/4 sec. 13, T. 11 N., R. 5 E. (Modal)	Loess over quartzite bedrock.	s73WI-56-1-1	19-28	--	--	96	94	94	91	89	64	37	31	50.2	27.2	A-7-6 (17)	CH
Dakota loam: NE1/4NE1/4SE1/4 sec. 26, T. 10 N., R. 6 E. (Modal)	Loamy material over outwash sand.	s73WI-56-2(1)	15-20	--	--	--	100	95	60	59	46	27	21	30.8	13.4	A-6(6)	CL
		s73WI-56-2(2)	34-60	--	--	--	100	89	5	5	5	4	2	--	NP[2]	A-3(0)	SP
Dickinson sandy loam: SW1/4NW1/4SW1/4 sec. 15, T. 12 N., R. 6 E. (Modal)	Loamy material over outwash sand.	s74WI-111-3(1)	18-26	--	--	--	100	92	28	27	23	13	9	--	NP	A-2-4 (0)	SM
		s74WI-111-3(2)	31-60	109.4	13.0	--	100	92	5	3	3	3	2	--	NP	A-3(0)	SP
Eleva sandy loam: NE1/4SE1/4NE1/4 sec. 23, T. 13 N., R. 5 E. (Modal)	Loamy material over outwash sand and sandstone.	s75WI-111-3	15-27	--	--	--	100	92	35	33	29	17	12	--	NP	A-2-4 (0)	SM
Ettrick silt loam: NW1/4SW1/4SW1/4 sec. 10, T. 11 N., R. 5 E. (Modal)	Silty material over stratified silty, loamy, and sandy material.	s76WI-111-1(4)	16-24	--	--	--	--	100	98	96	71	37	30	45.4	24.6	A-7-6 (15)	CL
		s76WI-111-1(8)	46-60	--	--	--	--	100	56	53	37	16	12	21.8	5.0	A-4(4)	CL-ML
Gale silt loam: SW1/4SE1/4SW1/4 sec. 15, T. 12 N., R. 4 E. (Modal)	Silty and loamy material over soft sandstone bedrock	s75WI-111-2-1	10-29	--	--	--	100	99	89	87	63	30	23	29.4	9.5	A-4(8)	CL
Gotham loamy sand: NE1/4NE1/4NE1/4 sec. 16, T. 12 N., R. 6 E. (slightly less clay in subsoil than modal)	Sandy material over outwash sand.	s75WI-111-1(1)	20-30	--	--	--	100	87	14	13	10	7	4	--	NP	A-2-4 (0)	SM
		s75WI-111-1(2)	34-60	--	--	--	100	88	2	2	2	1	1	--	NP	A-3(0)	SP

TABLE 17.--ENGINEERING TEST DATA--Continued

Soil name and location	Parent material	Report number	Depth	Moisture density		Percentage passing sieve--[1]				Percentage smaller than--[1]				Liquid limit	Plasticity index	Classification	
				Maximum dry	Optimum moisture	No. 4	No. 10	No. 40	No. 200	0.05 mm	0.02 mm	0.005 mm	0.002 mm			AASHTO	Unified
			In	Lb/cu ft	Pct									Pct			
La Farge silt loam:																	
SE1/4SE1/4NE1/4 sec. 33, T. 12 N., R. 4 E. (Modal)	Silty and loamy material over soft sandstone bedrock	s76WI-111-3-1	18-27	--	--	--	100	99	90	87	58	32	25	36.0	17.4	A-6(11)	CL
McHenry silt loam:																	
NE1/4SE1/4SW1/4 sec. 22, T. 11 N., R. 7 E. (More sand and less silt and clay in substratum than modal)	Silty and loamy material over calcareous gravelly sandy loam till.	s74WI-111-5(1)	13-22	--	--	--	100	98	88	85	63	35	29	42.0	21.4	A-7-6 (13)	CL
		s74WI-111-5(2)	22-37	--	--	--	100	92	54	50	35	22	17	29.6	13.8	A-6(5)	CL
		s74WI-111-5(3)	59-66	129.8	7.8	86	83	73	22	18	11	6	4	--	NP	A-2-4 (0)	SM
Reedsburg silt loam:																	
NE1/4NE1/4SW1/4 sec. 26, T. 11 N., R. 4 E. (Modal)	Loess over cherty clay residuum.	s75WI-111-4-(3)	17-26	--	--	--	100	99	97	96	70	37	29	41.1	19.3	A-7-6 (12)	CL
		s75WI-111-4(6)	37-60	--	--	84	82	78	74	73	70	62	58	81.5	53.5	A-7-6 (20)	CH
Sparta loamy sand:																	
NW1/4SW1/4NW1/4 sec. 5, T. 8 N., R. 3 E. (Modal)	Sandy material over outwash sand.	s74WI-111-2(1)	16-30	--	--	--	100	96	10	10	8	5	4	--	NP	A-2-4 (0)	SP-SM
		s74WI-111-2(2)	48-60	--	--	--	100	96	2	2	1	1	1	--	NP	A-3(0)	SP
Valton silt loam:																	
NW1/4NE1/4NW1/4 sec. 3, T. 11 N., R. 3 E. (Modal)	Loess over cherty clay residuum.	s74WI-111-1(3)	11-19	--	--	96	95	92	89	86	59	27	21	34.0	11.8	A-6(9)	CL
		s74WI-111-1(6)	29-60	--	--	74	72	69	60	60	59	53	51	66.2	35.2	A-7-5 (15)	CH
Wyocena sandy loam:																	
NE1/4NE1/4SE1/4 sec. 27, T. 12 N., R. 7 E. (Modal)	Loamy and sandy material over calcareous loamy sand and sandy till.	s74WI-111-4(1)	18-24	--	--	90	88	81	27	25	21	15	12	--	NP	A-2-4 (0)	SM
		s74WI-111-4(2)	46-60	112.2	10.6	95	93	83	12	9	5	3	2	--	NP	A-2-4 (0)	SP-SM

[1] Results by this procedure may differ somewhat from the results obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHTO procedure, the fine material is analyzed by the hydrometer method and various grain-size fractions are calculated on the basis of all material up to and including that 3 inches in diameter. In the SCS soil survey procedure, the fine material is analyzed by the pipette method, and the material coarser than 2 millimeters in diameter is excluded from calculations of grain-size fractions. The mechanical analyses used in this table are not suitable for use in naming textural classes of soil.

[2] NP means nonplastic.

TABLE 18.--CLASSIFICATION OF THE SOILS

[An asterisk in the first column indicates a taxadjunct to the series. See text for a description of those characteristics of this taxadjunct that are outside the range of the series]

Soil name	Family or higher taxonomic class
Adrian	Sandy or sandy-skeletal, mixed, euic, mesic Terric Medisaprists
Aquents	Aquents
Arenzville	Coarse-silty, mixed, nonacid, mesic Typic Udifluvents
Atterberry	Fine-silty, mixed, mesic Udollic Ochraqualfs
Baraboo	Fine-silty, mixed, mesic Typic Hapludalfs
Baraboo variant	Fine-silty, mixed, mesic Aquollic Hapludalfs
Bertrand	Fine-silty, mixed, mesic Typic Hapludalfs
Billett	Coarse-loamy, mixed, mesic Mollic Hapudalfs
Boone	Mesic, uncoated Typic Quartzipsamments
Brems	Mixed, mesic Aquic Udipsamments
Briggsville	Fine, mixed, mesic Typic Hapludalfs
Chaseburg	Coarse-silty, mixed, nonacid, mesic Typic Udifluvents
Colwood	Fine-loamy, mixed, mesic Typic Haplaquolls
Curran	Fine-silty, mixed, mesic Udollic Ochraqualfs
Dakota	Fine-loamy over sandy or sandy-skeletal, mixed, mesic Typic Argiudolls
Dells	Fine-silty over sandy or sandy-skeletal, mixed, mesic Aquollic Hapludalfs
Dickinson	Coarse-loamy, mixed, mesic Typic Hapludolls
Eleva	Coarse-loamy, mixed, mesic Typic Hapludalfs
Eleva variant	Coarse-loamy, mixed, mesic Udollic Ochraqualfs
Elkmound	Loamy, mixed, mesic Lithic Dystrochrepts
Ettrick	Fine-silty, mixed, mesic Fluvaquentic Haplaquolls
Fayette	Fine-silty, mixed, mesic Typic Hapludalfs
Fluvaquents	Loamy, mixed, nonacid, mesic Fluvaquents
Fox	Fine-loamy over sandy or sandy-skeletal, mixed, mesic Typic Hapludalfs
Gale	Fine-silty over sandy or sandy-skeletal, mixed, mesic Typic Hapludalfs
Gotham	Sandy, mixed, mesic Psammentic Hapludalfs
Granby	Sandy, mixed, mesic Typic Haplaquolls
Granby variant	Sandy, mixed, mesic Typic Haplaquolls
Houghton	Euic, mesic Typic Medisaprists
Jackson	Fine-silty, mixed, mesic Typic Hapludalfs
Kendall	Fine-silty, mixed, mesic Aeric Ochraqualfs
La Farge	Fine-silty, mixed, mesic Typic Hapludalfs
Marshan	Fine-loamy over sandy or sandy-skeletal, mixed, mesic Typic Haplaquolls
McHenry	Fine-loamy, mixed, mesic Typic Hapludalfs
Mosel	Fine-loamy, mixed, mesic Aquollic Hapludalfs
Norden	Fine-loamy, mixed, mesic Typic Hapludalfs
Orion	Coarse-silty, mixed, nonacid, mesic Aquic Udifluvents
Ossian	Fine-silty, mixed, mesic Typic Haplaquolls
Palms	Loamy, mixed, euic, mesic Terric Medisaprists
Pillot	Fine-silty over sandy or sandy-skeletal, mixed, mesic Typic Argiudolls
Plainfield	Mixed, mesic Typic Udipsamments
Reedsburg	Fine-silty over clayey, mixed, mesic Aquic Paleudalfs
Richwood	Fine-silty, mixed, mesic Typic Argiudolls
*Rimer	Loamy, mixed, mesic Aquic Arenic Hapludalfs
Ringwood	Fine-loamy, mixed, mesic Typic Argiudolls
Rowley	Fine-silty, mixed, mesic Aquic Argiudolls
St. Charles	Fine-silty, mixed, mesic Typic Hapludalfs
Saprists	Saprists
Shiffer	Fine-loamy over sandy or sandy-skeletal, mixed, mesic Aquollic Hapludalfs
Shiffer variant	Coarse-loamy, mixed,mesic Aeric Haplaquepts
Sisson	Fine-loamy, mixed, mesic Typic Hapludalfs
Sparta	Sandy, mixed, mesic Entic Hapludolls
Sparta variant	Sandy, mixed, mesic Entic Hapludolls
*Tama	Fine-silty, mixed, mesic Typic Argiudolls
Tell	Fine-silty over sandy or sandy-skeletal, mixed, mesic Typic Hapludalfs
Toddville	Fine-silty, mixed, mesic Typic Argiudolls
Tustin	Clayey, mixed, mesic Arenic Hapludalfs
Urne	Coarse-loamy, mixed, mesic Dystric Eutrochrepts
Valton	Fine-silty over clayey, mixed, mesic Mollic Paleudalfs
Watseka	Sandy, mixed, mesic Aquic Hapludolls
Wildale	Fine, mixed, mesic Mollic Paleudalfs
Wyocena	Coarse-loamy, mixed, mesic Typic Hapludalfs

☆ U.S. GOVERNMENT PRINTING OFFICE: 1980-299-999/78

NRCS Accessibility Statement

This document is not accessible by screen-reader software. The Natural Resources Conservation Service (NRCS) is committed to making its information accessible to all of its customers and employees. If you are experiencing accessibility issues and need assistance, please contact our Helpdesk by phone at 1-800-457-3642 or by e-mail at ServiceDesk-FTC@ftc.usda.gov. For assistance with publications that include maps, graphs, or similar forms of information, you may also wish to contact our State or local office. You can locate the correct office and phone number at http://offices.sc.egov.usda.gov/locator/app.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.