United States Department of Agriculture

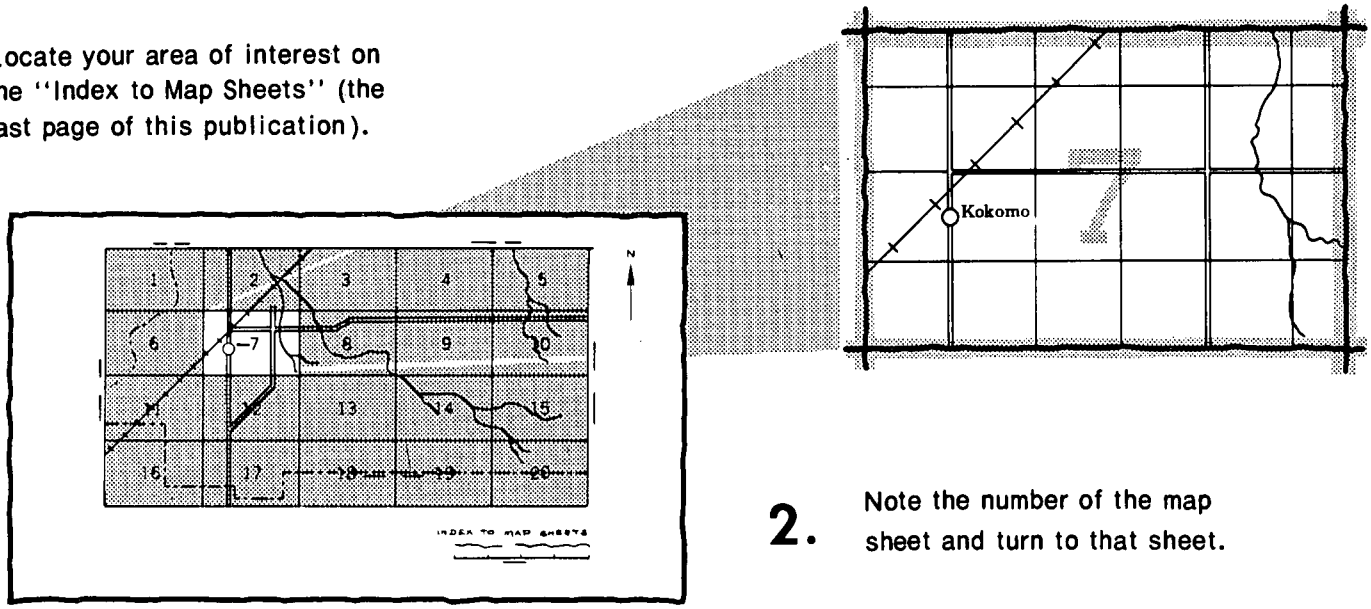
Soil Conservation Service

In Cooperation with Cornell University Agricultural Experiment Station

Soil Survey of Seneca Nation of Indians, New York

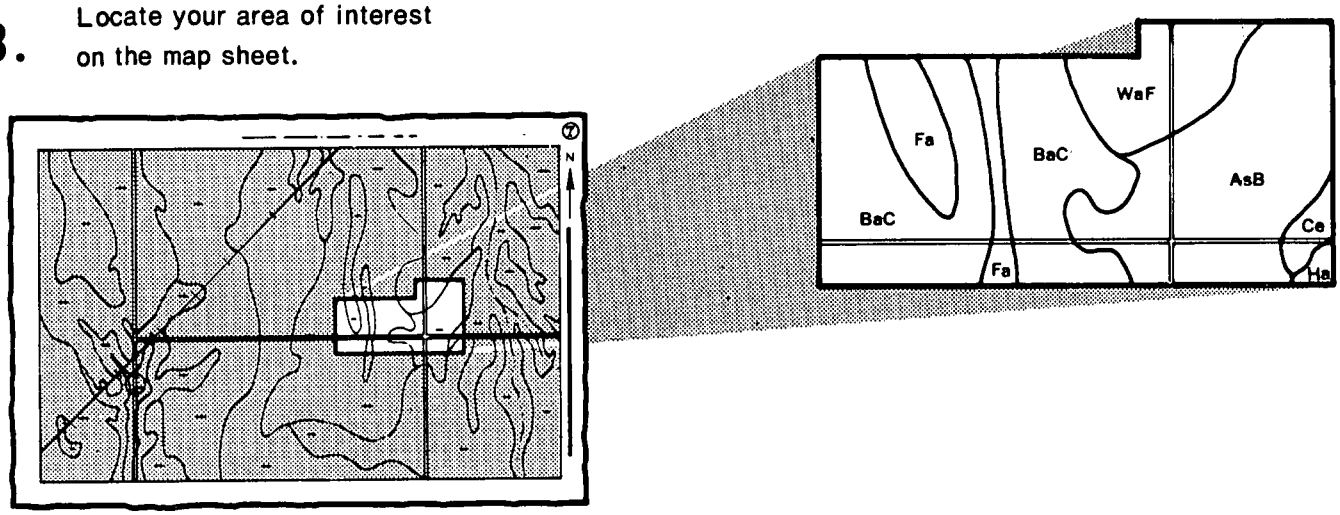
HOW TO USE

1. Locate your area of interest on the "Index to Map Sheets" (the last page of this publication).

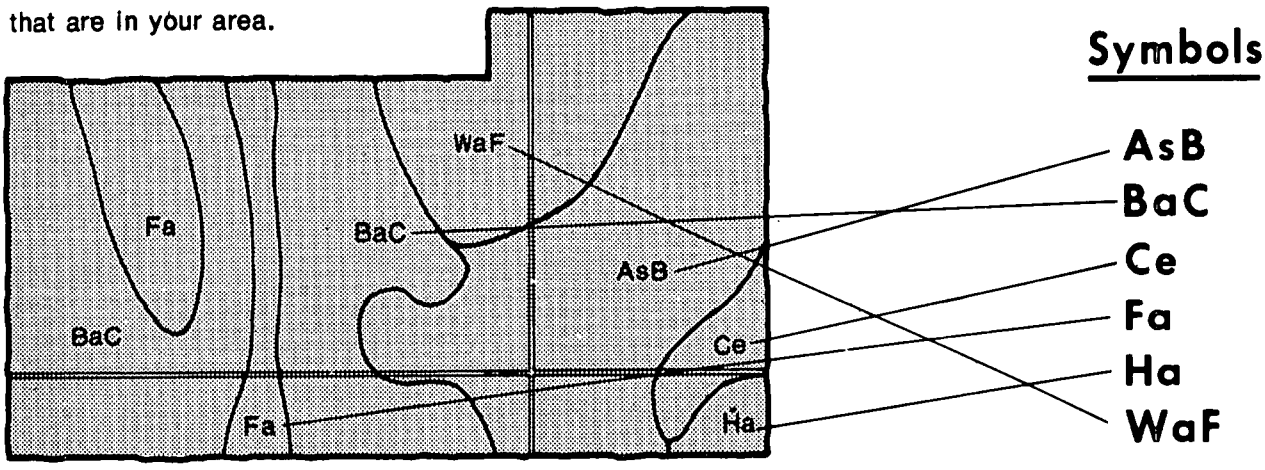


2. Note the number of the map sheet and turn to that sheet.

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

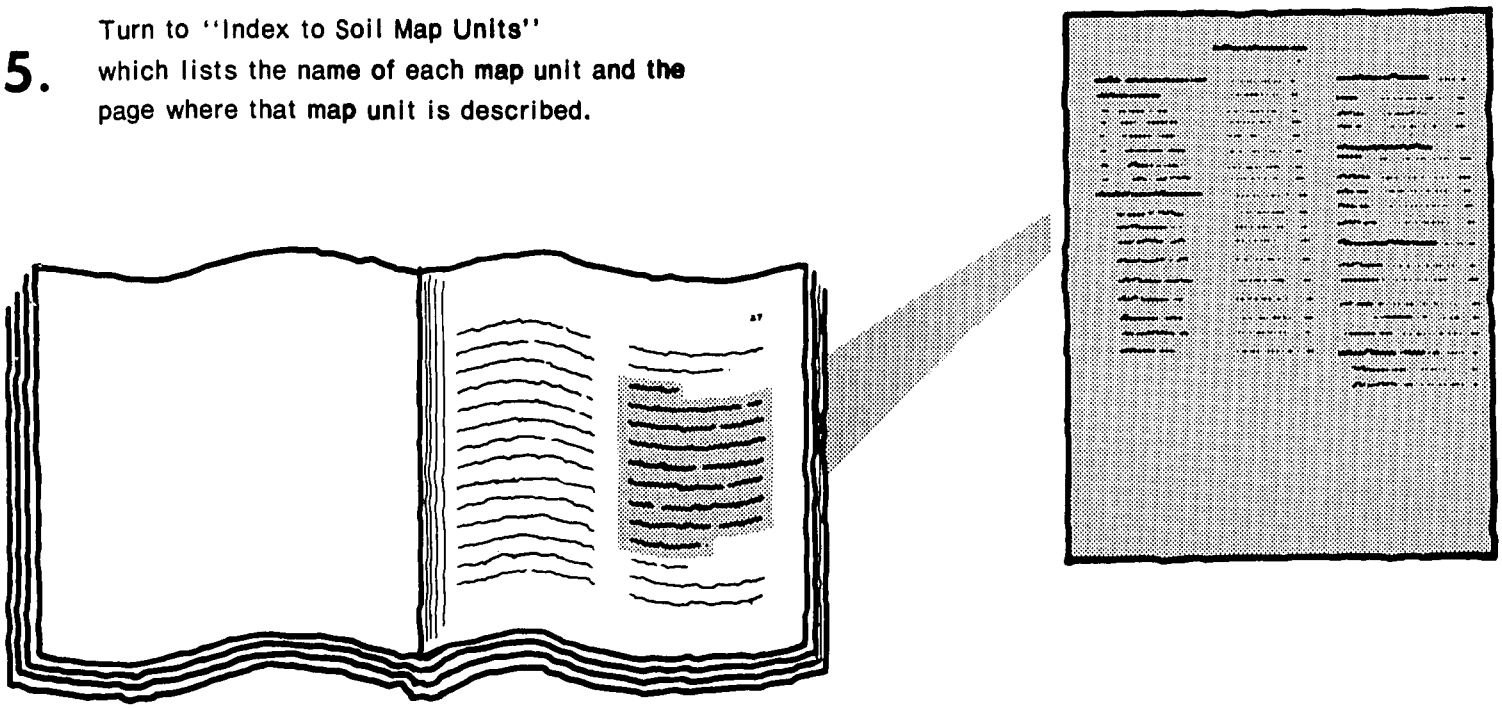


4. List the map unit symbols that are in your area.

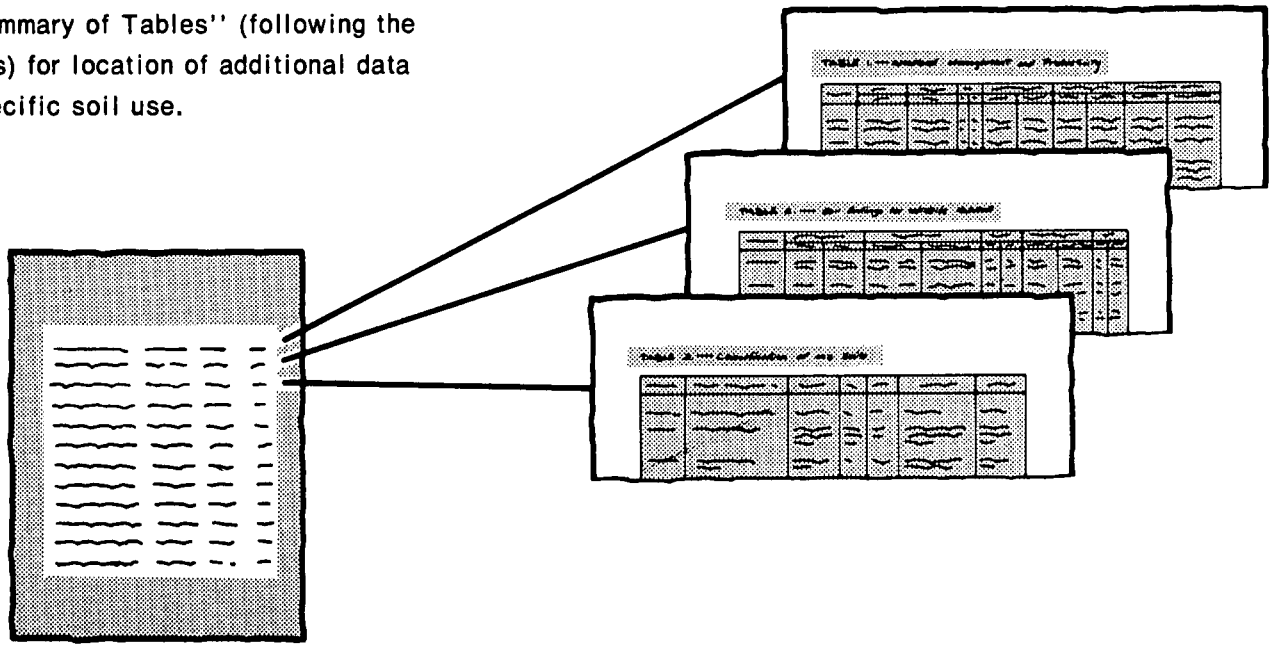


THIS SOIL SURVEY

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 completed in 1980. Soil names and descriptions were approved in 1980. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1980. This survey was made cooperatively by the Soil Conservation Service and the Cornell University Agricultural Experiment Station. It is part of the technical assistance furnished to the Seneca Nation of Indians.

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: The official tribal emblem of the Seneca Nation of Indians, representing the eight clans of the Seneca Nation.

Contents

Index to map units iv
Summary of tables vi
Foreword ix
General nature of the survey area 1
How this survey was made 4
Detailed soil map units 7
Soil descriptions 7
Prime farmland 65
Use and management of the soils 67
Crops and pasture 67
Woodland management and productivity 69
Recreation 70
Wildlife habitat 71
Engineering 72
Soil properties 77
Engineering index properties 77
Physical and chemical properties 78
Soil and water features 79
Classification of the soils 81
Soil series and their morphology 81
Formation of the soils 119
Factors of soil formation 119
Processes of soil horizon development 121
References 123
Glossary 125
Tables 133

Soil Series

Allard series 81
Allard Variant 82
Alton series 83
Angola series 83
Arkport series 84
Blasdell series 85
Brinkerton Variant 85
Canadice series 86
Canandaigua series 86
Caneadea series 87
Castile series 88
Chenango series 89
Chippewa series 89
Churchville series 90
Collamer series 91
Colonie series 91
Cosad series 92
Derb series 93
Elnora series 93
Ernest Variant 94
Farnham series 94
Fluvaquents 95
Fremont series 95
Galen series 96
Gilpin series 97
Halsey series 97
Haplaquolls 98
Hudson series 98
Lamson series 99
Lordstown series 99
Lyons series 100
Manlius series 101
Mardin series 101
Marilla series 102
Middlebury series 103
Minoa series 103
Niagara series 104
Orpark series 105
Palms series 105
Patchin series 106
Phelps series 107
Rayne series 108
Raynham series 108
Red Hook series 109
Rhinebeck series 109
Schuyler series 110
Scio series 111
Tioga series 112
Udifluvents 112
Unadilla series 113
Valois series 113
Volusia series 114
Wallington series 114
Wayland series 115
Wharton series 116
Williamson series 116

Issued August 1984

Index to Map Units

AkA—Allard silt loam, 0 to 3 percent slopes 7
AkB—Allard silt loam, 3 to 8 percent slopes 8
AlA—Allard Variant silt loam, 0 to 3 percent slopes... 8
AlB—Allard Variant silt loam, 3 to 8 percent slopes... 9
AlC—Allard Variant silt loam, 8 to 15 percent slopes 9
AmA—Alton fine gravelly loam, 0 to 3 percent slopes 10
AmB—Alton fine gravelly loam, 3 to 8 percent slopes 10
AmC—Alton fine gravelly loam, 8 to 15 percent slopes 11
AoA—Angola silt loam, 0 to 3 percent slopes 12
ArC—Arkport very fine sandy loam, 8 to 15 percent slopes 12
ArE—Arkport very fine sandy loam, 25 to 40 percent slopes 13
Be—Beaches 13
BlB—Blasdell shaly silt loam, 3 to 8 percent slopes.. 13
BrB—Brinkerton Variant silt loam, 3 to 8 percent slopes 14
BrC—Brinkerton Variant silt loam, 8 to 15 percent slopes 14
BrD—Brinkerton Variant silt loam, 15 to 25 percent slopes 15
Ca—Canadice silt loam 15
Cb—Canadice silty clay loam 15
Cc—Canandaigua silt loam 16
Cd—Canandaigua mucky silt loam 16
Ce—Canandaigua silt loam, acid substratum 17
CfA—Caneadea silty clay loam, 0 to 3 percent slopes 17
CfB—Caneadea silty clay loam, 3 to 8 percent slopes 18
CgA—Castile gravelly loam, 0 to 3 percent slopes 18
Ch—Chenango sandy loam 19
CkA—Chenango gravelly loam, 0 to 3 percent slopes 19
CkB—Chenango gravelly loam, 3 to 8 percent slopes 20
CkC—Chenango gravelly loam, 8 to 15 percent slopes 22
CkD—Chenango gravelly loam, 15 to 25 percent slopes 22
CkE—Chenango gravelly loam, 25 to 40 percent slopes 22
ClA—Chenango channery silt loam, fan, 0 to 3 percent slopes 23
ClB—Chenango channery silt loam, fan, 3 to 8 percent slopes 23
Cn—Chippewa silt loam 24
CoA—Churchville silt loam, 0 to 3 percent slopes 24
CoB—Churchville silt loam, 3 to 8 percent slopes 25
CsB—Collamer silt loam, 3 to 8 percent slopes 25
CsC—Collamer silt loam, 8 to 15 percent slopes 26
CtB—Collamer silt loam, till substratum, 3 to 8 percent slopes 26
CuB—Colonie loamy fine sand, 3 to 8 percent slopes 27
CuC—Colonie loamy fine sand, 8 to 15 percent slopes 27
Cv—Cosad loamy fine sand 28
DdA—Derb silt loam, 0 to 3 percent slopes 28
DdB—Derb silt loam, 3 to 8 percent slopes 28
DdC—Derb silt loam, 8 to 15 percent slopes 29
ElA—Elnora loamy fine sand, 0 to 3 percent slopes.. 29
ElB—Elnora loamy fine sand, 3 to 8 percent slopes.. 30
ErB—Ernest Variant silt loam, 3 to 8 percent slopes. 30
ErC—Ernest Variant silt loam, 8 to 15 percent slopes 31
ErD—Ernest Variant silt loam, 15 to 25 percent slopes 31
FbB—Farnham shaly silt loam, 3 to 8 percent slopes 32
Fu—Fluvaquents and Udifluvents, frequently flooded 32
FxB—Fremont silt loam, 3 to 8 percent slopes 32
GaA—Galen very fine sandy loam, 0 to 3 percent slopes 33
GaB—Galen very fine sandy loam, 3 to 8 percent slopes 33
GlB—Gilpin shaly silt loam, 3 to 8 percent slopes 34
GlC—Gilpin shaly silt loam, 8 to 15 percent slopes ... 34
GlD—Gilpin shaly silt loam, 15 to 25 percent slopes. 35
GlE—Gilpin shaly silt loam, 25 to 35 percent slopes. 35
GlF—Gilpin shaly silt loam, 35 to 65 percent slopes 36
Ha—Halsey silt loam 36
Hn—Haplaquolls, ponded 36
HuB—Hudson silt loam, 3 to 8 percent slopes 37
HvE—Hudson silty clay loam, 25 to 40 percent slopes 37
Lc—Lamson very fine sandy loam 38
Ld—Lamson mucky very fine sandy loam 38
LoC—Lordstown channery silt loam, 8 to 15 percent slopes 39
LoF—Lordstown channery silt loam, 35 to 65 percent slopes 39
Ly—Lyons silt loam 39

MaA—Manlius shaly silt loam, 0 to 3 percent slopes. 40
MaB—Manlius shaly silt loam, 3 to 8 percent slopes. 40
MaD—Manlius shaly silt loam, 15 to 25 percent slopes 41
MbE—Manlius very shaly silt loam, 25 to 35 percent slopes 41
MbF—Manlius very shaly silt loam, 35 to 50 percent slopes 41
MdB—Mardin channery silt loam, 3 to 8 percent slopes 42
MdC—Mardin channery silt loam, 8 to 15 percent slopes 42
MdD—Mardin channery silt loam, 15 to 25 percent slopes 43
MfB—Marilla shaly silt loam, 3 to 8 percent slopes 43
MfC—Marilla shaly silt loam, 8 to 15 percent slopes. 44
Mg—Middlebury silt loam 44
Mh—Minoa very fine sandy loam 45
NfA—Niagara silt loam, 0 to 3 percent slopes 46
NfB—Niagara silt loam, 3 to 8 percent slopes 46
Nh—Niagara silt loam, till substratum 47
OrA—Orpark silty clay loam, 0 to 3 percent slopes 47
OrB—Orpark silty clay loam, 3 to 8 percent slopes 48
OrC—Orpark silty clay loam, 8 to 15 percent slopes. 48
Pa—Palms muck 49
Pc—Patchin silt loam 49
PhA—Phelps gravelly loam, 0 to 3 percent slopes 50
Pt—Pits, borrow 50
Pu—Pits, gravel 50
RaB—Rayne channery silt loam, 3 to 8 percent slopes 50
RaC—Rayne channery silt loam, 8 to 15 percent slopes 51
RaD—Rayne channery silt loam, 15 to 25 percent slopes 51
RaE—Rayne channery silt loam, 25 to 35 percent slopes 52
RaF—Rayne channery silt loam, 35 to 65 percent slopes 52
RbC—Rayne extremely bouldery silt loam, 8 to 15 percent slopes 52
RbD—Rayne extremely bouldery silt loam, 15 to 25 percent slopes 53
RbE—Rayne extremely bouldery silt loam, 25 to 35 percent slopes 53
RbF—Rayne extremely bouldery silt loam, 35 to 65 percent slopes 53
RcA—Raynham silt loam, 0 to 3 percent slopes 54
RcB—Raynham silt loam, 3 to 8 percent slopes 54
Re—Red Hook silt loam 55
RgA—Rhinebeck silt loam, 0 to 3 percent slopes 55
RkA—Rhinebeck gravelly loam, 0 to 3 percent slopes 56
ScB—Schuyler silt loam, 3 to 8 percent slopes 56
ScD—Schuyler silt loam, 15 to 25 percent slopes 57
Sd—Scio silt loam 57
To—Tioga silt loam 57
Ua—Unadilla silt loam 58
VaB—Valois gravelly silt loam, 3 to 8 percent slopes 58
VpA—Volusia channery silt loam, 0 to 3 percent slopes 59
VpB—Volusia channery silt loam, 3 to 8 percent slopes 60
VpC—Volusia channery silt loam, 8 to 15 percent slopes 60
Wa—Wallington silt loam 61
Wd—Wayland silt loam 61
WhC—Wharton silt loam, 8 to 15 percent slopes 62
WhD—Wharton silt loam, 15 to 25 percent slopes 62
WmB—Williamson silt loam, 3 to 8 percent slopes 63

Summary of Tables

Temperature and precipitation (table 1) 134

Freeze dates in spring and fall (table 2) 135
Probability. Temperature.

Growing season (table 3) 135

Acreage and proportionate extent of the soils (table 4) 136
Acres. Percent.

Prime farmland (table 5) 138

Land capability and yields per acre of crops (table 6) 139
Land capability. Sweet corn. Tomatoes. Snap beans. Strawberries. Corn silage. Wheat. Alfalfa hay.

Woodland management and productivity (table 7) 144
Ordination symbol. Management concerns. Potential productivity. Trees to plant.

Recreational development (table 8) 150
Camp areas. Picnic areas. Playgrounds. Paths and trails. Golf fairways.

Wildlife habitat (table 9) 157
Potential for habitat elements. Potential as habitat for—Openland wildlife, Woodland wildlife, Wetland wildlife.

Building site development (table 10) 162
Shallow excavations. Dwellings without basements. Dwellings with basements. Small commercial buildings. Local roads and streets. Lawns and landscaping.

Sanitary facilities (table 11) 168
Septic tank absorption fields. Sewage lagoon areas. Trench sanitary landfill. Area sanitary landfill. Daily cover for landfill.

Construction materials (table 12) 174
Roadfill. Sand. Gravel. Topsoil.

Water management (table 13) 179
Limitations for—Pond reservoir areas; Embankments, dikes, and levees; Aquifer-fed excavated ponds. Features affecting—Drainage, Terraces and diversions, Grassed waterways.

Engineering index properties (table 14) 185
Depth. USDA texture. Classification—Unified, AASHTO. Fragments greater than 3 inches. Percentage passing sieve—4, 10, 40, 200. Liquid limit. Plasticity index.

Physical and chemical properties of the soils (table 15) 196
Depth. Clay. Moist bulk density. Permeability. Available water capacity. Reaction. Shrink-swell potential. Erosion factors. Organic matter.
Soil and water features (table 16) 201
Hydrologic group. Flooding. High water table. Bedrock. Potential frost action. Risk of corrosion.
Classification of the soils (table 17) 205
Family or higher taxonomic class.
Relationship between soil series and their position, parent material, and drainage (table 18) 206

Foreword

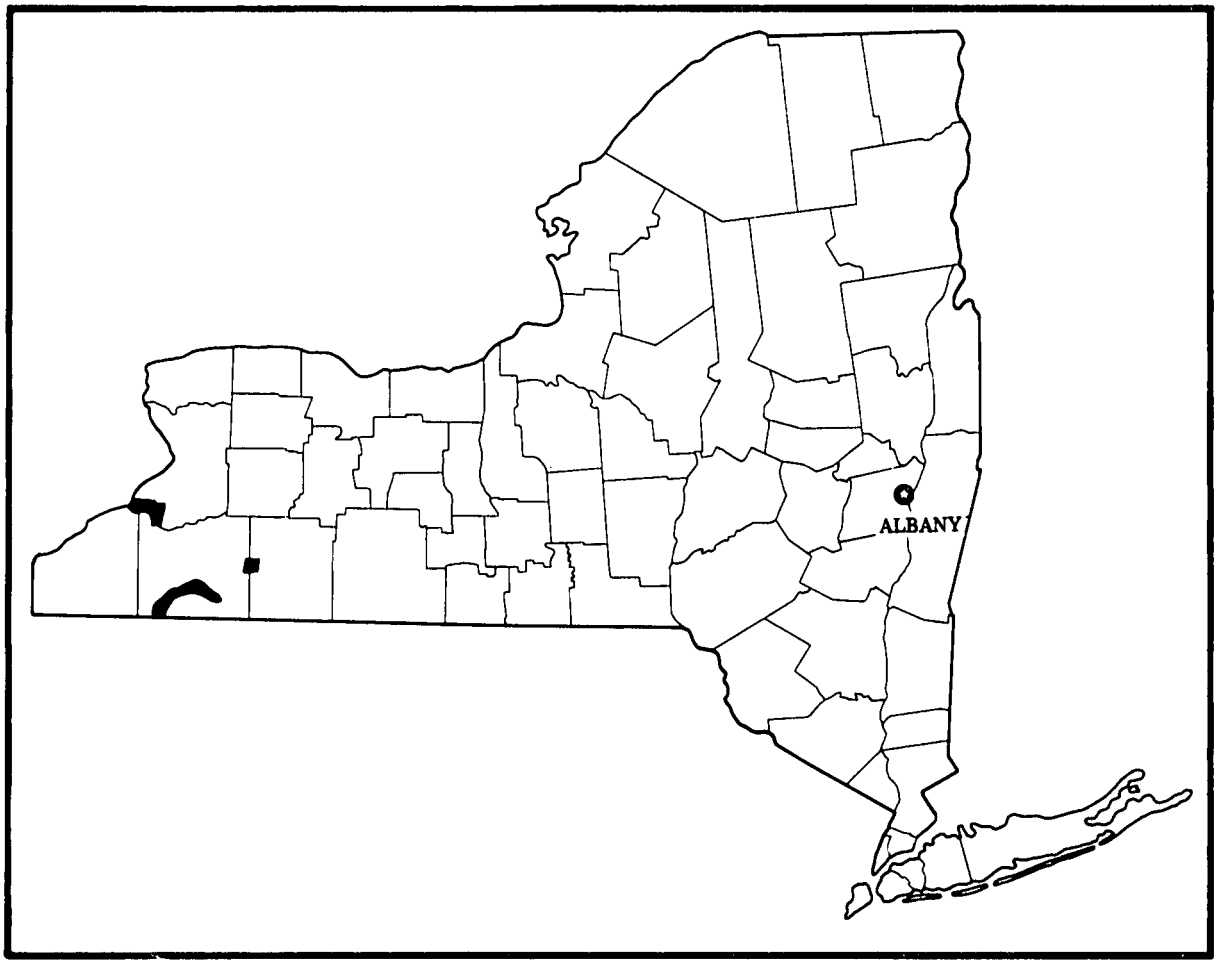
This soil survey contains information that can be used in land-planning programs in the survey area. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact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

Paul A. Dodd
State Conservationist
Soil Conservation Service



Location of the Seneca Nation of Indians in New York.

Soil survey of Seneca Nation of Indians New York

By Paul S. Puglia, Soil Conservation Service

Fieldwork by Gerald B. Brauen and Paul S. Puglia,
Soil Conservation Service

United States Department of Agriculture, Soil Conservation Service
In cooperation with
Cornell University Agricultural Experiment Station

The SENECA NATION OF INDIANS is in the southwestern part of New York State. It consists of three reservations: the Allegany, the Cattaraugus, and the Oil Springs.

The Allegany Reservation, consisting of 20,469 acres and including the city of Salamanca, is in the south-central part of Cattaraugus County and extends from Vandalia on the east to the Pennsylvania State line. The area is 1.5 miles wide and 30 miles long and generally follows the course of the Allegheny River. The Cattaraugus Reservation consists of 21,680 acres. It is at the junction of three counties, Cattaraugus, Erie, and Chautauqua Counties. It extends from the Gowanda-Collins area on the east to Lake Erie on the west. The area is 3 miles wide and 11 miles long and generally follows the course of Cattaraugus Creek. The Oil Springs Reservation consists of 640 acres, or about 1 square mile, and is near Cuba, New York.

The Seneca Indians are a member of the Iroquois Confederacy, which is made up of the Seneca, Cayuga, Onondaga, Oneida, Mohawk, and Tuscarora tribes, all in New York State.

The Seneca Nation is in the southwestern part of the State on land set aside by the Treaty of Canandaigua of 1794, more commonly known as the Treaty of Big Tree. The Senecas once inhabited most of western New York State and a part of Pennsylvania.

The Allegany Reservation has 854 people, and the Cattaraugus Reservation has 1,926. No members of the tribe live at Oil Springs.

General Nature of the Survey Area

This section provides general information about the Seneca Nation of Indians Reservations, including a description of the physiography and geology, drainage, water supply, climate, and transportation facilities.

Physiography and Geology

Bernard S. Ellis, senior staff geologist, Soil Conservation Service, assisted with the preparation of this section.

The Allegany Indian Reservation is in the unglaciated section of the Allegheny Plateau, the only part of New York State not covered by ice for at least part of the glacial period. The northern boundary of this unglaciated area follows the trend of the Allegheny River but is 4 to 6 miles north of the river.

The contrast in relief between the glaciated areas north of the Reservation and the unglaciated Reservation area is striking. The unglaciated Allegheny Plateau is more rugged and has longer and steeper slopes and does not have the irregular, hilly characteristics of much of the glaciated areas. A striking feature of this unglaciated section is the even skyline.

The valley through which the Allegheny River flows ranges from 1/2 mile to 2 miles in width. The valley walls are abrupt and steep. Some of the high elevations of the plateau are less than a mile from the valley floor. The elevation of the Allegany Reservation ranges from 2,228 feet at the top of the plateau, southeast of

Salamanca, to 1,365 feet at the edge of the Allegany Reservoir (*11*).

The bedrock underlying the Allegany Reservation is of Devonian age, mainly Upper Devonian. The oldest formation is in the Arkwright (Conneaut) Group, and the youngest is in the Conewango Group (*6*).

The Arkwright Group has one formation, the Chadakoin formation, in the Reservation. The Chadakoin formation is at the lower elevations, mostly below 1,700 feet (*6*). The thickness of this formation ranges from about 550 to 750 feet in Cattaraugus County. The formation can be viewed in numerous road cuts along West Bank Perimeter Road or County Route 10 in the western section of the Reservation, and along Peters Creek Road or NY 280 in the eastern part of the Reservation.

The lower section of the Chadakoin formation consists of gray siltstone and fine-grained sandstone and some interbedded gray shale and silty shale. This is known as the Dexterville member, named after quarries in the eastern part of the city of Jamestown.

The upper section, known as the Ellicott member of the Chadakoin formation, is interbedded soft gray shale and siltstone. This member was first described in Ellicott township west of the city of Jamestown.

The Conewango Group was deposited at the close of the Devonian period and is at the higher elevations in the Reservation. During the Conewango period, coarse material was deposited to form sandstone and conglomerate. The group is about 425 to 525 feet thick in Cattaraugus County and can be divided into the Cattaraugus and Oswego formations, of which only the Cattaraugus formation is in the Allegany Indian Reservation. Some of the more extensive exposures of the Cattaraugus formation may be seen in road cuts along the Allegany State Park entrance road south of the city of Salamanca.

Two members of the Cattaraugus formation, Salamanca conglomerate and Tunangwant-Killbuck conglomerate, are in the Allegany Indian Reservation. These conglomerates are similar in makeup and are interbedded with coarse sandstones that commonly are crossbedded. In some areas they are interbedded with gray shale and siltstone. The conglomerates contain flat pebbles that generally range from about 1/4 to 1/2 inch in diameter. The thickness of these members ranges from 10 to 40 feet.

The Cattaraugus Indian Reservation is made up of two physiographic provinces. The western edge is on the Erie-Ontario plain, and the rest is in the Allegheny Plateau province. Cattaraugus Creek Valley is the dominant physiographic feature in the area. It extends the full length of the reservation. The Erie-Ontario plain part of the Reservation is nearly devoid of significant relief and typifies the topography of a remnant lakebed. The area is small, extending 2 to 4 miles inland from Lake Erie. Leaving the lake plain, the relief picks up quickly and the topography rapidly changes to that typical of the Allegheny Plateau in southern New York State. Flat-topped hills, wide ridgetops, and steep valley walls are common in the Reservation, as is typical of a mature plateau undergoing dissection by youthful streams. The topography is strongly influenced by the underlying, nearly level-bedded rock.

The elevation of the Cattaraugus Reservation ranges from 572 feet at the Lake Erie shoreline to about 1,040 feet in the Perrysburg-Gowanda area (*9*). Much of the change in relief in the Reservation is in steplike increments caused by the underlying flat-bedded and ledgy bedrock. The elevation of the Erie-Ontario plain is in the range of 600 to 700 feet. Once the Allegheny Plateau is reached, there is a rapid rise in elevation to about 800 feet and then a gradual rise to 1,000 feet or more at the southern edge of the Reservation. This escarpmentlike relief is pronounced in the southwestern section of the Reservation.

The bedrock of the Cattaraugus Indian Reservation is sedimentary; that is, it formed from sediments deposited on the floors of ancient seas. Shales of Upper Devonian age or the Chautauquan series underlie most of the soils. This bedrock is 350 million to 450 million years old. Most of the bedrock in the Reservation is from the Seneca Group, which is divided into two formations, the Chemung and Canadaway formations.

The Chemung formation is composed of two members. The oldest member in the Reservation is called Angola shale. It is exposed along the Lake Erie cliffs between Silver Creek and Dunkirk. The Angola shale consists of gray shale about 235 feet thick and is overlain by gray Hanover shale, which is well exposed along the southern cliffs of Cattaraugus Creek.

Further inland and along the southern part of the Reservation, the soils are underlain by the Canadaway formation (*5*). The oldest member of this formation is the black Dunkirk shales, which are about 85 feet thick. These shales can be observed along the Cattaraugus Creek cliffs. Above the Dunkirk shales is about 280 feet of mostly gray Gowanda shales, interbedded with some thin black shale and gray siltstone. The Gowanda shales, which are the youngest bedrock in the area, underlie the soils in the northern and eastern parts of the Cattaraugus Reservation.

The Oil Springs Reservation is in the Allegheny Plateau province. This area consists of rolling uplands. Its elevation ranges from about 2,020 feet in the eastern part of the reservation to 1,500 feet along Cuba Lake outlet (*10*).

The bedrock underlying the soils in the Oil Springs Reservation is dominated by the Chadakoin formation, consisting of the Ellicott and Dexterville members, and by the Upper Canadaway formation, consisting of interbedded gray shale and gray siltstone.

Glacial Geology

The Cattaraugus and Oil Springs Reservations went through several glacial advances and retreats during the Pleistocene period (*4*). The last major glaciation reached its peak during the late Wisconsin glaciation, about 23,000 years ago. With each southern movement, the ice picked up soil material and pieces of bedrock and ultimately redeposited a mixture of unconsolidated material varying in size, shape, and mineralogy. The last advance stripped earlier deposits and laid down the mantle in which most of the soils have developed.

As the climate warmed and melting of the ice overcame the glacial advance, the glacier began to recede. The ice was thinnest on the uplands; therefore, these were the first areas to be exposed. The mixture of rock fragments and finer particles deposited by the ice on these upland areas is termed glacial till. The thickness of this till is quite variable. On some hilltops the mantle is less than a foot thick. In other areas, below the higher ridges, it is more than 10 feet thick. Some examples of soils that formed in deep glacial till are Volusia and Mardin soils. Orpark, Manlius, and Lordstown soils are examples of soils that formed in glacial till only 20 to 40 inches thick over bedrock.

As the glacial ice melted and receded, further exposing valley areas, large quantities of meltwater discharging from the glacial front carried rock and soil debris that was deposited as valley train terraces and eskers. Nearly level or undulating valley train terraces occupy the floor of the Cattaraugus and Allegheny Valleys. All of these proglacial fluvial deposits are generally termed outwash on glaciofluvial deposits and consist mainly of stratified sand and gravel. Alton and Chenango soils are examples of soils that formed in these deposits.

The last advance of the glacier was about 14,000 years ago and is called the Valley Heads substage. It left recessional moraines plugging many of the major valleys. As the glacier continued to retreat northward, meltwater was trapped between the valley walls, the blocking moraines, and the ice front. Consequently, proglacial lakes formed in the valleys. Fine soil particles carried in suspension by the meltwater settled in the waters of these lakes. Glaciolacustrine (lake-laid) deposits such as these are on the floor and lower sides of valleys. Stone-free Collamer and Niagara soils are examples of soils formed in these deposits.

Erosion and sedimentation are continually taking place in the area. Silty alluvial sediments from flood-prone streams are examples of more recent deposits not related to glaciation. Tioga and Middlebury soils formed in alluvial deposits on flood plains.

Drainage

The Allegany Reservation is drained by the Allegheny River, a part of the Mississippi River drainage system. The Allegheny River starts in Pennsylvania, enters the Reservation at the southeastern boundary, swings north a few miles, and re-enters Pennsylvania at the southwestern boundary where it is part of the Allegheny Reservoir. This drainage system flows the entire length of the Reservation.

Numerous secondary streams flow directly into the Allegheny River. Tunungwant Creek flows north and enters the Allegheny River near the junction of NY Routes 219 and 17; Great Valley Forks Creek flows south and enters the Allegheny River near the hamlet of Kill Buck; Little Valley Creek flows south and enters the Allegheny River at West Salamanca; and Cold Spring Creek flows south and enters the Allegheny Reservoir near Streamburg Resettlement area. The rest of the Reservation drains directly into the Allegheny River or Allegheny Reservoir through a number of minor tributaries.

The Cattaraugus Reservation is in the Lake Erie drainage basin. The main drainage system in this Reservation consists of Cattaraugus Creek, Clear Creek, Indian Creek, and Little Indian Creek. Cattaraugus Creek flows north out of Cattaraugus County and enters Lake Erie at Sunset Bay. This drainage system flows the entire length of the Reservation. Clear Creek flows out of Erie County and drains into Cattaraugus Creek.

In the southern part of the Reservation, Indian Creek and Little Indian Creek flow north and drain into Cattaraugus Creek. For the most part, the remainder of the Reservation drains directly into Cattaraugus Creek through a number of minor tributaries.

The Oil Springs Reservation is within the Allegheny drainage system; it is drained primarily by Cuba Lake outlet. Cuba Lake outlet flows south through the center of the Reservation and joins Oil Creek, which enters the Allegheny River at Olean, New York. The remainder of the Reservation drains directly into Cuba Lake outlet or Cuba Lake through a number of minor tributaries.

Water Supply

Domestic water for the rural areas of the Reservations is obtained largely from drilled wells or from dug wells. Dug wells are limited to a shallow depth and tend to dry up when the water table is low. They are effective in the Cattaraugus and Allegheny Valley bottom where gravelly and sandy outwash is encountered, but these wells are subject to contamination.

In the Cattaraugus Reservation, the Irving housing area has a municipal water system supplied by reservoirs from the town of Hanover; the former Thomas Indian School Area has a municipal water system supplied by local wells. In the Allegany Reservation, the Streamburg and Jimmersontown Resettlement Areas have a municipal water system supplied by local wells. Large storage tanks with gravity flow are used as a partial reserve source.

In some instances domestic water is supplied by springs. Springs are naturally occurring areas where the water table reaches the surface of the ground in a confined area. This source of water is scattered and unpredictable.

Climate

Prepared by the National Climatic Center, Asheville, North Carolina.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Allegany State Park in the period 1951 to 1979. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter the average temperature is 24 degrees F, and the average daily minimum temperature is 15 degrees. The lowest temperature on record, which occurred at Allegany State Park on January 15, 1957, is -25 degrees. In summer the average temperature is 65 degrees, and the average daily maximum temperature is 78 degrees. The highest recorded temperature, which occurred at Allegany State Park on September 2, 1953, is 97 degrees.

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

The total annual precipitation is 44 inches. Of this, 24 inches, or 55 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 20 inches. The heaviest 1-day rainfall during the period of record was 3.69 inches at Allegany State Park on June 10, 1966. Thunderstorms occur on about 25 days each year, and most occur in summer.

The average seasonal snowfall is 88 inches. The greatest snow depth at any one time during the period of record was 28 inches. On an average of 59 days, at least 1 inch of snow is on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines 70 percent of the time possible in summer and 35 percent in winter. The prevailing wind is from the southwest. Average windspeed is highest, 13 miles per hour, in spring.

Farming

The Cattaraugus and Allegany Reservations have some excellent farmland, much of which is bottomland and gravelly terraces along the principal streams and rivers. Some of this land is rented to farmers near the reservations. Raising vegetables is the main enterprise, particularly in the Cattaraugus Reservation. The main crops are sweet corn, beans, tomatoes, cabbage, and strawberries, and some areas are used for corn, hay, and wheat. A large acreage in the Cattaraugus Reservation is used for nursery stock.

Transportation

The Allegany Reservation is served by three railroad systems. A main line passes through the reservation in an east-west direction, another enters the reservation from Pennsylvania and extends north through Salamanca, and a local spur extends northwest from Salamanca.

State Highway 17 and the Southern Tier Expressway are the main east-west automotive routes in the Allegany Reservation. New York Route 219 extends from Salamanca into Pennsylvania. The East Bank Perimeter Road and West Bank Perimeter Road outline the Allegheny Reservoir.

The Cattaraugus Reservation is served by a rail system that runs along Lake Erie in a general northeast-southwest direction. The main highways are Interstate Route 90, New York Route 5, and U.S. Route 20. These are all within 5 miles of Lake Erie and are generally parallel to one another. State Route 438 is an east-west highway that runs the entire length of the Reservation and connects with New York Route 62 in Gowanda in the east and U.S. Route 20 in the western part of the Reservation.

Commercial airline service is available at the Chautauqua County Airport and to the north at Buffalo.

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 "Detailed Soil Map Units."

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 and woodland managers, engineers, planners, developers and builders, home buyers, and others.

Detailed Soil Map Units

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 and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series.* Except for differences in texture of the surface layer or of the underlying material, 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 underlying material. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases.* Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, *Chenango sandy loam* is one of several phases in the Chenango series.

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

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. *Fluvaquents and Udifluvents, frequently flooded,* 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. *Pits, gravel,* 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 4 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

AkA—Allard silt loam, 0 to 3 percent slopes. This soil is nearly level, deep, and well drained. It is on terraces. The areas of this soil are roughly rectangular or oblong and range from 5 to 20 acres.

Typically, this soil has a surface layer of dark brown silt loam about 9 inches thick. The subsoil is strong brown and yellowish brown silt loam 18 inches thick. The substratum is brown and light brownish gray very gravelly loamy sand to a depth of 60 inches or more.

Included with this soil in mapping are areas of moderately well drained Scio soils in slight depressions. Also included is a soil that is as much as 10 percent gravel. The areas of included soils range from 1/4 acre to 3 acres.

The permeability of this Allard soil is moderate in the subsoil and rapid or very rapid in the substratum. Available water capacity is high. Runoff is slow. The depth to bedrock is 5 feet or more. The surface layer and subsoil are very strongly acid to medium acid.

Most of the acreage of this soil is used for vegetables, other cultivated crops, nursery stock, and hay. A small acreage is wooded, and potential productivity for trees is good.

This soil is well suited to most cultivated crops, especially potatoes. The soil dries out quickly in early spring and after heavy rains. The main management practices are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops; and incorporating crop

residue into the soil. All help to maintain organic matter content and tilth. Irrigation systems are easy to manage on this soil.

This soil is suited to pasture and hay. Use of proper stocking rates, rotational grazing, yearly mowing, and deferred grazing during wet periods are the chief management needs.

The rapid permeability in the substratum causes a hazard of ground-water pollution in areas used for septic tank absorption fields. It is the main limitation of the soil for community development. This soil is a good source of material for topsoil and for sand and gravel in the lower layers. Some areas are suitable for athletic fields or other uses that require a nearly level, stone-free site.

Capability class: I.

AkB—Allard silt loam, 3 to 8 percent slopes. This soil is gently sloping, deep, and well drained. It is on terraces. The areas of this soil are roughly rectangular or oblong and range from 5 to 20 acres.

Typically, this soil has a surface layer of dark brown silt loam about 9 inches thick. The subsoil is strong brown and yellowish brown silt loam 18 inches thick. The substratum is brown and light brownish gray very gravelly loamy sand to a depth of 60 inches or more.

Included with this soil in mapping are areas of moderately well drained Scio soils in slight depressions. Also included is a soil that is as much as 10 percent rock fragments. The areas of included soils range from 1/4 acre to 3 acres.

The permeability of this Allard soil is moderate in the subsoil and rapid or very rapid in the substratum. Available water capacity is high. Runoff is medium. The depth to bedrock is 5 feet or more. The surface layer and subsoil are very strongly acid to medium acid.

Most of the acreage of this soil is used for cultivated crops, vegetables, nursery stock, and hay. A small acreage is wooded.

This soil is suited to most cultivated crops. The soil dries out quickly in the spring and after heavy rains. Erosion is a hazard, particularly where the slopes are long. The main management practices are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; cross-slope tillage; incorporating crop residue into the soil; and using sod crops and cover crops in the crop rotation. All help to control erosion and maintain organic matter content and tilth. Irrigation is suitable for this soil, but slope is a management limitation for irrigation systems.

This soil is suited to pasture and hay. Deep-rooted forage crops, such as alfalfa, are particularly well suited to this soil. Using proper stocking rates, rotational grazing, yearly mowing, and deferred grazing during wet periods help to maintain desirable pasture plants.

The potential productivity for trees on this soil is good. Erosion on logging trails is a hazard on long slopes.

The rapid permeability in the substratum causes a hazard of ground-water pollution in areas used for septic tank absorption fields. It is the main limitation of the soil for community development. This soil is a good source of material for topsoil and for sand and gravel in the lower layers. Some areas are suitable for athletic fields or other uses that require a nearly level, stone-free site.

Capability subclass: IIe.

AlA—Allard Variant silt loam, 0 to 3 percent slopes. This soil is nearly level, deep, and moderately well drained. It is on terraces along the Allegheny River. The areas of this soil are rectangular or oblong and range from 5 to 30 acres.

Typically, this soil has a surface layer that is dark grayish brown silt loam 9 inches thick. The subsoil is 25 inches thick. It is yellowish brown silt loam in the upper part and mottled, brown silty clay loam in the lower part. The substratum is brown very gravelly loamy sand to a depth of 60 inches or more.

Included with this soil in mapping are areas of well drained Allard, Unadilla, and Chenango soils. The Allard soils are on knolls and terraces. The Unadilla soils are in areas of deep silty deposits, and the Chenango soils are in areas that have gravel in the surface layer and subsoil. Also included are small areas of somewhat poorly drained soils along drainageways and in slight depressions. Some areas are underlain by sandy loam. The included areas range from 1/2 to 3 acres.

In early spring this Allard Variant soil has a seasonal high water table in the lower part of the subsoil. Permeability is moderate to moderately slow in the lower part of the subsoil and rapid or very rapid in the substratum. Available water capacity is high. Runoff is slow. The depth to bedrock is 5 feet or more. The surface layer and subsoil are very strongly acid to medium acid.

Some small areas of this soil are used for cultivated crops. Most of the acreage of the soil is in woodland. Some areas near Streamburg are in residential use.

This soil is suited to most cultivated crops, especially vegetables, and is well suited to specialized crops that require irrigation. The seasonal high water table sometimes delays tillage and planting in the spring. The main management practices are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops; incorporating crop residue into the soil; and tilling at the proper soil moisture content. All help to maintain tilth and increase organic matter content.

The soil is well suited to pasture grasses. Use of proper stocking rates, rotational grazing, yearly mowing, and deferred grazing during wet periods are the main management needs. Grazing when the soil is wet causes compaction of the soil and trampling of desirable pasture plants.

The potential productivity for trees on this soil is good, especially species that withstand acidity. Machine planting of seedlings is practical in large areas.

The seasonal high water table is the main limitation of the soil for community development. The rapid permeability in the substratum causes a hazard of ground-water pollution in areas used for septic tank absorption fields. Sidewalls of excavations in the soil are unstable, particularly when the soil is wet. The soil is a good source of topsoil and, in the lower layers, of sand and gravel. Some areas are suitable for athletic fields or other uses that require a nearly level, stone-free site.

Capability subclass: IIw.

AlB—Allard Variant silt loam, 3 to 8 percent slopes. This soil is gently sloping, deep, and moderately well drained. It is on terraces along the Allegheny River. The areas of this soil are rectangular and range from 5 to 30 acres.

Typically, this soil has a surface layer that is dark grayish brown silt loam 9 inches thick. The subsoil is 25 inches thick. It is yellowish brown silt loam in the upper part and mottled, brown silty clay loam in the lower part. The substratum is brown very gravelly loamy sand to a depth of 60 inches or more.

Included with this soil in mapping are areas of Allard soils and Unadilla soils. Also included are areas of soils along drainageways and in slight depressions that are similar to this Allard Variant soil but that are wetter. Some areas north of the Allegheny River are underlain by sandy loam. The included areas range from 1/2 acre to 3 acres.

In early spring this Allard Variant soil has a seasonal high water table in the lower part of the subsoil. Permeability is moderate to moderately slow in the lower part of the subsoil and rapid or very rapid in the substratum. Available water capacity is high. Runoff is slow. The depth to bedrock is 5 feet or more. The surface layer and subsoil are very strongly acid to medium acid.

Some small areas of this soil are used for cultivated crops. Most of the acreage of the soil is in woodland. Some areas near Streamburg are in residential use.

This soil is suited to most cultivated crops, especially vegetables. Erosion is the main hazard, particularly on long slopes. The seasonal high water table sometimes delays tillage and planting in the spring. The main management practices are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops; incorporating crop residue into the soil; and tilling at the proper soil moisture content. All help to maintain tilth, increase organic matter content, and reduce erosion. This soil is suitable for irrigation, but irrigation systems are difficult to manage because of the slope.

This soil is suited to pasture and hay. Use of proper stocking rates, rotational grazing, yearly mowing, and deferred grazing during wet periods are the principal management needs. Grazing when the soil is wet causes compaction of the soil and trampling of desirable pasture plants.

The potential productivity for trees on this soil is good. Machine planting of seedlings is practical in large areas. Erosion along logging roads or skid trails is a concern on long slopes.

The seasonal high water table is the main limitation of the soil for community development. The rapid permeability in the substratum causes a hazard of ground-water pollution in areas used for septic tank absorption fields. Sidewalls of excavations in the soil are unstable, particularly when the soil is wet. The soil is a good source of topsoil and, in the lower layers, of sand and gravel. Some areas are suitable for athletic fields or other uses that require a gently sloping, stone-free site.

Capability subclass: IIe.

AlC—Allard Variant silt loam, 8 to 15 percent slopes. This soil is sloping, deep, and moderately well drained. It is on terraces along the Allegheny River. The areas of this soil are rectangular and range from 5 to 20 acres.

Typically, this soil has a surface layer that is dark grayish brown silt loam 9 inches thick. The subsoil is 25 inches thick. It is yellowish brown silt loam in the upper part and mottled, brown silty clay loam in the lower part. The substratum is brown very gravelly loamy sand to a depth of 60 inches or more.

Included with this soil in mapping are areas of Allard soils and Unadilla soils. Also included are areas north of the Allegheny River that are underlain by gravelly sandy loam and areas of Chenango soils that contain numerous gravel fragments. The included areas range from 1 to 3 acres.

In early spring this Allard Variant soil has a seasonal high water table in the lower part of the subsoil. Permeability is moderate to moderately slow in the lower part of the subsoil and rapid or very rapid in the substratum. Available water capacity is high. Runoff is medium. The depth to bedrock is 5 feet or more. The surface layer and subsoil are very strongly acid to medium acid.

Most of the acreage of this soil is in woodland. Some areas are in residential use.

This soil is moderately suited to some crops grown in the area, but erosion is a hazard and planting and tillage sometimes are delayed because of seasonal wetness in the spring. Providing drainage is a main management concern; interceptor drains that divert seepage and runoff from higher areas help to reduce the risk of erosion and dry the soil earlier in the spring. The main management practices in cultivated areas are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; use of cover crops; mixing crop residue into the soil, contour tillage, and

tillage at the proper soil moisture content. All help to maintain tilth, improve organic matter content, and control erosion.

This soil is better suited to pasture and hay than to row crops. It is especially suitable for deep-rooted forage plants. Using proper stocking rates and restricting grazing in early spring when the soil is wet prevent compaction of the soil and trampling of desirable grasses.

The potential productivity for trees on this soil is good. Placing logging roads and skid trails on the contour where possible helps to eliminate trailside gullying.

The seasonal high water table and a hazard of instability in excavations are the main limitations of this soil for community development. This soil is a good source of topsoil, and the underlying layers are a good source of sand and gravel.

Capability subclass: IIIe.

AmA—Alton fine gravelly loam, 0 to 3 percent slopes. This soil is nearly level, deep, and well-drained and somewhat excessively drained. It formed in beach and deltaic deposits dominated by sand and gravel. The soil is on ridgetops, terraces, and deltas. The areas range mainly from 5 to 50 acres and generally are oblong.

Typically, the surface layer is dark grayish brown fine gravelly loam about 9 inches thick. The subsoil is 21 inches thick. It is yellowish brown fine gravelly loam in the upper part and dark yellowish brown fine very gravelly sandy loam in the lower part. The substratum consists of dark brown fine very gravelly loamy sand to a depth of 60 inches or more.

Included with this soil in mapping are areas of Phelps and Castile soils in small depressions. Also included are areas of Colonie, Chenango, and Blasdell soils; a few gently sloping areas; wet spots and sandy spots that are indicated by a special symbol on the soil map; and areas with a surface layer of silt loam or very fine sandy loam. The areas of included soils range from 1/4 acre to 2 acres.

The permeability of this Alton soil is moderately rapid in the subsoil and rapid or very rapid in the substratum. Available water capacity in the root zone is low to moderate. Runoff is slow. The soil is strongly acid or very strongly acid in the surface layer and strongly acid to neutral in the subsoil.

Most of the acreage of this soil is used for vegetables or nursery stock. The potential productivity for trees is fair to good.

This soil is suited to cultivated crops, especially to some types of vegetables (fig. 1). Pebbles in the surface layer, droughtiness in summer, and rapid leaching of nutrients are the main limitations for crops. This soil responds well to irrigation. The main management practices are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using organic matter and fertilizer; using cover crops; and incorporating crop residue into the soil. All help to maintain tilth and increase the organic matter content and water-holding capacity of the soil.

This soil is suited to hay and pasture. Overgrazing when the soil is dry causes a loss of desirable forage plants.

The permeability of the substratum causes a hazard of ground-water pollution in areas used for septic tank absorption fields. It is the main limitation of the soil for community development. Although there are pebbles in the soil, some areas are suitable for athletic fields and other uses that require a nearly level site.

Capability subclass: IIs.

AmB—Alton fine gravelly loam, 3 to 8 percent slopes. This soil is gently sloping, deep, and well drained and somewhat excessively drained. The soil formed in beach and deltaic deposits. It is on ridges, terraces, and deltas. The areas range mainly from 5 to 50 acres and generally are oblong.

Typically, the surface layer is dark grayish brown fine gravelly loam about 9 inches thick. The subsoil is 21 inches thick. It is yellowish brown fine gravelly loam in the upper part and dark yellowish brown fine very gravelly sandy loam in the lower part. The substratum consists of dark brown fine very gravelly loamy sand to a depth of 60 inches or more.

Included with this soil in mapping are areas of Phelps and Castile soils in small depressions. Also included are areas of Colonie, Chenango, and Blasdell soils; wet spots and sandy spots that are indicated by a special symbol on the soil map; and areas with a surface layer of silt loam or very fine sandy loam. The areas of included soils range from 1/4 acre to 2 acres.

The permeability of this Alton soil is moderately rapid in the subsoil and rapid or very rapid in the substratum. Available water capacity in the root zone is low to moderate. Runoff is slow. The soil is strongly acid or very strongly acid in the surface layer and strongly acid to neutral in the subsoil.

Most of the acreage of this soil is used for vegetables or nursery stock. The potential productivity for trees is fair to good.

This soil is suited to cultivated crops, especially to some types of vegetables. Pebbles in the surface layer, droughtiness in summer, and rapid leaching of nutrients are the main limitations for crops. This soil responds well to irrigation. The main management practices are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using organic matter and fertilizer; using cover crops; and incorporating crop residue into the soil. All help to maintain tilth and increase the organic matter content and water-holding capacity of the soil.

Figure 1.—Young tomato plants in an area of Alton fine gravelly loam, 0 to 3 percent slopes.

This soil is suited to hay and pasture. Overgrazing when the soil is dry causes a loss of desirable forage plants.

The permeability of the substratum causes a hazard of ground-water pollution in areas used for septic tank absorption fields. It is the main limitation of the soil for community development. Although there are pebbles in the soil, some areas are suitable for athletic fields and other uses that require a gently sloping site.

Capability subclass: IIs.

AmC—Alton fine gravelly loam, 8 to 15 percent slopes. This soil is sloping, deep, and well drained and somewhat excessively drained. The soil formed in glacial outwash and beach deposits. It is on the side slopes of ridges and streams. The areas of this soil generally are oblong and range from 5 to 30 acres.

Typically, the surface layer of this soil is dark brown fine gravelly loam about 9 inches thick. The subsoil is 21 inches thick. It is yellowish brown fine gravelly loam in the upper part and dark yellowish brown fine very gravelly sandy loam in the lower part. The substratum consists of dark brown fine very gravelly loamy sand to a depth of 60 inches or more.

Included with this soil in mapping are wet soils in small depressions and along seep spots. Also included are small areas of Colonie, Chenango, and Blasdell soils and areas of wet spots and sandy spots that are indicated by a special symbol on the soil map. The areas of included soils range from 1/4 acre to 2 acres.

The permeability of this Alton soil is moderately rapid in the subsoil and rapid or very rapid in the substratum. Available water capacity in the root zone is low to moderate. Runoff is medium. Reaction is strongly acid or very strongly acid in the surface layer and strongly acid to neutral in the subsoil.

Most of the acreage of this soil is in woodland. Some areas are used for cultivated crops.

This soil is moderately suited to cultivated crops, but a moderate hazard of erosion, midsummer droughtiness, and rapid leaching of nutrients are limitations. Slope restricts the use of irrigation. The main management practices are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; incorporating crop residue into the soil; and using cover crops and contour tillage. All help to control erosion and conserve moisture.

Deep-rooted pasture plants do well on this soil, but overgrazing is a hazard during the summer.

The potential productivity for trees on this soil is fair to good. Placing logging roads and skid trails on the contour or across the slope helps to minimize the hazard of erosion.

Slope, the permeability of the substratum, and pebbles in the soil are the main limitations for community development. The permeability causes a hazard of ground-water pollution in areas used for septic tank absorption fields.

Capability subclass: IIIe.

AoA—Angola silt loam, 0 to 3 percent slopes. This soil is nearly level and somewhat poorly drained and is 20 to 40 inches deep to shale bedrock. The soil formed in glacial till with a large amount of shale fragments. Most areas of this soil are on broad, shelflike landscapes. The areas generally are oblong and range from 5 to 10 acres.

Typically, the surface layer is very dark grayish brown silt loam about 9 inches thick. The subsurface layer is mottled, grayish brown silt loam 2 inches thick. The subsoil is firm, mottled, dark grayish brown silty clay loam 15 inches thick. The substratum is firm, mottled, dark grayish brown shaly silt loam 4 inches thick. Shale bedrock is at a depth of 30 inches.

Included with this soil in mapping are areas on knolls and slight rises of soils that are similar to this Angola soil but that are better drained. Also included are areas of Orpark soils, soils that are less than 20 inches deep to bedrock, and wet spots that are indicated by a special symbol on the soil map. The areas of included soils range from 1/4 acre to 2 acres.

The seasonal high water table in this Angola soil rises into the subsoil during early spring. Permeability is slow in the subsoil. Available water capacity is moderate to low. The root zone is limited to the depth to bedrock. The surface layer and subsoil are medium acid to mildly alkaline.

Some areas of this soil are used for crops or pasture, but many areas are wooded.

This soil is moderately suited to cultivation, but seasonal wetness and the depth to bedrock are limitations. Drainage is difficult to install because of the bedrock; without drainage, planting is delayed in the spring. The main management practices in cultivated areas are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops; and incorporating crop residue into the soil. All help to maintain tilth and improve organic matter content.

Undrained areas of this soil are suited to pasture and some hay crops. Restricting grazing during the spring and other wet periods prevents trampling and loss of desirable pasture plants.

The potential productivity for trees on this soil is fair to good. Seasonal wetness limits the use of equipment and is the cause of high seedling mortality. Uprooting of trees during windy periods is a hazard because of the shallow rooting depth.

The depth to bedrock and the seasonal wetness are major limitations of the soil for community development.

Capability subclass: IIIw.

ArC—Arkport very fine sandy loam, 8 to 15 percent slopes. This soil is deep, sloping, and well drained. It is in fan-shaped areas. This soil has short, convex slopes that receive little or no runoff. The areas range from 5 to 10 acres.

Typically, the surface layer is very dark grayish brown very fine sandy loam 4 inches thick. The subsoil is about 52 inches thick. The upper part of the subsoil is strong brown and brown very fine sandy loam, and the lower part is pale brown loamy very fine sand and thin horizontal bands of dark brown loam. The substratum is light grayish brown loamy fine sand and very fine sand to a depth of 70 inches or more.

Included with this soil in mapping are small areas that have a surface layer of silt loam. Also included are areas of Colonie soils. A few areas have gravelly spots, wet spots, and drainageways that are indicated on the soil map by special symbols. The areas of included soils range from 1/4 acre to 3 acres.

The permeability of this Arkport soil is moderately rapid throughout. Runoff is medium. The available water capacity is moderate to low. Bedrock is at a depth of more than 5 feet. The surface layer and upper part of the subsoil are very strongly acid to neutral.

Most of the acreage of this soil is wooded, but some areas are cultivated.

This soil is moderately suited to cultivated crops, but slope is a limitation. Most areas are suitable for hay. The main management practices are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; contour tillage; stripcropping; and mixing crop residue into the soil. All help to control erosion, maintain tilth, and improve organic matter content and available water capacity. Stripcropping and contour tillage, however, are not practical in some areas where the slope is irregular. Overgrazing of pastures, especially during dry periods, causes a loss of desirable pasture plants and increases the hazard of erosion.

The potential productivity for trees on this soil is good. Placing logging roads and skid trails on the contour or across the slope helps to prevent erosion.

Slope is the main limitation of the soil for community development.

Capability subclass: IIIe.

ArE—Arkport very fine sandy loam, 25 to 40 percent slopes. This soil is deep, steep, and well drained. It is on steeply dissected remnant deltas and along valley sides. Slopes are commonly short and slightly convex. Most areas are long and narrow and range from 10 to 50 acres.

Typically, the surface layer is very dark grayish brown very fine sandy loam 4 inches thick. The subsoil is about 52 inches thick. The upper part of the subsoil is strong brown and brown very fine sandy loam, and the lower part is pale brown loamy very fine sand and thin horizontal bands of dark brown loam. The substratum is light grayish brown loamy fine sand and very fine sand to a depth of 70 inches or more.

Included with this soil in mapping are small areas that have a surface layer of silt loam. Also included are areas of Colonie soils. A few areas have gravelly spots, wet spots, and drainageways that are indicated on the soil map by special symbols. The areas of included soils range from 1/4 acre to 3 acres.

The permeability of this Arkport soil is moderately rapid throughout. Runoff is rapid. The available water capacity is low. Bedrock is at a depth of more than 5 feet. The surface layer and upper part of the subsoil are very strongly acid to neutral.

Slope makes this soil generally unsuited to cultivated crops. The soil is suitable for hay, but slope limits the operation of equipment. Some areas are suited to permanent pasture, but slope also makes reseeding and applying fertilizer difficult. Overgrazing of pastures during dry periods causes a loss of desirable pasture plants and increases the erosion hazard.

The potential productivity for trees on this soil is good, and most areas are wooded. Erosion is a severe hazard. Placing logging roads on the contour or across the slope helps to control trailside gullying. Slope limits the use of timber harvesting equipment and is the main limitation of the soil for community development.

Capability subclass: VIe.

Be—Beaches. This unit consists of narrow areas of sandy or sandy and gravelly material deposited mostly by wave action along beachfronts. Slopes range from 0 to 8 percent.

Typically, these beach areas have a discontinuous layer of driftwood, sticks, and bark covering about 10 percent of the surface. Beaches are usually devoid of vegetation; however, some areas have a cover of algae, seaweed, and other aquatic plants. Many areas are almost continually wet because of constant wave action.

Included with this unit in mapping are areas of riverwash material consisting mostly of gravel and cobblestones. These areas are mainly fan-shaped deposits where large streams and creeks empty in lakes. Also included are areas where rock fill or railroad ties have been installed to control beachfront erosion.

The location and tidal inundation make the areas of this unit generally unsuitable for most uses other than for recreation or for some types of wildlife habitat. Onsite investigation is needed to determine the suitability of the unit for any potential use.

Capability subclass: not assigned.

BlB—Blasdell shaly silt loam, 3 to 8 percent slopes. This soil is deep, gently sloping, and well drained. It formed in water-sorted deposits high in content of shaly gravel. It is on the crests of remnant beach ridges and on terraces and remnant deltas. Most areas are long and narrow and range from 5 to 10 acres.

Typically, the surface layer is dark grayish brown shaly silt loam about 8 inches thick. The subsoil is 28 inches thick. It is yellowish brown very shaly silt loam in the upper part and dark yellowish brown very shaly loam in the lower part. The substratum is brown very shaly loam to a depth of 60 inches or more.

Included with this soil in mapping are areas of Farnham and Alton soils. Also included are areas that have a surface layer of fine gravelly loam and areas of wet spots, sandy spots, gravel pits, and drainageways that are indicated by special symbols on the soil map. The areas of included soils range from 1/4 acre to 3 acres.

The permeability of this Blasdell soil is moderately rapid in the subsoil and substratum. Runoff is slow. Available water capacity ranges from low to moderate. Bedrock is at a depth of more than 5 feet. In unlimed areas reaction in the surface layer and subsoil ranges from very strongly acid to medium acid.

Most of the acreage of this soil is wooded, and the potential productivity for trees is good. Some areas are cultivated.

This soil is suited to most cultivated crops and to hay. The low to moderate available water capacity is the main limitation for crops. Gravel in the surface layer hinders planting and cultivation of fine-seeded crops and causes rapid wear of machinery. The main management practices are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; use of cover crops; incorporating crop residues in the soil; and contour tillage. All help to reduce erosion and to increase the organic matter content and the moisture-holding capacity. Vegetable crops are suited to this soil where the climate is modified by Lake Erie and where irrigation water is available.

This soil is suited to pasture. Overgrazing of pasture, particularly during dry periods, causes a loss of desirable pasture plants.

The permeability of this soil causes a hazard of ground-water pollution in areas used for septic tank absorption fields. It is the main limitation of the soil for community development.

Capability subclass: IIs.

BrB—Brinkerton Variant silt loam, 3 to 8 percent slopes. This soil is deep, gently sloping, and somewhat poorly drained. The soil formed in silt-mantled colluvium. It is on toe slopes and lower side slopes in the Allegheny River Valley. The areas are long and narrow and range from 5 to 50 acres.

Typically, this soil has a surface layer of very dark grayish brown silt loam 3 inches thick. The subsoil is 35 inches thick. The upper 12 inches is yellowish brown silt loam. The lower 23 inches is mottled, firm, brown chanHnery silt loam. The substratum is firm, brown channery loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of moderately well drained Ernest Variant soils, poorly drained soils in depressions and along drainageways, and Canadea soils that are adjacent to the valley floor. The areas of included soils range from 1/4 acre to 3 acres. Some areas of this unit are at high elevations and generally have a shorter growing season than those at lower elevations.

This Brinkerton Variant soil has a perched seasonal high water table above the firm part of the subsoil. Permeability is moderate in the upper part of the subsoil and moderately slow or slow in the lower part of the subsoil and in the substratum. Runoff is medium. Available water capacity is high. The depth to bedrock is 5 feet or more. In unlimed areas the surface layer and subsoil are strongly acid or very strongly acid.

Most of the acreage of this soil is in woodland. Some areas are farmed.

With drainage, mainly by subsurface and open-ditch systems, this soil is moderately suited to most crops grown in the area. Tile drainage is suitable for some wet spots. The main management practices are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; contour tillage; using cover crops; plowing at the proper moisture content; and incorporating crop residue into the soil. All help to maintain tilth and organic matter content and control erosion.

This soil is suited to hay and pasture. In undrained areas, forage varieties that withstand seasonal wetness are especially suited to this soil. The prevention of overgrazing or grazing when the soil is wet is the major pasture management concern. Deferred grazing during wet periods helps to avoid trampling of the pasture and compaction of the soil.

The potential productivity for trees on this soil is fair to good. Seasonal wetness limits machine harvesting and planting of trees.

The seasonal high water table, the slow permeability in the substratum, and a high frost-action potential are the main limitations of this soil for community development.

Capability subclass: IIIw.

BrC—Brinkerton Variant silt loam, 8 to 15 percent slopes. This soil is deep, sloping, and somewhat poorly drained. The soil formed in silt-mantled colluvium. It is on toe slopes and lower side slopes in the Allegheny River Valley. The areas are long and narrow and range from 10 to 50 acres.

Typically, this soil has a surface layer of very dark grayish brown silt loam 3 inches thick. The subsoil is 35 inches thick. The upper 12 inches of the subsoil is yellowish brown silt loam. The lower 23 inches is mottled, firm, brown channery silt loam. The substratum is firm, brown channery loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of moderately well drained Ernest Variant soils, poorly drained soils in depressions and along drainageways, and Canadea soils that are adjacent to the valley floor. The areas of included soils range from 1/4 acre to 3 acres. Some areas of this unit are at high elevations and generally have a shorter growing season than those at lower elevations.

This Brinkerton Variant soil has a perched seasonal high water table above the firm part of the subsoil. Permeability is moderate in the upper part of the subsoil and moderately slow or slow in the lower part of the subsoil and in the substratum. Runoff is medium. Available water capacity is high. The depth to bedrock is 5 feet or more. In unlimed areas the surface layer and subsoil are strongly acid or very strongly acid.

Most of the acreage of this soil is in woodland. Some areas are farmed.

Drained areas of this soil are moderately suited to cultivated crops. The seasonal high water table and erosion are the main limitations for crops. Undrained areas are suited to short-season crops or hay. Excess surface water can be removed by diverting runoff from higher adjacent soils. The main management practices are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; incorporating crop residue into the soil; tillage at the proper moisture level; using cover crops; and contour tillage. All help to maintain good tilth and reduce the erosion hazard.

In undrained areas, forage varieties that withstand seasonal wetness are especially suited to this soil. The prevention of overgrazing or grazing when the soil is wet is the major pasture management concern. Deferred grazing during wet periods prevents trampling of the pasture and compaction of the soil.

The potential productivity for trees on this soil is fair to good. Placing logging roads and skid trails across the slope helps to control erosion.

The seasonal high water table, the slow permeability in the substratum, and a high frost-action potential are the main limitations of this soil for community development.

Capability subclass: IIIe.

BrD—Brinkerton Variant silt loam, 15 to 25 percent slopes. This soil is deep, moderately steep, and somewhat poorly drained. The soil formed in silt-mantled colluvium. It is on toe slopes and lower side slopes in the Allegheny River Valley. The areas are rectangular and range from 10 to 30 acres.

Typically, this soil has a surface layer of very dark grayish brown silt loam 3 inches thick. The subsoil is 35 inches thick. The upper 12 inches of the subsoil is yellowish brown silt loam. The lower 23 inches is mottled, firm, brown channery silt loam. The substratum is firm, brown channery loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of moderately well drained Ernest Variant soils and areas of Canadea soils adjacent to the valley bottom. The areas of included soils range from 1/4 acre to 3 acres. Some areas of this unit are at high elevations and generally have a shorter growing season than those at lower elevations.

This Brinkerton Variant soil has a perched seasonal high water table above the firm part of the subsoil. Permeability is moderate in the upper part of the subsoil and moderately slow or slow in the lower part of the subsoil and in the substratum. Runoff is rapid. Available water capacity is high. The depth to bedrock is 5 feet or more. In unlimed areas the surface layer and subsoil are strongly acid or very strongly acid.

Seasonal wetness, an erosion hazard, and slope make this soil poorly suited to cultivated crops. Drainage is usually necessary for cultivation, and slope limits the operation of farm equipment. The main management practices in cultivated areas are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; and using cover crops, diversions, and contour tillage. All help to control erosion.

This soil is suited to hay and pasture. In undrained areas, forage varieties that withstand seasonal wetness are especially suited to this soil. The prevention of overgrazing or grazing when the soil is wet is the major pasture management concern. Deferred grazing during wet periods prevents trampling of the pasture and compaction of the soil.

The potential productivity for trees on this soil is fair to good, and most areas are wooded. Placing logging roads and skid trails on the contour or across the slope helps prevent trail gullying. Restricting the use of heavy equipment during excessively wet periods helps prevent soil compaction.

The seasonal high water table, the slow permeability in the substratum, and slope are the major limitations of the soil for community development.

Capability subclass: IVe.

Ca—Canadice silt loam. This soil is nearly level, deep, and poorly drained. The soil formed in glacial lake sediments that have a high content of clay. This soil is along intermittent streams or in closed depressions on plains. Slopes range from 0 to 3 percent. The areas of this soil range from 5 to 15 acres and generally are oblong.

Typically, the surface layer of this soil is dark grayish brown silt loam about 8 inches thick. The subsoil is mottled, grayish brown silty clay about 45 inches thick. The substratum is firm, mottled, dark grayish brown silty clay to a depth of 65 inches or more.

Included with this soil in mapping are small areas of Rhinebeck, Canandaigua, and Wayland soils. The Rhinebeck soils are better drained than this Canadice soil and are slightly higher. The Canandaigua soils are more silty, and the Wayland soils are on flood plains. Also included are areas with a mucky surface layer. The areas of included soils range from 1/4 acre to 2 acres.

The water table in this Canadice soil is at or near the surface for much of the winter and spring. Permeability is moderate to moderately slow in the surface layer and very slow in the subsoil and substratum. Runoff is slow, and the available water capacity is moderate to high. Bedrock is at a depth of more than 5 feet. The surface layer is very strongly acid to slightly acid, and the subsoil is strongly acid to mildly alkaline.

Most areas of this soil are covered by water-tolerant grasses, brush, and trees.

The high water table makes this soil poorly suited to cultivated crops. Drainage is often difficult to establish because the areas are nearly flat and because of a lack of suitable outlets. Where drainage is practical, this soil is suitable for selected crops, but maintaining tilth is a major management concern. Using sod crops and cover crops in the cropping system, tillage at the proper soil moisture content, and mixing crop residue into the soil help to maintain tilth in cultivated areas. Undrained areas are suitable for pasture, but grazing during wet periods causes compaction of the soil and trampling of desirable grass species.

The potential productivity for trees on this soil is poor. The high water table is the main limitation. It limits the use of harvesting and planting equipment, causes high seedling mortality, restricts rooting, and causes a hazard of uprooting during windy periods.

The high water table, the very slow permeability in the subsoil and substratum, and poor stability are the main limitations of this soil for community development. Some areas are suitable for wetland wildlife habitat.

Capability subclass: IVw.

Cb—Canadice silty clay loam. This soil is deep, nearly level, and poorly drained. The soil formed in slackwater alluvial deposits. It is in depressional areas

on stream terraces in the Allegheny River Valley. Slopes range from 0 to 3 percent. The areas of this soil range up to 30 acres and are long and narrow.

Typically, the surface layer of this soil is very dark gray silty clay loam about 4 inches thick. The subsoil is mottled clay 41 inches thick. It is gray in the upper part and yellowish brown in the lower part. The substratum is firm, mottled, olive brown silty clay to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Caneadea, Canandaigua, Halsey, and Wayland soils. The Caneadea soils are better drained than this Canadice soil and are on the higher parts of this unit. The Canandaigua and Wayland soils have more silt and less clay in the subsoil than this Canadice soil, and the Halsey soils have more gravel in the subsoil. The Wayland soils are in the transition zone between the primary flood plain and the slackwater areas. The areas of included soils are as much as 3 acres each.

The water table in this Canadice soil is at or near the surface for much of the winter and spring. Permeability is moderately slow in the surface layer and very slow in the subsoil and substratum. Runoff is slow. The available water capacity is moderate to high. Bedrock is at a depth of 5 feet or more. The surface layer is strongly acid or very strongly acid, and the subsoil and substratum are strongly acid.

Most areas of this soil are covered by water-tolerant vegetation.

The high water table is the major limitation of this soil for cultivated crops. Drainage is often difficult to establish because the areas are nearly level and because of a lack of suitable outlets. Where drainage is practical, the soil is suitable for selected crops, but maintaining tilth is a major management concern. Applying lime, using sod crops and cover crops in the cropping system, tillage at the proper soil moisture level, and mixing crop residue into the soil help to maintain organic matter content and tilth.

Undrained areas of this soil are suitable for pasture, but grazing during wet periods causes compaction of the soil and trampling of desirable forage plants. Restricted grazing during wet periods, use of proper stocking rates, rotational grazing, applying lime, and yearly mowing are the main pasture management practices.

The potential productivity for trees on this soil is poor. The high water table is the main limitation. It limits the use of harvesting and planting equipment, causes high seedling mortality, restricts rooting, and causes a hazard of uprooting during windy periods.

The high water table, the very slow permeability in the subsoil and substratum, and poor stability are the main limitations of this soil for community development. Some areas are suitable for wetland wildlife habitat.

Capability subclass: IVw.

Cc—Canandaigua silt loam. This soil is deep, nearly level, and poorly drained. The soil formed in silty lake-laid sediments. It is mainly in shallow depressions. Slopes range from 0 to 3 percent. The areas of this soil are irregular in shape or oblong and are generally less than 30 acres each.

Typically, the surface layer of this soil is very dark gray silt loam about 9 inches thick. The subsoil consists of mottled, gray to brown silt loam about 28 inches thick. The substratum consists of light brownish gray silt loam to a depth of 60 inches or more.

Included with this soil in mapping are areas of soils that have a surface layer of silty clay loam and a sandy subsoil. Also included are areas of Niagara, Lyons, Lamson, and Canandaigua soils. The areas of included soils range from 1/4 acre to 3 acres.

The water table in this Canandaigua soil is near the surface for prolonged periods during spring and early summer. Permeability is moderately slow in the subsoil and substratum. Available water capacity is high. Runoff is very slow. The soil ranges from medium acid to mildly alkaline in the surface layer and slightly acid to mildly alkaline in the subsoil.

Most of the acreage of this soil is in pasture or woodland.

With drainage, this soil is moderately suited to most crops grown in the region, except early-season and late-season crops. A combination of open ditches and subsurface drains is generally suitable, but outlets for drains are difficult to establish in some areas. Where this soil is cultivated, the main management practices are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops; incorporating crop residue into the soil; and tillage at proper soil moisture content. All help to maintain tilth and increase organic matter content.

The prevention of grazing when the soil is wet is the main concern of pasture management. Grazing during wet periods compacts the soil and causes trampling of desirable grasses.

The potential productivity for trees on this soil is fair to poor. The high water table is the main limitation. It limits the use of equipment and is the cause of high seedling mortality. The shallow rooting depth causes a hazard of uprooting during windy periods.

The water table is the major limitation of the soil for community development. Poor stability of the soil is a limitation for some uses. Some areas of the soil are suitable for wetland or woodland wildlife habitat.

Capability subclass: IIIw.

Cd—Canandaigua mucky silt loam. This soil is deep, level, and very poorly drained. It is in depressional areas that usually have water on the surface until late in spring. Slopes range from 0 to 1 percent. The areas of this soil are roughly circular and range from 5 to 30 acres.

Typically, the surface layer is black mucky silt loam about 9 inches thick. The subsoil consists of mottled, gray to brown silt loam 28 inches thick. The substratum is firm, light brownish gray silt loam to a depth of at least 60 inches.

Included with this soil in mapping are areas of Lamson and Palms soils and a few areas that are not mucky. The areas of included soils range from 1/4 acre to 2 acres.

The water table in this Canandaigua soil is at or near the surface during most of the year. Permeability is moderately slow in the subsoil and substratum. Available water capacity is high. The soil ranges from medium acid to mildly alkaline in the surface layer and from slightly acid to mildly alkaline in the subsoil.

Most of the acreage of this soil is in woodland.

If drained, this soil is suited to most crops grown in the area, but not to early-season and late-season crops. The principal limitation to drainage is the lack of adequate outlets. The main management practices in cultivated areas are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops; incorporating crop residue into the soil; and tillage at the proper soil moisture content. All help to maintain tilth.

Some drainage is needed if this soil is used for pasture. Grazing when the soil is wet causes soil compaction and trampling of pasture grasses.

The potential productivity for trees on this soil is fair to poor. The high water table is the main limitation. It limits the use of equipment and is the cause of high seedling mortality. The shallow rooting depth causes a hazard of uprooting during windy periods.

The water table is the major limitation of the soil for community development. Poor stability of the soil is a limitation for some uses. Some areas of the soil are suitable for wetland or woodland wildlife habitat.

Capability subclass: Vw.

Ce—Canandaigua silt loam, acid substratum. This soil is deep, nearly level, and poorly drained and very poorly drained. It is in depressional areas on stream terraces. Slopes range from 0 to 3 percent. The areas of this soil are irregular in shape or oblong and are generally less than 30 acres each.

Typically, the surface layer is very dark grayish brown silt loam about 9 inches thick. The upper part of the subsoil consists of mottled, gray silty clay loam 21 inches thick. The lower part of the subsoil is gray and brown silty clay loam 7 inches thick. The substratum is brown silt loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Niagara, Canadice, and Halsey soils. Also included are spots of Canandaigua soils that have a mucky surface layer. The areas of included soils range from 1/4 acre to 5 acres.

The water table in this Canandaigua soil is at or near the surface for prolonged periods during spring and early summer. Most areas have water on the surface for brief periods in early spring. Permeability is moderately slow in the subsoil and substratum. Available water capacity is high. Runoff is very slow. Bedrock is at a depth of 5 feet or more. The soil ranges from slightly acid to strongly acid in the surface layer and from medium acid to very strongly acid in the subsoil.

Most of the acreage of this soil is in pasture or woodland.

If drained, this soil is suited to most crops grown in the area, but not to early-season and late-season crops. The principal limitation to drainage is the lack of adequate outlets. The main management practices in cultivated areas are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops; incorporating crop residue into the soil; and tillage at the proper soil moisture content. All help to maintain tilth and organic matter content.

Some drainage is needed if this soil is used for pasture. Grazing when the soil is wet causes soil compaction and trampling of pasture grasses.

The potential productivity for trees on this soil is fair to poor. The high water table is the main limitation. It limits the use of equipment and is the cause of high seedling mortality. The shallow rooting depth causes a hazard of uprooting during windy periods.

The water table is the major limitation of the soil for community development. Poor stability of the soil is a limitation for some uses. Some areas of the soil are suitable for wetland or woodland wildlife habitat.

Capability subclass: Vw.

CfA—Caneadea silty clay loam, 0 to 3 percent slopes. This soil is deep, nearly level, and somewhat poorly drained. It is on terraces in the Allegheny River Valley. The areas are long and narrow and range from 10 to 50 acres.

Typically, this soil has a surface layer of dark brown silty clay loam about 3 inches thick. The subsoil is 25 inches thick. The upper 14 inches of the subsoil is mottled, grayish brown and gray silty clay; the lower 11 inches is mottled, strong brown silty clay loam. The substratum extends to a depth of 60 inches or more. The upper part is strong brown and dark yellowish brown silty clay loam, and the lower part is dark yellowish brown loam.

Included with this soil in mapping are areas of poorly drained Canadice and Canandaigua soils and somewhat poorly drained Brinkerton Variant soils. The Canadice and Canandaigua soils are in low depressions and along drainageways. The Brinkerton Variant soils are in areas that are underlain by loamy soil deposits at a depth of less than 40 inches. The areas of included soils range from 1/2 acre to 4 acres.

This Caneadea soil has a perched seasonal high water table in the upper part of the subsoil in the spring and

other wet periods. Permeability and runoff are slow. Available water capacity is moderate to high. The depth to bedrock is generally 5 feet or more. In unlimed areas the surface layer and subsoil are strongly acid or very strongly acid.

Most of the acreage of this soil is in woodland. Some areas are used for hay and cultivated crops.

The soil is moderately suited to cultivated crops; the seasonal high water table is the main limitation. The use of drainage, mainly a combination of open ditches and closely spaced subsurface drains, increases the suitability for crops. Crusting and clodding of the soil are common if it is tilled when wet. The main management practices are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops; incorporating crop residue into the soil; and tillage at the proper soil moisture content. All help to maintain tilth and improve organic matter content.

This soil is suitable for pasture and hay, but suitability is increased when the soil is at least partially drained. In undrained areas, forage species that withstand seasonal wetness are the most desirable. Grazing during wet periods causes soil compaction and destroys desirable pasture plants.

The potential productivity for trees on this soil is fair to good; the soil is more suitable for species that withstand wetness. Machine planting is practical in large areas when the soil is not wet. The seasonal high water table causes high seedling mortality and restricts rooting, which causes a hazard of uprooting during windy periods.

The seasonal high water table, the slow permeability, and a potential for frost action and shrink-swell are the main limitations of this soil for community development. The sides of excavations in this soil are unstable and are subject to slumping and sliding.

Capability subclass: IIIw.

CfB—Caneadea silty clay loam, 3 to 8 percent slopes. This soil is deep, gently sloping, and somewhat poorly drained. It is on terraces and toe slopes in the Allegheny River Valley. The areas are long and narrow and range from 10 to 30 acres.

Typically, this soil has a surface layer of dark brown silty clay loam about 3 inches thick. The subsoil is 25 inches thick. The upper 14 inches of the subsoil is mottled, grayish brown and gray silty clay; the lower 11 inches is mottled, strong brown silty clay loam. The substratum extends to a depth of 60 inches or more. The upper part is strong brown and dark yellowish brown silty clay loam, and the lower part is dark yellowish brown loam.

Included with this soil in mapping are areas of poorly drained Canadice and Canandaigua soils and somewhat poorly drained Brinkerton Variant soils. The Canadice and Canandaigua soils are in low depressions and along drainageways. The Brinkerton Variant soils are in areas that are underlain by loamy soil deposits at a depth of less than 40 inches. The areas of included soils range from 1/2 acre to 4 acres.

This Caneadea soil has a perched seasonal high water table in the upper part of the subsoil in the spring and other wet periods. Permeability is slow in the subsoil and substratum. Runoff is slow to medium. Available water capacity is moderate to high. The depth to bedrock is generally 5 feet or more. In unlimed areas the surface layer and subsoil are strongly acid or very strongly acid.

Most of the acreage of this soil is in woodland. Some areas are used for hay and cultivated crops.

Undrained areas of this soil are moderately suited to cultivated crops. Drained areas are suitable for many crops grown in the area. Using interceptor drains that divert runoff and seepage from adjacent higher areas and using closely spaced subsurface drains will increase the suitability for crops. Crusting and clodding of the soil are common if it is tilled when wet, and erosion is a hazard in intensively cultivated areas. The main management practices in cultivated areas are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops; incorporating crop residue into the soil; contour tillage; and tillage at the proper soil moisture content. All help to maintain tilth, control erosion, and improve organic matter content.

This soil is suitable for pasture and hay, but suitability is increased when the soil is at least partially drained. In undrained areas, forage species that withstand seasonal wetness are the most desirable. Grazing during wet periods causes soil compaction and destroys desirable pasture plants.

The potential productivity for trees on this soil is fair to good; the soil is more suitable for species that withstand wetness. Machine planting is practical in large areas when the soil is not wet. The seasonal high water table causes high seedling mortality and restricts rooting, thus causing a hazard of uprooting during windy periods. Placing logging trails across the slope helps to minimize the hazard of trailside gullying.

The seasonal high water table, the slow permeability, and a potential for frost action and shrink-swell are the main limitations of this soil for community development. The sides of excavations in this soil are unstable and are subject to slumping and sliding.

Capability subclass: IIIw.

CgA—Castile gravelly loam, 0 to 3 percent slopes. This soil is deep, nearly level, and moderately well drained. It is on long, narrow terraces consisting of outwash and deltaic deposits. The areas of this soil mainly range from 3 to 20 acres.

Typically, this soil has a surface layer of very dark grayish brown gravelly loam about 8 inches thick. The upper part of the subsoil is dark brown gravelly loam 11

inches thick. The lower part of the subsoil is mottled, dark yellowish brown very gravelly loam 12 inches thick. The substratum is brown very gravelly sandy loam to a depth of 65 inches or more.

Included with this soil in mapping are areas of well drained Chenango soils and a few spots of gently sloping Castile soils. Also included are areas of somewhat poorly drained Red Hook soils on foot slopes and along drainageways. Some small areas are more sandy and have fewer small stone fragments than is typical for this Castile soil. Included areas range from 1/2 acre to 2 acres.

In the spring the water table in this Castile soil is in the lower part of the subsoil. Permeability is moderately rapid in the subsoil and rapid or very rapid in the substratum. Runoff is slow. Available water capacity is moderate to low. Bedrock is at a depth of more than 5 feet. In unlimed areas the surface layer and subsoil are very strongly acid to medium acid.

Most of the acreage of this soil is cultivated, pastured, or in woodland. Potential productivity for trees is fair to good.

This soil is suited to cultivated crops, but seasonal wetness sometimes briefly delays tillage in the spring. Gravel in the surface layer causes rapid wear of equipment and hinders planting of fine-seeded crops. The main management practices are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops and grasses and legumes in the cropping system; and mixing crop residue into the soil. All help to maintain tilth and increase organic matter content, which in turn improves the available water capacity. Some wet spots in this soil require drainage.

This soil is well suited to pasture. Restricting grazing in the spring when the soil is wet and not overgrazing in midsummer when it is dry help to maintain the pasture.

Seasonal wetness is the main limitation of this soil for community development. The permeability in the substratum causes a hazard of pollution to ground water in areas used for septic tank absorption fields. This soil is a potential source of sand and gravel.

Capability subclass: IIw.

Ch—Chenango sandy loam. This soil is deep, nearly level, and well drained to somewhat excessively drained. It is on outwash plains and terraces in the Allegheny River Valley. Slopes range from 0 to 3 percent. The areas are oblong and range from 5 to 20 acres.

Typically, the surface layer is dark grayish brown sandy loam about 9 inches thick. The upper part of the subsoil is yellowish brown sandy loam 5 inches thick. The lower part of the subsoil is dark brown very gravelly loam 16 inches thick. The substratum is dark brown very gravelly loamy sand to a depth of 60 inches or more.

Included with this soil in mapping are areas of Allard soils. Also included are small areas with a surface layer of gravelly sandy loam and a few spots of moderately well drained Castile soils in level, shallow depressions. The areas of included soils range from 1/4 acre to 2 acres.

The permeability of this Chenango soil is moderate or moderately rapid in the subsoil and rapid in the substratum. Available water capacity is low to moderate. Runoff is slow. Bedrock is at a depth of more than 5 feet. In unlimed areas the soil ranges from strongly acid to very strongly acid in the surface layer and from very strongly acid to medium acid in the subsoil.

Most of the acreage of this soil is in woodland, and potential productivity for trees is good. Some areas are cultivated or used for homesites.

This soil is suited to cultivated crops and early-season vegetables. Droughtiness is the main limitation. The main management practices are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops; and incorporating crop residue into the soil. All help to improve tilth and maintain organic matter content, which in turn improves the available water capacity of the soil. Crops on this soil respond well to irrigation, and irrigation systems are easy to manage.

This soil is well suited to deep-rooted hay and pasture plants (fig. 2). Overgrazing during dry periods causes a loss of desirable pasture plants.

The rapid permeability in the substratum causes a hazard of ground-water pollution in areas used for septic tank absorption fields. It is the main limitation of the soil for community development. This soil is a good source for sand and gravel. Some areas provide suitable sites for recreational uses that require a level, nearly stone-free area.

Capability subclass: IIs.

CkA—Chenango gravelly loam, 0 to 3 percent slopes. This soil is deep, nearly level, and well drained to somewhat excessively drained. It is in long, narrow areas on terraces and beach ridges and in irregularly shaped areas on outwash plains and deltas. The areas mainly range from 5 to 100 acres, but several are about 200 acres.

Typically, the surface layer of this soil is dark brown gravelly loam about 8 inches thick. The upper part of the subsoil is yellowish brown gravelly loam 5 inches thick. The lower part of the subsoil is dark brown very gravelly loam 17 inches thick. The substratum is dark brown and light brownish gray very gravelly loamy sand to a depth of 60 inches or more.

Included with this soil in mapping are areas of gently sloping Chenango soils and spots of Castile and Allard soils. Also included are small areas with a surface layer of fine sandy loam. The included areas range from 1/4 acre to 2 acres.

The permeability of this Chenango soil is moderate or moderately rapid in the subsoil and rapid in the

Figure 2.—Alfalfa in an area of Chenango sandy loam.

substratum. Available water capacity is low to moderate. Runoff is slow. Bedrock is at a depth of more than 5 feet. In unlimed areas the soil ranges from strongly acid to very strongly acid in the surface layer and from very strongly acid to medium acid in the subsoil.

Most of the acreage of this soil is used for vegetables, field crops, or nursery stock (fig. 3). A few areas are urbanized. The potential productivity for trees is good.

This soil is suited to cultivated crops and early-season vegetables. Droughtiness and some cobblestones in the soil are the main limitations. Gravel and small rock fragments in the soil hinder planting of some fine-seeded crops and cause rapid wear of machinery. The main management practices are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops; and incorporating crop residues into the soil. All help to improve tilth and maintain organic matter content, which in turn improves the available water capacity of the soil. Crops on this soil respond well to irrigation, especially to sprinkler irrigation.

This soil is suited to hay and pasture, especially to deep-rooted plants. Overgrazing during dry periods causes a loss of desirable plants.

The rapid permeability in the substratum causes a hazard of ground-water pollution in areas used for septic tank absorption fields. It is the main limitation of the soil for community development. This soil is a good source for sand and gravel. Some areas provide suitable sites for recreational uses that require a level, nearly stone-free area.

Capability subclass: IIs.

CkB—Chenango gravelly loam, 3 to 8 percent slopes. This soil is deep, gently sloping, and well drained to somewhat excessively drained. It is on outwash plains, remnant beach ridges, terraces, and deltas. The areas are irregular in shape on outwash plains, long and narrow on beaches, and oval on terraces and deltas. The areas range from 5 to 50 acres, but areas of 5 to 25 acres are most common.

Figure 3.—Nursery stock in an area of Chenango gravelly loam, 0 to 3 percent slopes.

Typically, the surface layer of this soil is dark brown gravely loam about 8 inches thick. The upper part of the subsoil is yellowish brown gravelly loam 5 inches thick. The lower part of the subsoil is dark brown very gravelly loam 17 inches thick. The substratum is dark brown and light brownish gray very gravelly loamy sand to a depth of 60 inches or more.

Included with this soil in mapping are areas of nearly level Chenango soils and areas of Castile, Allard, and Alton soils. The areas of included soils are as much as 2 acres each.

The permeability of this Chenango soil is moderate or moderately rapid in the subsoil and rapid in the substratum. Available water capacity is low to moderate. Runoff is slow. Bedrock is at a depth of more than 5 feet. In unlimed areas the soil ranges from strongly acid to very strongly acid in the surface layer and from very strongly acid to medium acid in the subsoil.

Most of the acreage of this soil is used for field crops, vegetables, or nursery stock. Potential productivity for trees on this soil is good.

This soil is suited to cultivated crops and early-season vegetables. Droughtiness and some stones on the surface are the main limitations. Gravel and some cobblestones in the soil hinder planting of some crops and cause rapid wear of machinery. The main management practices are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops; contour tillage where practical; and incorporating crop residue into the soil. All help to improve tilth, control erosion, and increase the organic matter content, which in turn improves the available water capacity of the soil. Crops on this soil respond well to irrigation, though slope limits some types of irrigation.

This soil is suited to hay and pasture, especially to deep-rooted plants. Overgrazing during dry periods causes a loss of desirable plants.

The rapid permeability in the substratum causes a hazard of ground-water pollution in areas used for septic tank absorption fields. It is the main limitation of the soil for community development. This soil is a good source

for sand and gravel. Some areas provide suitable sites for recreational uses that require a gently sloping, nearly stone-free area.

Capability subclass: IIs.

CkC—Chenango gravelly loam, 8 to 15 percent slopes. This soil is deep, sloping, and well drained to somewhat excessively drained. It is on rolling outwash plains, remnant beach ridges, and terraces. The areas are irregular in shape on outwash plains and long and narrow on beaches and terraces. The areas range from 5 to 50 acres, but areas of 5 to 25 acres are most common.

Typically, the surface layer of this soil is dark brown gravelly loam about 8 inches thick. The upper part of the subsoil is yellowish brown gravelly loam 5 inches thick. The lower part of the subsoil is dark brown very gravelly loam 17 inches thick. The substratum is dark brown and light brownish gray very gravelly loamy sand to a depth of 60 inches or more.

Included with this soil in mapping are areas of gently sloping Chenango soils and areas of Castile and Alton soils. Some areas have a surface layer of fine sandy loam. The areas of included soils are as much as 2 acres each.

The permeability of this Chenango soil is moderate or moderately rapid in the subsoil and rapid in the substratum. Available water capacity is low to moderate. Runoff is medium. Bedrock is at a depth of more than 5 feet. In unlimed areas the soil ranges from strongly acid to very strongly acid in the surface layer and from very strongly acid to medium acid in the subsoil.

Most of the acreage of this soil is in hay or pasture. Some areas are wooded, and potential productivity for trees is good. A few areas are used for residential development.

This soil is moderately suited to cultivated crops. Slope, an erosion hazard, droughtiness, and some stones and gravel on and in the soil are the main limitations. The gravel and stones hinder planting of some crops and cause rapid wear of machinery. The main management practices are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; use of cover crops and sod crops; contour tillage where practical; and incorporating crop residue into the soil. All help to improve tilth, control erosion, and increase the organic matter content, which in turn improves the water-holding capacity of the soil. Crops on this soil respond well to irrigation, but slope limits the use of irrigation systems.

Most areas of this soil are suited to hay and pasture. Overgrazing during dry periods causes a loss of desirable pasture plants.

Slope is the main limitation of the soil for community development. The permeability in the substratum causes a hazard of ground-water pollution in areas used for septic tank absorption fields.

Capability subclass: IIIe.

CkD—Chenango gravelly loam, 15 to 25 percent slopes. This soil is deep, moderately steep, and well drained to somewhat excessively drained. It is on hilly outwash areas, terraces, and deltas. The areas are irregular in shape on outwash plains and long and narrow on terraces and deltas. The areas range from 5 to 50 acres, but most are 5 to 20 acres.

Typically, the surface layer of this soil is dark brown gravelly loam about 8 inches thick. The upper part of the subsoil is yellowish brown gravelly loam 5 inches thick. The lower part of the subsoil is dark brown very gravelly loam 17 inches thick. The substratum is dark brown and light brownish gray very gravelly loamy sand to a depth of 60 inches or more.

Included with this soil in mapping are areas of gently sloping Chenango soils and areas of Castile and Alton soils. Some areas have a surface layer of fine sandy loam. The areas of included soils are as much as 2 acres each.

The permeability of this Chenango soil is moderate or moderately rapid in the subsoil and rapid in the substratum. Available water capacity is low to moderate. Runoff is medium to rapid. Bedrock is at a depth of more than 5 feet. In unlimed areas the soil ranges from strongly acid to very strongly acid in the surface layer and from very strongly acid to medium acid in the subsoil.

Slope, erosion, and droughtiness make this soil poorly suited to cultivated crops. The soil is suited to hay and pasture. However, overgrazing when the soil is dry causes a loss of desirable pasture plants and increases the erosion hazard, and slope limits the use of harvesting equipment.

The potential productivity for trees on this soil is good, and most areas are wooded. Slope makes tree harvesting difficult in some areas. Where practical, placing logging trails on the contour helps to control the hazard of trailside gullying.

Slope is the main limitation of the soil for community development. The permeability in the substratum causes a hazard of ground-water pollution in areas used for septic tank absorption fields.

Capability subclass: IVe.

CkE—Chenango gravelly loam, 25 to 40 percent slopes. This soil is deep, steep, and somewhat excessively drained to well drained. It is on terraces, sides of ridges, and side slopes of dissected outwash plains. The areas are long and mainly narrow. They range from 5 to 50 acres, but most are 5 to 20 acres.

Typically, the surface layer of this soil is dark brown gravelly loam about 8 inches thick. The upper part of the subsoil is yellowish brown gravelly loam 5 inches thick. The lower part of the subsoil is dark brown very gravelly loam 17 inches thick. The substratum is dark brown and

light brownish gray very gravelly loamy sand to a depth of 60 inches or more.

Included with this soil in mapping are areas of Chenango soils that have slopes of less than 25 percent and areas of Arkport soils. Some areas have a cobbly surface layer. The areas of included soils are as much as 2 acres each.

The permeability of this Chenango soil is moderate or moderately rapid in the subsoil and rapid in the substratum. Available water capacity is low to moderate. Runoff is medium to rapid. Bedrock is at a depth of more than 5 feet. In unlimed areas the soil ranges from strongly acid to very strongly acid in the surface layer and from very strongly acid to medium acid in the subsoil.

Slope makes this soil generally unsuited to cultivated crops or hay. Erosion is a very severe hazard if sod cover or trees are removed. Some areas are suitable for pasture, although pasture quality is usually poor because of the difficulty in reseeding and applying fertilizer and because of droughtiness in midsummer. Overgrazing during dry periods weakens the sod cover and increases the erosion hazard.

The potential productivity for trees on this soil is good, and most areas are wooded. Slope, however, limits the use of planting and harvesting equipment. Erosion is also a serious hazard. Placing logging trails on the contour where possible helps to control trailside gullying.

Slope is the major limitation of the soil for community development. The soil generally is a good source of gravel. Some areas provide habitat for wildlife.

Capability subclass: VIe.

CIA—Chenango channery silt loam, fan, 0 to 3 percent slopes. This soil is deep, nearly level, and well drained to somewhat excessively drained. It is on alluvial fans where narrow side streams enter the Allegheny River Valley. The areas of this soil are fan-shaped and generally are less than 50 acres each.

Typically, this soil has a surface layer of dark brown channery silt loam about 8 inches thick. The subsoil is 22 inches thick. It is yellowish brown channery loam in the upper part and dark brown very gravelly loam in the lower part. The substratum is dark brown very gravelly loamy sand to a depth of 60 inches or more.

Included with this soil in mapping are areas of moderately well drained Castile soils and somewhat poorly drained Red Hook soils. Both are in depressional areas along valley toe slopes. Areas of silt, sand, and gravel are near the fan margins, where this soil adjoins alluvial, lacustrine, or outwash deposits. The included areas are as much as 3 acres each.

This Chenango soil is subject to rare flooding after extremely heavy rainfall. A seasonal high water table is at a depth of 3 to 6 feet for a brief period early in spring. The depth to bedrock generally is more than 5 feet. Permeability is moderate to moderately rapid in the surface layer and subsoil and rapid in the substratum. Runoff is slow. The available water capacity is low to moderate. In unlimed areas the soil is strongly acid or very strongly acid in the surface layer and very strongly acid to medium acid in the subsoil.

Much of the acreage of this soil is wooded. Some of the acreage is in forage crops and vegetables.

Most cultivated crops common to the region are suited to this soil. The major limitations for crops are the stone fragments in the soil, which hamper tillage and cause rapid wear of equipment; droughtiness of the soil in summer; and low natural fertility. The main management practices are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; incorporating crop residue into the surface layer; applying lime and fertilizer; and planting sod crops. The main pasture management practices are using fertilizer, use of proper stocking rates, rotational grazing, and annual mowing.

The potential productivity for trees on this soil is good, especially for species that withstand acid soil and droughtiness. Stone fragments on the surface are a minor limitation for planting.

Flooding is a main limitation of this soil for most types of community development. The rapid permeability in the substratum causes a hazard of ground-water pollution in areas used for septic tank filter fields. Many areas are a good source of roadfill and a probable source of gravel.

Capability subclass: IIs.

CIB—Chenango channery silt loam, fan, 3 to 8 percent slopes. This soil is deep, gently sloping, and well drained to somewhat excessively drained. It is on alluvial fans where narrow side streams enter the Allegheny River Valley. The areas of this soil are fan-shaped and generally are less than 50 acres each.

Typically, this soil has a surface layer of dark brown channery silt loam about 8 inches thick. The subsoil is 22 inches thick. It is yellowish brown channery loam in the upper part and dark brown very gravelly loam in the lower part. The substratum is dark brown very gravelly loamy sand to a depth of 60 inches or more.

Included with this soil in mapping are areas of moderately well drained Castile soils and somewhat poorly drained Red Hook soils. Both are in depressional areas along valley toe slopes. Areas of silt, sand, and gravel are near the fan margins, where this soil adjoins alluvial, lacustrine, or outwash deposits. The included areas are as much as 3 acres each.

This Chenango soil is subject to rare flooding after extremely heavy rainfall. A brief seasonal high water table is at a depth of 3 to 6 feet in early spring. The depth to bedrock generally is more than 5 feet. Permeability is moderate to moderately rapid in the surface layer and subsoil and rapid in the substratum. Runoff is slow. The available water capacity is low to moderate. In unlimed areas the soil is strongly acid or

very strongly acid in the surface layer and very strongly acid to medium acid in the subsoil.

Much of the acreage of this soil is wooded. A small acreage is used for forage crops and vegetables.

This soil is suited to most cultivated crops. The main limitations are the stone fragments in the surface layer, which hamper tillage and cause rapid wear of equipment; droughtiness in summer; and erosion, particularly on long slopes. The main management practices are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; incorporating crop residue into the soil; and planting sod crops. All help to control erosion and maintain tilth. The main pasture management practices are using fertilizer, use of proper stocking rates, rotational grazing, and annual mowing.

The potential productivity for trees on this soil is good, especially for species that withstand acid soil and droughtiness. Stone fragments on the surface are a minor limitation for planting.

Flooding is a main limitation of this soil for most types of community development. The rapid permeability in the substratum causes a hazard of ground-water pollution in areas used for septic tank filter fields. Many areas are a good source of roadfill and a probable source of gravel.

Capability subclass: IIs.

Cn—Chippewa silt loam. This soil is deep, nearly level, and poorly drained. It is in depressional areas on the upland plateau. It formed in dense glacial till. The areas are roughly oblong and range from 5 to 10 acres. Slopes range from 0 to 3 percent.

Typically, this soil has a surface layer of very dark gray silt loam about 7 inches thick. The subsurface layer is mottled, grayish brown silt loam 6 inches thick. The subsoil is firm and brittle, dark grayish brown channery silt loam 23 inches thick. The substratum is very dark grayish brown channery silt loam to a depth of at least 60 inches.

Included with this soil in mapping are intermingled areas of Lyons and Volusia soils. The included areas range from 1/4 acre to 2 acres.

This Chippewa soil has a perched seasonal high water table at or near the surface for prolonged periods. Permeability is moderate above the subsoil and very slow or slow in the subsoil and substratum. Runoff is very slow. Available water capacity is low. The surface layer of this soil is very strongly acid to slightly acid, and the subsoil is strongly acid to neutral.

Undrained areas of this soil are poorly suited to cultivated crops. Drainage is difficult to establish because of the lack of suitable outlets and the dense subsoil. The main management practices in drained areas are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops; incorporating crop residue into the soil; and tillage at the proper soil moisture content. All help to improve tilth and maintain organic matter content. Although the available water capacity of the soil is low because of restricted rooting depth, generally there is sufficient moisture from lateral seepage across the top of the subsoil to sustain plant growth.

This soil has limited suitability for pasture. Grazing during wet periods causes compaction of th soil and trampling of grasses. Partial drainage improves the suitability of most areas for pasture.

Although many areas are wooded, the potential productivity for trees on this soil is poor. Because of prolonged wetness, the use of equipment is limited and seedling mortality is high. Uprooting of trees during windy periods is a hazard caused by the shallow rooting depth.

The seasonal high water table and the permeability of the substratum are the main limitations of the soil for community development.

Capability subclass: IVw.

CoA—Churchville silt loam, 0 to 3 percent slopes. This soil is nearly level, deep, and somewhat poorly drained. It formed in a thin mantle of lake sediments high in clay content that overlie loamy glacial till. It is on broad flats of the lowland till plain. The areas of this soil are oblong and range from 10 to 20 acres.

Typically, the surface layer is very dark grayish brown silt loam about 9 inches thick. The subsurface layer is mottled, pinkish gray silt loam 7 inches thick. The subsoil is 15 inches thick. The upper part is reddish brown silty clay loam, and the lower part is firm, mottled, reddish brown silty clay. The substratum is very firm, mottled, reddish gray gravelly loam to a depth of at least 60 inches.

Included with this soil in mapping are small areas of Niagara, Rhinebeck, and Derb soils. Also included are wet spots and drainageways that are indicated by special symbols on the soil map. The areas of included soils range from 1/4 acre to 2 acres.

This Churchville soil has a perched seasonal high water table in the upper part of the subsoil during early spring and other wet periods. Water is ponded on the surface of some areas. Permeability is slow or very slow in the subsoil and substratum. Available water capacity is moderate to high. Runoff is slow. The surface layer is medium acid to neutral, and the subsoil is slightly acid to mildly alkaline. Bedrock is at a depth of more than 5 feet.

Most of the acreage of this soil is in woodland. Some areas are used for cultivated crops.

This soil is suitable for some crops, but seasonal wetness delays planting and limits the length of the growing season. Drainage increases the suitability for crops, but drains must be closely spaced because of the slow or very slow permeability in the subsoil. Tillage of this soil at the proper moisture content helps to minimize the hazard of surface crusting and clodding. The main management practices are: using a conservation tillage

system that includes no-till farming, strip tillage, and stubble mulching; using cover crops and sod crops; and mixing crop residue into the soil. All help to maintain soil tilth and reduce crusting and clodding.

This soil is suited to water-tolerant hay and pasture plants. Restricting grazing during wet periods reduces soil compaction and trampling of desirable pasture grasses.

The potential productivity for trees on this soil is fair to good. The use of equipment is limited by seasonal wetness. Uprooting of trees during windy periods is a hazard caused by the restricted rooting depth.

The main limitations of this soil for community development are the seasonal high water table, a frost-action potential, and the permeability of the subsoil.

Capability subclass: IIIw.

CoB—Churchville silt loam, 3 to 8 percent slopes. This soil is gently sloping, deep, and somewhat poorly drained. It formed in a thin mantle of lake sediments high in clay content that overlie glacial till. It is on plateau shoulders above valley sides and in low, undulating areas. The areas of this soil are irregular in shape or oblong and range from 10 to 30 acres.

Typically, the surface layer is very dark grayish brown silt loam about 9 inches thick. The subsurface layer is mottled, pinkish gray silt loam 7 inches thick. The subsoil is 15 inches thick. The upper part is reddish brown silty clay loam, and the lower part is firm, mottled, reddish brown silty clay. The substratum is very firm, mottled, reddish gray gravelly loam to a depth of at least 60 inches.

Included with this soil in mapping are small areas of Niagara, Rhinebeck, and Derb soils. Also included are wet spots and drainageways that are indicated by special symbols on the soil map. The areas of included soils range from 1/4 acre to 2 acres.

This Churchville soil has a perched seasonal high water table in the upper part of the subsoil during early spring and other wet periods. Water is ponded on the surface of some areas. Permeability is slow or very slow in the subsoil and substratum. Available water capacity is moderate to high. Runoff is slow to medium. The surface layer is medium acid to neutral, and the subsoil is slightly acid to mildly alkaline. Bedrock is at a depth of more than 5 feet.

Most of the acreage of this soil is in woodland. Some areas are used for cultivated crops.

This soil is suitable for some crops, but seasonal wetness delays planting and limits the length of the growing season. Drainage increases the suitability for crops, but drains generally must be closely spaced because of the slow or very slow permeability in the subsoil. Interceptor drains in some areas help to divert runoff and subsurface seepage from higher adjacent areas. Tillage of this soil at the proper moisture content helps to minimize the hazard of surface crusting and clodding. Erosion is a hazard in intensively cultivated areas. The main management practices are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops and sod crops; and mixing crop residue into the soil. All help to maintain soil tilth, reduce crusting and clodding, and control the erosion hazard.

This soil is suited to water-tolerant hay and pasture plants. Restricting grazing during wet periods reduces soil compaction and trampling of desirable pasture grasses.

The potential productivity for trees on this soil is fair to good. Use of equipment is limited by seasonal wetness. Uprooting of trees during windy periods is a hazard caused by the restricted rooting depth.

The main limitations of this soil for community development are the seasonal high water table, a frost-action potential, and the permeability of the subsoil.

Capability subclass is IIIw.

CsB—Collamer silt loam, 3 to 8 percent slopes. This soil is gently sloping, deep, and moderately well drained. It is on the shoulders of drainageways in the lowland lake plain. Some areas are undulating. This soil formed in glacial lake deposits that have a high silt content. The areas range from 5 to 20 acres and are roughly oblong.

Typically, this soil has a surface layer of dark grayish brown silt loam about 10 inches thick. The subsurface layer is pale brown silt loam 2 inches thick. The upper part of the subsoil is mottled and is 8 inches thick. It is brown and pale brown silt loam. The lower part of the subsoil is mottled, dark yellowish brown silty clay loam 12 inches thick. The substratum is brown, stratified silt loam, very fine sand, and silty clay loam to a depth of at least 60 inches.

Included with this soil in mapping are areas of Hudson, Niagara, and Canandaigua soils. The areas of included soils range from 1/2 acre to 3 acres.

This Collamer soil has a seasonal high water table in the lower part of the subsoil during the spring. Permeability is moderate in the upper part of the subsoil and moderately slow or slow in the lower part of the subsoil and in the substratum. Available water capacity is high. Runoff is medium. The depth to bedrock is more than 5 feet. The soil is strongly acid to neutral in the surface layer and medium acid to mildly alkaline in the subsoil.

Many areas of this soil are used for vegetables, cultivated crops, and hay. Some areas are in woodland.

This soil is suited to most crops grown in the area, especially to vegetables, but spring planting is sometimes delayed because of seasonal wetness. Using interceptor drains to divert runoff from higher adjacent areas and using drainage for wet spots allow earlier tillage of many fields. The soil is easy to till once it dries in the spring, but erosion is a hazard in intensively

cultivated areas. The main management practices are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops; mixing crop residue into the soil; and tillage at the proper soil moisture content. All help to maintain tilth, improve organic matter content, and reduce erosion.

This soil is well suited to pasture and hay. Restricting grazing in early spring when the soil is wet prevents compaction of the soil and trampling of desirable grasses.

The potential productivity for trees on this soil is good. Erosion is generally not a concern, but placing logging trails on the contour helps to prevent trailside gullying.

The seasonal high water table, the permeability of the subsoil, instability and low strength, and a high frost-action potential are the main limitations of the soil for community development.

Capability subclass: IIe.

CsC—Collamer silt loam, 8 to 15 percent slopes. This soil is sloping, deep, and moderately well drained. It is on convex side slopes along drainageways and is also on ridges. Some areas are rolling. The soil formed in glacial lake deposits that have a high silt content. The areas range from 5 to 15 acres and generally are long and narrow.

Typically, this soil has a surface layer of dark grayish brown silt loam about 10 inches thick. The subsurface layer is pale brown light silt loam 2 inches thick. The upper part of the subsoil is mottled and is 8 inches thick. It is brown and pale brown silt loam. The lower part of the subsoil is mottled, dark yellowish brown silty clay loam 12 inches thick. The substratum is brown silt loam and very fine sand and silty clay loam that extend to a depth of at least 60 inches.

Included with this soil in mapping are areas of Hudson, Williamson, and Niagara soils and areas of gently sloping soils. The areas of included soils range from 1/2 acre to 3 acres.

This Collamer soil has a seasonal high water table in the lower part of the subsoil during the spring. Permeability is moderate in the upper part of the subsoil and moderately slow or slow in the lower part of the subsoil and in the substratum. Available water capacity is high. Runoff is rapid. The depth to bedrock is more than 5 feet. The soil is strongly acid to neutral in the surface layer and medium acid to mildly alkaline in the subsoil.

Many areas of this soil are used for pasture and hay or for woodland. Some areas are cultivated.

This soil is moderately suited to some crops grown in the area. Erosion is a major hazard. Planting is sometimes delayed because of seasonal wetness in the spring. Drainage of wet spots allows earlier tillage of many fields. The use of interceptor drains that divert seepage and runoff from higher adjacent areas helps to reduce the risk of erosion and dries the soil earlier in the spring. The main management practices are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; stripcropping; using cover crops and sod crops; mixing crop residue into the soil; contour tillage; and tillage at the proper soil moisture content. All help to maintain tilth, improve organic matter content, and control erosion.

This soil is better suited to pasture and hay than to row crops. Restricting grazing in early spring when the soil is wet prevents compaction of the soil and trampling of desirable grasses.

The potential productivity for trees on this soil is good. Placing logging trails on the contour helps to control the hazard of trailside gullying.

The main limitations of the soil for community development are the seasonal high water table, slope, low strength and instability, and a high frost-action potential.

Capability subclass: IIIe.

CtB—Collamer silt loam, till substratum, 3 to 8 percent slopes. This soil is gently sloping, deep, and moderately well drained. It formed in silty glacial lake sediments that overlie loamy glacial till deposits at a depth of 3 1/2 to 5 feet. It is on lowland lake plains and in valleys. The areas are irregular in shape or roughly circular and range from 5 to 20 acres.

Typically, this soil has a surface layer of dark grayish brown silt loam about 8 inches thick. The subsurface layer is mottled, pale brown silt loam about 2 inches thick. The subsoil is 38 inches thick. It is mottled, brown silt loam in the upper part and mottled, dark yellowish brown silty clay loam in the lower part. The substratum is mottled, dark grayish brown gravelly silt loam to a depth of 60 inches or more.

Included with this soil in mapping are areas of Hudson, Scio, Niagara, and Canandaigua soils. Also included are wet spots that are indicated on the soil map by a special symbol and a few small areas of soils that are similar to this Collamer soil except that they have slopes of as much as 15 percent or they do not have underlying loamy glacial till deposits. The included areas range from 1/2 acre to 3 acres.

This Collamer soil has a seasonal high water table in the subsoil during early spring. Permeability is moderate in the upper part of the subsoil and moderately slow or slow in the lower part of the subsoil and in the substratum. Available water capacity is high. Runoff is medium. The depth to bedrock is more than 5 feet. The surface layer is strongly acid to neutral, and the subsoil is medium acid to mildly alkaline.

Most of the acreage of this soil is used for cultivated crops, hay, or pasture. Some areas are wooded.

The soil is suited to most crops grown in the county, especially to vegetables. Wetness in the spring sometimes delays planting, and erosion is a hazard where the soil is cultivated intensively. The soil is easy to till once it dries in the spring. The main management

practices are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops and sod crops; incorporating crop residue into the soil; tillage at the proper soil moisture content; and contour tillage. All help to maintain tilth and reduce the hazard of erosion.

This soil is suited to pasture and hay. Grazing when the soil is wet causes compaction of the soil and destroys desirable pasture grasses.

The potential productivity for trees on this soil is good. Although erosion in wooded areas is generally not a hazard, placing logging trails across the slope reduces the hazard of trailside gullying.

The seasonal high water table, the permeability of the subsoil, instability and low strength, and a high frost-action potential are the main limitations of the soil for community development.

Capability subclass: IIe.

CuB—Colonie loamy fine sand, 3 to 8 percent slopes. This soil is deep, gently sloping, and well drained to somewhat excessively drained. It formed in lake-laid or windblown deposits dominated by fine sand. It is on undulating areas of the lowland lake plain. The areas of this soil are oblong or irregular in shape. They range from 5 to 30 acres.

Typically, this soil has a surface layer of dark grayish brown loamy fine sand about 7 inches thick. The subsoil is 53 inches thick. It is strong brown and yellowish brown loamy fine sand in the upper part and pale brown fine sand in the lower part. The substratum is light grayish brown fine sand to a depth of at least 70 inches.

Included with this soil in mapping are areas of Elnora, Arkport, Galen, and Minoa soils on foot slopes. The areas of included soils range from 1/2 acre to 3 acres.

The permeability of this Colonie soil mainly is moderately rapid or rapid. Runoff is slow to medium. Available water capacity is low. Bedrock is at a depth of more than 5 feet. The surface layer and subsoil are strongly acid to slightly acid.

Most of the acreage of this soil is wooded. Some areas are cultivated.

This soil is moderately suited to cultivated crops, but growth is restricted because of midsummer droughtiness and low natural fertility. Using irrigation and lime and fertilizer increases the suitability for crops, especially for vegetables. Wind erosion is a hazard in areas where the plant cover has been removed. The main management practices are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops and sod crops; and mixing crop residue into the soil. All help to increase the organic matter content and tilth of the soil.

Because of the very low organic matter content, droughtiness, and sandy texture, this soil is only moderately suited to pasture and hay. Some areas are suitable for early-season pasture, but growth by midsummer is usually sparse. Overgrazing during the drier summer months causes a loss of desirable pasture grasses.

The potential productivity for trees on this soil is fair to poor. Droughtiness causes high seedling mortality.

The permeability of this soil causes a hazard of ground-water pollution in areas used for septic tank absorption fields. The sides of excavations in this soil are unstable.

Capability subclass: IIIs.

CuC—Colonie loamy fine sand, 8 to 15 percent slopes. This soil is deep, sloping, and well drained to somewhat excessively drained. It formed in lake-laid or windblown deposits dominated by fine sand. It is on rolling areas and side slopes on the lowland lake plain. The areas are long and narrow and range from 5 to 50 acres.

Typically, this soil has a surface layer of dark grayish brown loamy fine sand about 7 inches thick. The subsoil is 53 inches thick. It is strong brown and yellowish brown loamy fine sand in the upper part and pale brown fine sand in the lower part. The substratum is light grayish brown fine sand to depth of at least 70 inches.

Included with this soil in mapping are small intermingled areas of Elnora, Arkport, and Galen soils. Also included are areas of gently sloping soils. The areas of included soils range from 1/4 acre to 3 acres.

The permeability of this Colonie soil mainly is moderately rapid or rapid. Runoff is medium. Available water capacity is low. Bedrock is at a depth of more than 5 feet. The surface layer and subsoil are strongly acid to slightly acid.

This soil is poorly suited to cultivated crops because of slope, midsummer droughtiness, and low natural fertility. Water erosion is a hazard, particularly on long slopes and where the soil is cultivated. Irrigation improves the suitability for crops, but irrigation water can cause erosion. Wind erosion is a further hazard in areas where the plant cover has been removed. The main management practices in cultivated areas are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops and sod crops; and mixing crop residue into the soil. All help to control erosion and increase tilth and organic matter content.

Because of the very low organic matter content, droughtiness, and sandy texture, this soil is only moderately suited to pasture and hay. Some areas are suitable for early-season pasture, but growth by midsummer is usually sparse. Overgrazing during the drier summer months causes a loss of desirable pasture grasses and increases the hazard of erosion.

Most areas of this soil are wooded. The potential productivity for trees is fair to poor. Low natural fertility and low available water capacity are the main limitations. Droughtiness causes high seedling mortality. Placing

logging trails across the slope helps to minimize the erosion hazard.

Slope and the instability of the soil are main limitations for community development. The permeability of the soil causes a hazard of ground-water pollution in areas used for septic tank absorption fields.

Capability subclass: IVs.

Cv—Cosad loamy fine sand. This soil is deep, nearly level, and somewhat poorly drained. It formed in sandy, lake-laid sediments that overlie clayey deposits. It is on the lake plain. Slopes range from 0 to 3 percent. The areas range mainly from 5 to 10 acres and mainly are irregular in shape.

Typically, the surface layer of this soil is a very dark grayish brown loamy fine sand 9 inches thick. The subsoil is mottled and is 23 inches thick. It is yellowish brown loamy fine sand in the upper part; brown fine sandy loam in the middle part; and firm, brown silty clay in the lower part. The substratum is firm, reddish brown and brown silty clay to a depth of 60 inches or more.

Included with this soil in mapping are poorly drained and very poorly drained soils in the Cattaraugus Reservation in slight depressions and along some drainageways. Also included are areas of Elnora, Rhinebeck, Minoa, and Lamson soils. Some wet spots, gravelly spots, and drainageways are indicated by special symbols on the soil map. The areas of included soils range from 1/4 acre to 2 acres.

This Cosad soil has a perched seasonal high water table in the upper part of the subsoil during early spring and other wet periods. The permeability is rapid in the upper part of the surface layer and subsoil and slow or very slow in the lower part of the subsoil and in the substratum. Available water capacity is low to moderate. Runoff is very slow. Reaction ranges from strongly acid to slightly acid in the surface layer and upper part of the subsoil.

Drained areas of this soil are moderately suited to cultivated crops, but droughtiness is a concern in midsummer. Because the soil has a low capacity for storing nutrients, periodic light application of fertilizer, particularly nitrogen, is needed while the crop is growing. The main management practices in cultivated areas are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; incorporating crop residue into the soil; using sod crops in the cropping system; and tillage at proper moisture content. All help to maintain tilth and increase organic matter content.

In undrained areas this soil is suited to some water-tolerant hay and pasture plants. Restricted grazing during wet periods and prevention of overgrazing help to maintain high quality pasture.

Most areas of the soil are wooded. The potential productivity for trees is fair to poor. The use of equipment is somewhat limited by seasonal wetness. Seedling mortality is high, and uprooting of trees during windy periods is a hazard.

The seasonal high water table, the permeability of the substratum, and the low strength of the soil are the main limitations for community development.

Capability subclass: IIIw.

DdA—Derb silt loam, 0 to 3 percent slopes. This soil is deep, nearly level, and somewhat poorly drained. It formed in silty glacial till deposits. It is on upland glacial till plains and glaciated plateaus. The areas are irregular in shape and range from 5 to 75 acres, but most areas are between 5 and 30 acres.

Typically, this soil has a surface layer of dark grayish brown silt loam about 6 inches thick. The subsoil is mottled and is 32 inches thick. It is brown silt loam in the upper part, brown silty clay loam in the middle part, and olive silty clay loam in the lower part. The substratum is mottled, olive silty clay loam to a depth of at least 60 inches.

Included with this soil in mapping are areas of Orpark soils that are as much as 3 acres each. Also included are areas of soils that are similar to this Derb soil but that have more sand in the subsoil or that are poorly drained.

This Derb soil has a perched seasonal high water table in the upper part of the subsoil. Permeability is moderate or moderately slow in the subsoil and slow in the substratum. Runoff is slow. Available water capacity is high. In unlimed areas the surface layer and subsoil are strongly acid or very strongly acid.

Most areas of this soil are in woodland. Some areas are used for hay or pasture.

Drained areas of this soil are moderately suited to most cultivated crops. The main management practices are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops; incorporating crop residue into the soil; and tillage at the proper soil moisture content. All help to maintain tilth.

Hay and pasture plant species that withstand seasonal wetness are well suited to this soil, especially if lime is used. Overgrazing and grazing when the soil is wet cause a loss of the pasture plants and compaction of the soil.

The potential productivity for trees on this soil is fair to good. Seasonal wetness limits equipment use and causes high seedling mortality. The shallow rooting depth causes a hazard of uprooting during windy periods.

Seasonal wetness, the slow permeability in the substratum, and the potential for frost action are the main limitations of this soil for community development.

Capability subclass: IIIw.

DdB—Derb silt loam, 3 to 8 percent slopes. This soil is deep, gently sloping, and somewhat poorly

drained. It formed in silty glacial till deposits. It is on undulating glacial till plains and upland plateaus. The areas are irregular in shape and range from 5 to 75 acres, but most range from 5 to 30 acres.

Typically, this soil has a surface layer of dark grayish brown silt loam about 6 inches thick. The subsoil is mottled and is 32 inches thick. It is brown silt loam in the upper part, brown silty clay loam in the middle part, and olive silty clay loam in the lower part. The substratum is mottled, olive silty clay loam to a depth of at least 60 inches.

Included with this soil in mapping are areas of Orpark soils that are as much as 3 acres each. Also included are areas of soils that are similar to this Derb soil but that have more sand in the subsoil or that are poorly drained.

This Derb soil has a perched seasonal high water table in the upper part of the subsoil. Permeability is moderate or moderately slow in the subsoil and slow in the substratum. Runoff is slow. Available water capacity is high. In unlimed areas the surface layer and subsoil are strongly acid or very strongly acid.

Most areas of this soil are in woodland. Some areas are used for hay or pasture.

Drained areas of this soil are moderately suited to most cultivated crops. Erosion is a moderate hazard. The main management practices are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops; incorporating crop residue into the soil; tillage at the proper soil moisture content; and cross-slope tillage. All help to maintain tilth and reduce the hazard of erosion.

Hay and pasture plant species that withstand seasonal wetness are well suited to this soil, especially if lime is used. Overgrazing and grazing when the soil is wet cause loss of the pasture plants and compaction of the soil.

The potential productivity for trees on this soil is fair to good. Seasonal wetness limits equipment use and causes high seedling mortality. The shallow rooting depth causes a hazard of uprooting during windy periods.

Seasonal wetness, the slow permeability in the substratum, and the potential for frost action are the main limitations of this soil for community development.

Capability subclass: IIIw.

DdC—Derb silt loam, 8 to 15 percent slopes. This soil is deep, sloping, and somewhat poorly drained. It formed in silty glacial till deposits. It is on rolling glacial till plains and on side slopes and valley sides on the upland plateau. This soil commonly receives runoff from higher adjacent soils. The areas are irregular in shape or oblong and range from 5 to 30 acres.

Typically, this soil has a surface layer of dark grayish brown silt loam about 6 inches thick. The subsoil is mottled and is 32 inches thick. It is brown silt loam in the upper part, brown silty clay loam in the middle part, and olive silty clay loam in the lower part. The substratum is mottled, olive silty clay loam to a depth of at least 60 inches.

Included with this soil in mapping are areas of Schuyler and Orpark soils that are as much as 3 acres each. Also included are areas of soils that are similar to this Derb soil except that they have more sand and shale fragments in the subsoil.

This Derb soil has a perched seasonal high water table in the upper part of the subsoil. Permeability is moderate or moderately slow in the subsoil and slow in the substratum. Runoff is medium. Available water capacity is high. In unlimed areas the surface layer and subsoil are strongly acid or very strongly acid.

Most areas of this soil are in woodland or used for pasture.

Drained areas of this soil are moderately suited to most cultivated crops, but erosion is a major hazard. The main management practices are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops; incorporating crop residue into the soil; tillage at the proper soil moisture content; and contour tillage. All help to maintain soil tilth and reduce the erosion hazard.

Hay and pasture plant species that withstand seasonal wetness are well suited to this soil, especially if lime is used. Overgrazing and grazing when the soil is wet cause impaired growth or loss of the pasture plants and compaction of the soil.

The potential productivity for trees on this soil is fair to good. Seasonal wetness limits equipment use and causes high seedling mortality. The shallow rooting depth causes a hazard of uprooting during windy periods. Placing logging trails across the slope will help to eliminate trail erosion and gullying.

Seasonal wetness, the slow permeability in the substratum, the high potential for frost action, and slope are the main limitations of this soil for community development.

Capability subclass: IIIe.

ElA—Elnora loamy fine sand, 0 to 3 percent slopes. This soil is deep, nearly level, and moderately well drained. It formed in wind- or water-deposited sands. It is on broad flats of the lowland lake plain and in a few valleys. The areas of this soil are oblong and range from 5 to 20 acres.

Typically, this soil has a surface layer of very dark grayish brown loamy fine sand about 4 inches thick. The subsoil is strong brown and yellowish brown loamy fine sand 20 inches thick. The substratum extends to a depth of 60 inches or more. It is mottled, pale brown and grayish brown fine sand.

Included with this soil in mapping are areas of Colonie, Arkport, Scio, and Galen soils. Also included are soils that are similar to this Elnora soil except that they are

not so well drained. The areas of included soils are as much as 3 acres each.

This Elnora soil has a seasonal high water table in the lower part of the subsoil. Permeability is rapid in the subsoil and substratum. Runoff is slow. Available water capacity is low. The depth to bedrock is generally more than 5 feet. The surface layer and subsoil are very strongly acid to slightly acid.

Many areas of this soil are used for corn, hay, and vegetables. Some areas are wooded.

This soil is moderately well suited to cultivated crops. With irrigation, it is well suited to high-value crops, such as vegetables. The main management practices are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops and sod crops; mixing crop residue into the soil; and tillage at the proper soil moisture content. All help to improve tilth and increase organic matter content.

This soil is suitable for hay and pasture, but yields often are low because of the tendency of this soil to be droughty. Overgrazing during dry periods causes a loss of the desirable grasses. Proper stocking rates, restricted grazing in dry periods, using lime and fertilizer, and seeding with drought-tolerant pasture plants help to improve pasture.

The potential productivity for trees on this soil is fair to poor. Seedling mortality is high because of droughtiness and the very low natural fertility of the soil. The soil is well suited to machine planting of seedlings.

Seasonal wetness and instability of excavations are the main limitations of the soil for community development. The permeability of the substratum causes a hazard of ground-water pollution in areas used for septic tank absorption fields.

Capability subclass: IIIw.

ElB—Elnora loamy fine sand, 3 to 8 percent slopes. This soil is deep, gently sloping, and moderately well drained. It formed in wind- or water-deposited sands. It is on undulating areas of the lowland lake plain and in a few valleys. The areas of this soil are oblong and range from 5 to 30 acres.

Typically, this soil has a surface layer of very dark grayish brown loamy fine sand about 4 inches thick. The subsoil is strong brown and yellowish brown loamy fine sand 20 inches thick. The substratum extends to a depth of 60 inches or more. It is mottled, pale brown and grayish brown fine sand.

Included with this soil in mapping are areas of Colonie, Arkport, and Galen soils. Also included are soils that are similar to this Elnora soil except that they are not so well drained. The areas of included soils are as much as 3 acres each.

This Elnora soil has a seasonal high water table in the lower part of the subsoil. Permeability is rapid in the subsoil and substratum. Runoff is medium. Available water capacity is low. The depth to bedrock is generally more than 5 feet. The surface layer and subsoil are very strongly acid to slightly acid.

Many areas of this soil are wooded. Some areas are used for cultivated crops, hay, and vegetables.

This soil is moderately suited to cultivated crops. With irrigation, it is well suited to high-value crops, such as vegetables. Erosion is a moderate hazard in intensively cultivated areas. The main management practices are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops and sod crops; contour tillage; mixing crop residues into the soil; and tillage at the proper soil moisture content. All help to improve tilth, control erosion, and increase organic matter content.

This soil is suitable for hay and pasture, but yields often are low because of the tendency of this soil to be droughty. Overgrazing during dry periods causes a loss of desirable grasses. Proper stocking rates, restricted grazing in dry periods, using lime and fertilizer, and seeding with drought-tolerant pasture plants help to improve pastures.

The potential productivity for trees on this soil is fair to poor. Seedling mortality is high because of droughtiness and the very low natural fertility of the soil.

Seasonal wetness and instability of excavations are the main limitations of the soil for community development. The permeability of the substratum causes a hazard of ground-water pollution in areas used for septic tank absorption fields.

Capability subclass: IIIw.

ErB—Ernest Variant silt loam, 3 to 8 percent slopes. This soil is deep, gently sloping, and moderately well drained. It formed in silt-mantled colluvium derived from shale and siltstone. It is on the lower side slopes of the Allegheny River Valley. The areas are oblong or rectangular and range from 5 to 50 acres.

Typically, the surface layer is very dark grayish brown silt loam about 2 inches thick. The upper part of the subsoil is brown and yellowish brown silt loam about 18 inches thick. The lower part of the subsoil is 26 inches thick. It consists of firm, mottled, yellowish brown silty clay loam and grayish brown shaly clay loam. The substratum is firm, grayish brown shaly silty clay loam to a depth of 60 inches or more.

Included with this soil in mapping are areas of Caneadea, Brinkerton Variant, and Scio soils. The areas of included soils range from 1/2 acre to 3 acres. Some areas of this unit are at high elevations and generally have a shorter growing season than those at lower elevations.

This Ernest Variant soil has a perched seasonal high water table above the firm part of the subsoil in early spring. Permeability is moderate in the upper part of the subsoil and moderately slow to slow in the lower part of the subsoil and in the substratum. Available water capacity is high. Runoff is medium. In unlimed areas the

surface layer and subsoil are very strongly acid or strongly acid.

Most of the acreage of this soil is in woodland. Some areas are cultivated or in hay or pasture.

This soil is suited to cultivated crops. Tillage is slightly delayed in the spring because of the high water table. The use of subsurface drains in places allows earlier cultivation. Erosion is a hazard on long slopes and in intensively cultivated areas. Terracing, contour tillage, and stripcropping help to control erosion. The use of cover crops; incorporating crop residue into the soil; and using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching also help to control erosion and to maintain tilth.

This soil is well suited to hay and pasture. Grazing when the soil is wet causes soil compaction and trampling of desirable plant species.

The potential productivity for trees on this soil is good. Placing logging roads and skid trails across the slope helps to prevent trailside gullying. Clearing brush and planting in the early spring when the soil is moist help to improve the rate of seedling survival. The use of heavy equipment during excessively wet periods causes soil compaction.

The main limitations of this soil for community development are the seasonal high water table, the permeability in the substratum, and a high frost-action potential.

Capability subclass: IIe.

ErC—Ernest Variant silt loam, 8 to 15 percent slopes. This soil is deep, sloping, and moderately well drained. It formed in silt-mantled colluvial deposits derived from shale and siltstone. It is on the lower side slopes of the Allegheny River Valley. The areas are mostly rectangular and range from 10 to 40 acres.

Typically, the surface layer is very dark grayish brown silt loam about 2 inches thick. The upper part of the subsoil is brown and yellowish brown silt loam about 18 inches thick. The lower part of the subsoil is 26 inches thick. It consists of firm, mottled, yellowish brown silty clay loam and grayish brown shaly clay loam. The substratum is firm, grayish brown shaly silty clay loam to a depth of 60 inches or more.

Included with this soil in mapping are areas of Rayne, Brinkerton Variant, and Wharton soils. The areas of included soils range from 1/2 acre to 3 acres. Some areas of this unit are at high elevations and generally have a shorter growing season than those at lower elevations.

This Ernest Variant soil has a perched seasonal high water table above the firm part of the subsoil in early spring. Permeability is moderate in the upper part of the subsoil and moderately slow to slow in the lower part of the subsoil and in the substratum. Available water capacity is high. Runoff is medium to rapid. In unlimed areas the surface layer and subsoil are very strongly acid or strongly acid.

This soil is moderately suited to cultivated crops commonly grown in the area, but erosion is a major hazard. The use of large tillage and harvesting equipment is limited by slope. Contour tillage, stripcropping, and diversions that intercept runoff help to control erosion. Incorporating crop residue into the soil; using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; cultivating at the proper moisture content; and using cover crops help to maintain tilth and control erosion.

This soil is well suited to hay and pasture. Grazing when the soil is wet causes soil compaction and trampling of desirable plant species.

The potential productivity for trees on this soil is good, and most areas are wooded. Erosion is a hazard during harvesting. Placing logging roads and skid trails on the contour or across the slope wherever possible helps to prevent trailside gullying. The use of heavy equipment during wet periods causes soil compaction.

The main limitations of this soil for community development are the seasonal high water table, the permeability in the substratum, and slope.

Capability subclass: IIIe.

ErD—Ernest Variant silt loam, 15 to 25 percent slopes. This soil is deep, moderately steep, and moderately well drained. It formed in silt-mantled colluvium derived from shale and siltstone. The soil is on the lower side slopes of the Allegheny River Valley. The areas are mostly rectangular and range from 10 to 30 acres.

Typically, the surface layer is very dark grayish brown silt loam about 2 inches thick. The upper part of the subsoil is brown and yellowish brown silt loam about 18 inches thick. The lower part of the subsoil is 26 inches thick. It consists of firm, mottled, yellowish brown silty clay loam and grayish brown shaly clay loam. The substratum is firm, grayish brown shaly silty clay loam to a depth of 60 inches or more.

Included with this soil in mapping are areas of Rayne, Wharton, Brinkerton Variant, and Scio soils. The areas of included soils range from 1/2 acre to 3 acres. Some areas of this unit are at high elevations and generally have a shorter growing season than those at lower elevations.

This Ernest Variant soil has a perched seasonal high water table above the firm part of the subsoil in early spring. Permeability is moderate in the upper part of the subsoil and moderately slow to slow in the lower part of the subsoil and in the substratum. Available water capacity is high. Runoff is rapid. In unlimed areas the surface layer and subsoil are very strongly acid or strongly acid.

Slope makes this soil poorly suited to cultivated crops and makes the use of farm equipment difficult and

sometimes hazardous. The erosion hazard in cultivated areas is severe. The main management practices in cultivated areas are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops; and using diversions to intercept runoff.

This soil is suited to pasture. Grazing when the soil is wet causes soil compaction and trampling of desirable plant species, which causes further erosion.

The potential productivity for trees on this soil is good, and most areas are wooded. Placing logging roads and skid trails on the contour or across the slope helps to prevent trailside gullying. Slope limits the use of harvesting equipment, and the use of heavy equipment during wet periods causes soil compaction.

The main limitations of this soil for community development are the seasonal high water table, the permeability in the substratum, and slope.

Capability subclass: IVe.

FbB—Farnham shaly silt loam, 3 to 8 percent slopes. This soil is deep, gently sloping, and moderately well drained. It is on terraces, glacial lake beaches, and undulating outwash plains. The areas are long and narrow and range from 5 to 10 acres.

Typically, this soil has a surface layer of very dark grayish brown shaly silt loam about 7 inches thick. The subsoil is dark brown and is 31 inches thick. It is shaly silt loam in the upper part and mottled very shaly loam in the lower part. The substratum is grayish brown very shaly loam to a depth of 60 inches or more.

Included with this soil in mapping are areas of Blasdell, Chenango, Castile, and Red Hook soils. The areas of included soils range from 1/4 acre to 3 acres.

This Farnham soil has a seasonal high water table in the lower part of the subsoil. Permeability is moderately rapid throughout the soil. Runoff is medium. Available water capacity is low to moderate. The depth to bedrock is generally 5 feet or more. The surface layer and subsoil in unlimed areas are very strongly acid to medium acid.

Most areas of this soil are used for cultivated crops or hay, and a few areas are wooded.

This soil is suited to cultivated crops. The seasonal high water table, droughtiness in midsummer, and low natural fertility are the main limitations. The main management practices are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops and sod crops; incorporating crop residue into the soil; and contour tillage. All help to improve tilth, control erosion, and increase organic matter content. Irrigation is suitable for this soil, but slope hinders the management of irrigation systems.

This soil is suited to pasture and hay. Grazing during wet periods and extremely dry periods causes a loss of desirable pasture plants.

The potential productivity for trees on this soil is fair to good. Machine planting of seedlings is practical in most areas.

The main limitation of this soil for community development is the seasonal high water table.

Capability subclass: IIw.

Fu—Fluvaquents and Udifluvents, frequently flooded. This unit consists of nearly level soils that formed in recent stream deposits. The soil material is dominantly sandy or loamy alluvial sediments and small stone fragments. The soils are subject to frequent flooding by nearby streams. The areas are mostly long and narrow. They range from 35 to 50 acres, but most are 5 to 20 acres. Slopes range from 0 to 5 percent. Some areas consist mostly of Fluvaquents, some mostly of Udifluvents, and some of both. The Fluvaquents and Udifluvents were mapped together because they have no major differences in use and management. The total acreage of the unit is about 50 percent somewhat poorly drained or poorly drained Fluvaquents, 30 percent well drained or moderately well drained Udifluvents, and 20 percent other soils.

Included with this unit in mapping are areas of well drained Tioga soils, moderately well drained and somewhat poorly drained Middlebury soils, and poorly drained and very poorly drained Wayland soils. These soils are in areas that are not so frequently flooded as the rest of this unit. The areas of the included soils range from 1/4 acre to 3 acres.

Most areas of this unit are in brush. A few areas have been cleared and are used as pasture. The frequent flooding and the variability in the properties of the soils make onsite investigation necessary to determine the suitabilities and potentials of an area for any use.

Capability subclass: Vw.

FxB—Fremont silt loam, 3 to 8 percent slopes. This soil is deep, gently sloping, and somewhat poorly drained. It formed in glacial till derived from siltstone, shale, and small amounts of sandstone. It is on slightly concave side slopes on uplands that receive seepage or runoff from adjacent higher areas. The areas mostly range from 5 to 20 acres.

Typically, the surface layer is dark grayish brown silt loam about 10 inches thick. The upper part of the subsoil is mottled, brown silt loam 5 inches thick. The lower part is a firm layer of mottled, light brownish gray to yellowish brown channery silty clay loam 20 inches thick. The substratum is firm, light olive brown channery silty clay loam to a depth of 60 inches or more.

Included with this soil in mapping are spots of Chippewa soils, many of which are indicated by a wet-spot symbol on the soil map, and a few areas of Schuyler and Volusia soils. The areas of included soils are as much as 3 acres each.

This Fremont soil has a perched seasonal high water table at a depth of 1/2 foot to 1 1/2 feet. Bedrock is at a depth of more than 60 inches. Permeability is moderate in the surface layer, moderately slow or moderate in the subsoil, and slow or very slow in the substratum. Runoff is moderate. Available water capacity is high. In unlimed areas the surface layer is medium acid to very strongly acid.

Some areas of this soil are farmed at a low level of intensity. Many areas are wooded.

This soil is moderately suited to cultivated crops if it is drained. Erosion is a hazard on long slopes. The main management practices that help to control erosion are stripcropping, contour tillage, and the use of cover crops. This soil requires careful management to maintain good tilth. Plowing at the proper soil moisture content; using cover crops; using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; and incorporating crop residue into the soil help to maintain tilth and increase organic matter content.

The prevention of overgrazing and of grazing when the soil is wet is the main concern in pasture management. If the pasture is grazed when the soil is wet, the soil becomes compacted and plant growth is impaired. Proper stocking rates, deferred and rotational grazing, and yearly mowing are the main management needs.

The potential productivity for trees on this soil is fair to good. Seasonal wetness limits machine harvesting and planting. Species that are suitable for acid soils are the most productive.

The main limitations of the soil for community development are the seasonal high water table and the permeability in the subsoil and substratum.

Capability subclass: IIIw.

GaA—Galen very fine sandy loam, 0 to 3 percent slopes. This soil is deep, nearly level, and moderately well drained. It is on broad areas of remnant deltas and beaches of former glacial lakes. These areas are irregular in shape or long and narrow and range from 5 to 30 acres.

Typically, this soil has a surface layer of dark brown very fine sandy loam about 8 inches thick. The subsoil is about 28 inches thick. The upper part of the subsoil is mottled, brownish yellow fine sandy loam; the middle part is mottled, brown loamy fine sand; and the lower part is brown loamy fine sand and thin bands of dark yellowish brown fine sandy loam. The substratum is mottled, pale brown fine sand to a depth of 60 inches or more.

Included with this soil in mapping are small areas of gently sloping Galen soils and areas of Minoa, Arkport, Elnora, and Scio soils. In some areas of Galen soils there are horizontal bands of silty material in the subsoil; these bands add up to as much as 10 inches in total thickness. The areas of included soils range from 1/2 acre to 2 acres.

This Galen soil has a seasonal high water table in spring at a depth of about 1 1/2 to 2 feet. Permeability mainly is moderate or moderately rapid in the subsoil and moderately rapid in the substratum. Some areas have slowly permeable layers in the substratum at a depth of more than 5 feet. Runoff is slow. Available water capacity is moderate. The depth to bedrock is more than 5 feet. Reaction ranges from strongly acid to neutral in the surface layer and from medium acid to neutral in the subsoil.

Most of the acreage of this soil is used for corn, hay, or vegetables. Some areas are wooded, and the potential productivity for trees is good.

With adequate drainage and maintenance of tilth and fertility levels, this soil is suitable for most crops grown in the area, especially for vegetables. Irrigation is needed for some crops in dry periods. Spring wetness sometimes delays planting. Water erosion is usually not a hazard except where open ditches are unprotected, but soil blowing is a hazard in intensively cultivated areas during dry periods. The main management practices are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops; and using sod crops. All help to maintain tilth and increase organic matter content. The installation and use of drains are limited by the nearly level slopes and the instability of cutbanks.

This soil is suited to hay and pasture. Overgrazing and grazing when the soil is wet cause a loss of desirable pasture grasses.

Seasonal wetness, instability of cutbanks, and the moderate potential for frost action are the main limitations of this soil for community development. Some areas provide sites for recreational uses such as campsites, picnic areas, and athletic fields.

Capability subclass: IIw.

GaB—Galen very fine sandy loam, 3 to 8 percent slopes. This soil is deep, gently sloping, and moderately well drained. It is on low ridges and side slopes. It has a high sand content and formed on deltas and beaches of former glacial lakes. A few areas consist of sandy glacial outwash deposits. The areas of this soil are irregular in shape and range from 5 to 30 acres.

Typically, this soil has a surface layer of dark brown very fine sandy loam about 8 inches thick. The subsoil is about 28 inches thick. The upper part of the subsoil is mottled, brownish yellow fine sandy loam; the middle part is mottled, brown loamy fine sand; and the lower part is brown loamy fine sand and thin bands of dark yellowish brown fine sandy loam. The substratum is mottled, pale brown fine sand to a depth of 60 inches or more.

Included with this soil in mapping are small areas of nearly level Galen soils and areas of Minoa, Arkport,

Elnora, and Scio soils. In some areas of Galen soils there are horizontal bands of silty material in the subsoil, which range up to 10 inches in total thickness. The areas of included soils range from 1/2 acre to 2 acres.

This Galen soil has a seasonal high water table in spring at a depth of about 1 1/2 to 2 feet. Permeability mainly is moderate or moderately rapid in the subsoil and moderately rapid in the substratum. Some areas have slowly permeable layers in the substratum at a depth of more than 5 feet. Runoff is slow to medium. Available water capacity is moderate. The depth to bedrock is more than 5 feet. Reaction ranges from strongly acid to neutral in the surface layer and from medium acid to neutral in the subsoil.

Most of the acreage of this soil is cultivated, is in hay or pasture, or is wooded. Some areas are used for vegetables.

If tilth and fertility are maintained, this soil is suited to most crops grown in the area, including vegetables. Spring wetness sometimes delays planting. Water erosion is a hazard on long slopes and where the soil is intensively cultivated. Open ditches need plant cover to prevent erosion by water and wind. The main management practices in cultivated areas are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops and sod crops; and contour tillage. All help to maintain tilth, control erosion, and increase organic matter content. Subsurface drainage in wet spots improves the suitability of many areas, but installation of drains is limited because of the tendency of cutbanks to cave or slump. Irrigation is needed for some crops in dry periods. Slope, however, limits the installation and use of irrigation systems.

This soil is well suited to hay and pasture. Overgrazing and grazing when the soil is wet cause a loss of desirable pasture grasses.

The potential productivity for trees on this soil is good. Placing logging trails across long slopes helps to eliminate the hazard of trailside erosion.

Seasonal wetness, instability of cutbanks, and the moderate potential for frost action are the main limitations of this soil for community development. Some areas provide sites for recreational uses such as campsites, picnic areas, and athletic fields.

Capability subclass: IIw.

GlB—Gilpin shaly silt loam, 3 to 8 percent slopes. This soil is gently sloping, moderately deep, and well drained. It formed in weathered residual material derived from interbedded acid shale and siltstone bedrock. It is on hillcrests on uplands. Most areas are oblong and range from 5 to 20 acres.

Typically, this soil has a surface layer of dark grayish brown shaly silt loam 8 inches thick. The subsoil is yellowish brown shaly silt loam 18 inches thick. Bedrock is at a depth of 26 inches.

Included with this soil in mapping are areas of Rayne soils and areas of soils where bedrock is at a depth of less than 20 inches. Also included are areas of soils that are similar to this Gilpin soil except that they are nearly level, are moderately well drained, and have a seasonal high water table above the bedrock for brief periods early in spring. The areas of included soils range fom 1/2 acre to 5 acres. Some areas of this unit are at high elevations and generally have a shorter growing season than those at lower elevations.

The permeability of this Gilpin soil is moderate above the bedrock. Available water capacity is low to moderate. Runoff is medium to slow. Bedrock is at a depth of 20 to 40 inches. In unlimed areas the surface layer and subsoil are very strongly acid or strongly acid.

This soil is suited to farming, but droughtiness is often a hazard in midsummer, and erosion is a hazard in some intensively cultivated areas. Shale fragments in the soil limit planting of fine-seeded crops and cause machinery to wear at a rapid rate. The included soils that are seasonally wet sometimes hinder early-season tillage of some fields. Subsurface drains commonly are difficult to install, however, because of the underlying bedrock. The main management practices in cultivated areas are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; cross-slope tillage; and using cover crops and grasses and legumes in the cropping system. All help to maintain tilth, control erosion, and increase organic matter content.

This soil is suited to hay and pasture, especially plant species that withstand droughtiness in summer. Overgrazing during dry periods causes a loss of pasture grasses.

The potential productivity for trees on this soil is good, and most areas are wooded. Trees that withstand acid soil conditions and summer droughtiness generally are the most suitable.

The depth to bedrock is the main limitation of this soil for community development. Droughtiness limits the establishment of lawns. Some areas are suitable for recreational uses.

Capability subclass: IIe.

GlC—Gilpin shaly silt loam, 8 to 15 percent slopes. This soil is sloping, moderately deep, and well drained. It formed in weathered residual material derived from interbedded acid shale and siltstone bedrock. It is on hillcrests on uplands. Most areas are long and narrow and range from 5 to 30 acres.

Typically, this soil has a surface layer of dark grayish brown shaly silt loam 8 inches thick. The subsoil is yellowish brown shaly silt loam 18 inches thick. Bedrock is at a depth of 26 inches.

Included with this soil in mapping are areas of Rayne soils and areas of soils that are less than 20 inches deep to bedrock. Also included are spots of wet soils. The areas of included soils range from 1/2 acre to 3

acres. Some areas of this unit are at high elevations and generally have a shorter growing season than those at lower elevations.

The permeability of this Gilpin soil is moderate above the bedrock. Available water capacity is low to moderate. Runoff is medium to rapid. Bedrock is at a depth of 20 to 40 inches. In unlimed areas the surface layer and subsoil are very strongly acid or strongly acid.

The main limitations of this soil for cultivated crops are droughtiness, slope, and an erosion hazard. Subsurface drainage is often difficult to install in the included wetter soils because of the depth to bedrock. The shale fragments in the soil interfere with tillage and cause rapid wear of equipment. The main management practices in cultivated areas are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops and grasses and legumes in the cropping system; and using cross-slope tillage. All help to maintain tilth, increase organic matter content, and control the erosion hazard.

This soil is moderately suited to hay and pasture, mainly to plants that withstand droughtiness in summer. Overgrazing during dry periods causes a loss of pasture plants and an increased hazard of erosion.

The potential productivity for trees on this soil is good, especially for species that withstand acid soil conditions and summer droughtiness. Most areas are wooded. Placing logging trails across the slope helps to eliminate any hazard of trailside gullying.

The depth to bedrock and the slope are the main limitations of this soil for community development. Some areas are suitable for recreational uses, such as hiking trails, campsites, or picnic areas.

Capability subclass: IIIe.

GID—Gilpin shaly silt loam, 15 to 25 percent slopes. This soil is moderately steep, moderately deep, and well drained. It formed in weathered residual material derived from interbedded acid shale and siltstone bedrock. It is on uniformly sloping valley sides. The areas are long and narrow and range from 5 to 30 acres.

Typically, this soil has a surface layer of dark grayish brown shaly silt loam 8 inches thick. The subsoil is yellowish brown shaly silt loam 18 inches thick. Bedrock is at a depth of 26 inches.

Included with this soil in mapping are areas of Rayne soils and areas of soils where bedrock is at a depth of less than 20 inches. The areas of included soils range from 1/2 acre to 5 acres. Some areas of this unit are at high elevations and generally have a shorter growing season than those at lower elevations.

The permeability of this Gilpin soil is moderate above the bedrock. Available water capacity is low to moderate. Runoff is rapid. Bedrock is at a depth of 20 to 40 inches. In unlimed areas the surface layer and subsoil are very strongly acid or strongly acid.

The depth to bedrock and the slope make this soil poorly suited to row crops. The main management practices in cultivated areas are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops and grasses and legumes in the cropping system; incorporating crop residue into the soil; and tillage at proper moisture level. All help to reduce runoff and erosion and improve tilth. The slope makes the use of farm machinery on this soil difficult and hazardous.

This soil is moderately suited to pasture. Overgrazing causes a loss of desirable pasture plants and increases the erosion hazard. The use of proper stocking rates, rotational and deferred grazing, and restricted grazing during dry periods are the main pasture management needs. Applying lime and fertilizer and reseeding are difficult because of the slope.

Potential productivity for trees on this soil is good. Most areas are wooded. Erosion is a hazard along logging roads and skid trails. Placing the roads or trails on the contour or across the slope helps to prevent erosion. Slope interferes with machine harvesting and planting of trees, and seedling mortality is high.

Slope and the depth to bedrock are major limitations of the soil for community development.

Capability subclass: IVe.

GIE—Gilpin shaly silt loam, 25 to 35 percent slopes. This soil is steep, moderately deep, and well drained. It formed in residual material derived from siltstone and sandstone bedrock. It is on uniformly sloping valley sides. The areas are long and narrow and range from 10 to 50 acres.

Typically, this soil has a surface layer of dark grayish brown shaly silt loam 8 inches thick. The subsoil is yellowish brown shaly silt loam 18 inches thick. Bedrock is at a depth of 26 inches.

Included with this soil in mapping are areas of Rayne soils and areas of soils where bedrock is at a depth of less than 20 inches. The areas of included soils range from 1/2 acre to 5 acres. Some areas of this soil are at high elevations and generally have a shorter growing season than those at lower elevations.

The permeability of this Gilpin soil is moderate above the bedrock. Available water capacity is low to moderate. Runoff is very rapid. Bedrock is at a depth of 20 to 40 inches. In unlimed areas the surface layer and subsoil are very strongly acid or strongly acid.

Slope, the depth to bedrock, and droughtiness make this soil generally unsuited to cultivated crops or hay. Slopes are too steep for the safe operation of most farm equipment. Some areas are suitable for pasture, though pasture improvement is difficult because of the slope. Overgrazing causes further erosion and gullying.

This soil is mostly wooded, and the potential productivity for trees is good, especially for species that withstand acid soil conditions and droughtiness. The use

of equipment for planting and harvesting is limited because of slope. Placing logging trails on the contour wherever possible helps to control the hazard of trailside gullying.

Slope and the depth to bedrock are major limitations of the soil for community development.

Capability subclass: VIe.

GIF—Gilpin shaly silt loam, 35 to 65 percent slopes. This soil is very steep, moderately deep, and well drained. It formed in residual material derived from siltstone and sandstone bedrock. It is on uniformly sloping valley sides. The areas are long and narrow and range from 10 to 50 acres.

Typically, this soil has a surface layer of dark grayish brown shaly silt loam 8 inches thick. The subsoil is yellowish brown shaly silt loam 18 inches thick. Bedrock is at a depth of 26 inches.

Included with this soil in mapping are areas of Rayne soils and areas of soils where bedrock is at a depth of less than 20 inches. The areas of included soils range from 1/2 acre to 5 acres. Some areas are at high elevations and generally have a shorter growing season than those at lower elevations.

The permeability of this Gilpin soil is moderate above the bedrock. Available water capacity is low to moderate. Runoff is very rapid. Bedrock is at a depth of 20 to 40 inches. In unlimed areas the surface layer and subsoil are very strongly acid or strongly acid.

Slope, the depth to bedrock, and droughtiness make this soil generally unsuited to farming. The slopes are too steep for the safe operation of most farm equipment.

This soil is mostly wooded, and the potential productivity for timber is good, especially for species that withstand acid soil conditions and droughtiness. Placing logging trails on the contour wherever possible helps to control the hazard of trailside gullying.

Slope and the depth to bedrock are major limitations of the soil for community development.

Capability subclass: VIIe.

Ha—Halsey silt loam. This soil is deep, nearly level, and very poorly drained. It formed in gravelly glacial outwash deposits. The soil is in circular depressions on outwash plains and in oblong areas along drainageways and seep areas. Slopes range from 0 to 3 percent. The areas range mainly from 5 to 50 acres.

Typically, the surface layer of this soil is black silt loam about 8 inches thick. The subsoil is mottled and is 17 inches thick. It consists of grayish brown gravelly silt loam in the upper part and gray very gravelly sandy loam in the lower part. The substratum is gray stratified sand and gravel to a depth of 60 inches or more.

Included with this soil in mapping are areas of Red Hook soils on a few small, slightly higher rises. Also included are small areas of soils with silty deposits at a depth of less than 40 inches. The areas of included soils range from 1/4 acre to 2 acres.

This Halsey soil has a high water table at or near the surface during much of the year. Water is ponded on some areas in the spring. Permeability is moderate or moderately rapid in the subsoil and rapid in the substratum. The root zone is mostly limited to a depth of 10 to 12 inches because of the water table. Available water capacity is moderate to high. Runoff is slow. Reaction in the surface layer and subsoil ranges from medium acid through neutral.

Most of the acreage of this soil is wooded or used for pasture.

Without drainage, this soil generally is not suited to cultivated crops. The soil is suitable for some types of crops if it is drained. In most areas, however, it is difficult to establish outlets for drainage because of the low position of the soil on the landscape. Open ditches, surface drainage, land shaping, or some combination of these with tile drainage is needed. If this soil is drained and cultivated, the main management practices are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; growing cover crops; and mixing crop residue into the soil. All help to maintain organic matter content and tilth.

This soil is suited to some types of pasture, mainly plants that tolerate long periods of wetness and restricted rooting. If the pasture is grazed when the soil is wet, compaction occurs and growth is restricted.

The potential productivity for trees on this soil is poor. The high water table severely limits the use of equipment for planting and timber harvesting. It also causes high seedling mortality and restricted rooting, which results in the uprooting of trees during windy periods.

The high water table is the main limitation of this soil for community development. Seepage and a high potential for frost action further limit the soil for most nonfarm uses other than wetland wildlife habitat.

Capability subclass: Vw.

Hn—Haplaquolls, ponded. This unit consists of deep, level, very poorly drained soils that have shallow water on the surface for much of the year. The areas commonly border lakes, ponds, and other bodies of water and are called freshwater marsh. The depth of the water covering these soils fluctuates with the depth of the adjacent bodies of water. Slopes range from 0 to 1 percent. The areas are mostly oblong and range from 3 to 5 acres.

Haplaquolls have a surface layer that is 5 to 25 inches thick. It is mottled, black or gray, loamy or sandy material with a moderate or high amount of organic matter. The underlying layers extend to a depth of 60 inches or more. They are mottled, gray or brown, sandy or loamy material with varying amounts of gravel fragments.

Included with this soil in mapping are areas of Palms muck and Halsey soils. The areas of included soils range from 1/4 to 1 acre.

Most areas of this unit are in natural depressions; others are manmade or are the result of beaver dams. The dominant vegetation is cattails, rushes, and other water-tolerant herbaceous plants. Most areas have no trees, but water-tolerant species are common in some areas. The location of this unit and the water on the surface limit the unit for most uses other than as wetland wildlife habitat. Onsite investigation is needed to determine the suitability or potential of an area for any use.

Capability subclass: VIIIw.

HuB—Hudson silt loam, 3 to 8 percent slopes. This soil is deep, gently sloping, and moderately well drained. It formed in glacial lake sediments that have a high content of clay and silt. It is on undulating areas on the lowland lake plain. The areas are oblong, and most are less than 5 acres.

Typically, this soil has a surface layer of brown silt loam about 8 inches thick. The subsurface layer is pale brown silt loam 6 inches thick. The subsoil is dark grayish brown silty clay 15 inches thick. The substratum mostly is dark grayish brown clay to a depth of 60 inches or more.

Included with this soil in mapping are areas of Collamer, Churchville, and Rhinebeck soils. The areas of included soils range from 1/4 acre to 3 acres.

This Hudson soil has a seasonal high water table in the lower part of the subsoil for brief periods in early spring. Permeability is moderate or moderately slow in the surface and subsurface layers and slow or very slow in the subsoil and substratum. Runoff is medium. The available water capacity is moderate to high. The surface layer is strongly acid to neutral, and the subsoil is strongly acid to mildly alkaline. The depth to bedrock is generally 5 feet or more.

Most of the acreage of this soil is cultivated or used for hay. Some areas are in woodland, and the potential productivity for trees is good.

This soil is suited to cultivated crops, but erosion is a hazard where the soil is unprotected. The seasonal high water table sometimes delays tillage and planting. Hard clods in the soil and a crust on the surface commonly form when the soil is cultivated while it is wet. The main management practices are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops and sod crops; and mixing crop residue into the soil. All help to improve tilth, reduce crusting, and increase organic matter content. These practices and cross-slope tillage also help to control erosion. Subsurface drainage of the included wet spots allows early cultivation of many fields.

This soil is well suited to pasture and hay. Grazing when the soil is wet in early spring causes compaction of the soil and trampling of the desirable pasture plants. Use of proper stocking rates, rotational and deferred grazing, and yearly mowing are the principal pasture management practices.

The main limitations of the soil for community development are seasonal wetness, the slow or very slow permeability in the subsoil, a high potential for frost action, and the clayey texture of the subsoil and substratum. Some areas are suitable for recreational uses such as campsites and picnic areas.

Capability subclass: IIe.

HvE—Hudson silty clay loam, 25 to 40 percent slopes. This soil is deep, steep, and moderately well drained. It formed in glacial lake sediments that have a high content of clay and silt. It is on side slopes of dissected areas and on the sides of ridges and valleys. In many places the soil surface has a steplike appearance. The areas range from 5 to 30 acres.

Typically, this soil has a surface layer of brown silt loam about 8 inches thick. The subsurface layer is pale brown silt loam 6 inches thick. The subsoil is dark grayish brown silty clay 15 inches thick. The substratum mostly is dark grayish brown clay to a depth of 60 inches or more.

Included with this soil in mapping are areas of Collamer and Rhinebeck soils and a few areas of severely eroded soils. The areas of the included soils range from 1/4 acre to 3 acres.

This Hudson soil has a seasonal high water table in the lower part of the subsoil for brief periods in early spring. Permeability is moderate or moderately slow in the surface and subsurface layers and slow or very slow in the subsoil and substratum. Runoff is rapid or very rapid. The available water capacity is moderate to high. The surface layer is strongly acid to neutral, and the subsoil is strongly acid to mildly alkaline. The depth to bedrock is generally 5 feet or more.

Slope makes this soil generally unsuitable for cultivated crops or hay. The operation of most types of farm equipment is difficult and hazardous and is further limited by the uneven topography.

Some areas of this soil have limited suitability for pasture, but reseeding and applying fertilizers generally are not feasible. Overgrazing causes a loss of pasture grasses, which increases erosion and gullying. Grazing when the soil is wet results in soil compaction and trampling of the pasture grasses.

The potential timber productivity for trees on this soil is good. Most areas are wooded. Machine planting of seedlings and timber harvesting are difficult because of the steep slopes. Placing logging trails across the slope helps to minimize trail gullying.

Slope, the seasonal high water table, instability, and the slow or very slow permeability limit this soil for most types of community development. Some areas are suitable for use as wildlife habitat.

Capability subclass: VIe.

Lc—Lamson very fine sandy loam. This soil is deep, nearly level, and poorly drained. It formed in glacial lake sediments that have a high sand content. It is on lowland glacial lake plains. Slopes range from 0 to 3 percent. The areas are irregular in shape and range from 5 to 20 acres.

Typically, this soil has a surface layer of very dark gray very fine sandy loam about 9 inches thick. The subsurface layer is mottled, light gray loamy very fine sand 5 inches thick. The subsoil is mottled fine sandy loam 26 inches thick. The upper part is brown, and the lower part is grayish brown. The substratum is mottled, light brownish gray loamy very fine sand to a depth of 60 inches or more.

Included with this soil in mapping are areas of Minoa soils. Also included are soils, in some depressional areas, that have a mucky surface layer. The areas of included soils range from 1/4 acre to 3 acres.

This Lamson soil has a seasonal high water table at or near the surface during wet periods. Permeability is moderate or moderately rapid throughout the soil. Runoff is very slow. Available water capacity is moderate to high. The depth to bedrock is generally 5 feet or more. Reaction is medium acid to mildly alkaline in the surface and subsurface layers and slightly acid to moderately alkaline in the subsoil.

Most areas of this soil are wooded. Some areas are in pasture, and a few areas have been drained and are cultivated.

This soil is moderately suited to cultivated crops if it is drained. Drainage outlets are often difficult to establish, however, because of the low position of the soil on the landscape. The main management practices in cultivated areas are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops; mixing crop residue into the soil; and tillage at the proper soil moisture content. All help to maintain tilth and improve organic matter content.

Pasture and hay are poorly suited to undrained areas of this soil. Land leveling or bedding improves drainage enough so that some wetness-tolerant pasture grasses can be grown. Grazing during wet periods causes compaction of the soil and trampling of desirable pasture plants.

The potential productivity of this soil for trees is fair to poor. Only those species that tolerate prolonged wetness are suitable. The seasonal high water table also limits the use of planting and harvesting equipment and restricts rooting, causing a hazard of uprooting during windy periods.

The seasonal high water table and the potential for frost action are the main limitations of the soil for community development. The sides of excavations on this soil are unstable. Some areas are suitable for the development of wetland wildlife habitat.

Capability subclass: IIIw.

Ld—Lamson mucky very fine sandy loam. This soil is deep, nearly level, and very poorly drained. It formed in glacial lake sediments that have a high sand content. The soil is in deep depressions, mainly on the lowland lake plain. Slopes range from 0 to 2 percent. The areas are irregular in shape and range from 5 to 15 acres.

Typically, this soil has a surface layer that is black mucky very fine sandy loam about 9 inches thick. The subsurface layer is mottled, light gray loamy very fine sand 5 inches thick. The subsoil is mottled fine sandy loam 26 inches thick. The upper part is brown, and the lower part is grayish brown. The substratum is mottled, light brownish gray loamy very fine sand to a depth of 60 inches or more.

Included with this soil in mapping are areas of Minoa and Cosad soils. In some areas the surface layer is not mucky. The areas of included soils range from 1/4 acre to 3 acres.

This Lamson soil has a high water table at the surface during much of the year. Water commonly is ponded on the surface in the spring. Permeability is moderate or moderately rapid throughout the soil. Runoff is very slow. Available water capacity is moderate to high. The depth to bedrock is generally 5 feet or more. Reaction is medium acid to mildly alkaline in the surface and subsurface layers and slightly acid to moderately alkaline in the subsoil.

Undrained areas of this soil generally are unsuited to cultivated crops or hay. Drainage outlets are difficult to establish because of the very low position of this soil on the landscape. Where drainage is feasible, a combination of open ditches and subsurface drains generally makes the soil suitable for field crops and some vegetables. The main management practices in cultivated areas are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops; mixing crop residue into the soil; and tillage at the proper soil moisture content. All help maintain tilth and the organic matter content.

Undrained areas of this soil are poorly suited to pasture. Land leveling or a bedding system improves drainage enough so that some wetness-tolerant pasture grasses can be grown. Grazing during wet periods causes compaction of the soil and trampling of desirable pasture plants.

The potential productivity of this soil for trees is fair to poor. Most areas are wooded, but only those species that tolerate prolonged wetness are suitable. The high water table and seasonal ponding limit the use of planting and harvesting equipment and restrict rooting, causing a hazard of uprooting during windy periods.

The seasonal high water table and the high potential for frost action are the main limitations of the soil for

community development. The sides of excavations are unstable. Some areas are suitable for the development of wetland wildlife habitat.

Capability subclass: Vw.

LoC—Lordstown channery silt loam, 8 to 15 percent slopes. This soil is sloping, moderately deep, and well drained. It formed in glacial till derived from siltstone and sandstone. It is on hillcrests on uplands. Most areas are long and narrow and range from 5 to 30 acres.

Typically, this soil has a surface layer of dark grayish brown channery silt loam about 4 inches thick. The subsoil is channery silt loam 25 inches thick. The upper part is yellowish brown, and the lower part is brown. The substratum is brown very channery silt loam 7 inches thick. Siltstone bedrock is at a depth of 36 inches.

Included with this soil in mapping are small areas of Schuyler and Mardin soils. Also included are small areas of soils where bedrock is at a depth of less than 20 inches. The areas of included soils range from 1/2 acre to 3 acres.

The permeability of this Lordstown soil is moderate. Available water capacity is low to moderate. Runoff is medium to rapid. Bedrock is at a depth of 20 to 40 inches. The surface layer is very strongly acid to slightly acid, and the subsoil is very strongly acid to medium acid.

Most of the acreage of this soil is in woodland. A few areas are cultivated.

The main limitations of this soil for cultivated crops are droughtiness, slope, and an erosion hazard. Channery rock fragments in the soil interfere with tillage and cause rapid wear of equipment. The main management practices in cultivated areas are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops; and using grasses and legumes in the cropping system. All help to maintain tilth and increase organic matter content. These practices, as well as cross-slope tillage, also help to control the erosion hazard.

This soil is moderately suited to hay and pasture, mainly to those plants that withstand droughtiness in summer. Overgrazing during dry periods causes plant losses and increases the hazard of erosion.

The potential productivity for trees on this soil is fair to good, especially for species that withstand acid soil conditions and summer droughtiness. Placing logging trails on slope contours helps to eliminate any hazard of trailside gullying.

The depth to bedrock and the slope are the main limitations of this soil for community development. Some areas are suitable for recreational uses, such as hiking trails, campsites, or picnic areas.

Capability subclass: IIIe.

LoF—Lordstown channery silt loam, 35 to 65 percent slopes. This soil is very steep, moderately deep, and well drained. It formed in glacial till derived from siltstone and sandstone. It is on uniformly sloping valley sides. The areas are long and narrow or oblong and range from 10 to 50 acres.

Typically, this soil has a surface layer of dark grayish brown channery silt loam about 4 inches thick. The subsoil is channery silt loam 25 inches thick. The upper part is yellowish brown, and the lower part is brown. The substratum is brown very channery silt loam 7 inches thick. Siltstone bedrock is at a depth of 36 inches.

Included with this soil in mapping are small areas of soils that have bedrock at a depth of slightly more than 40 inches or less than 20 inches and a few areas of exposed bedrock. Also included are a few areas of soils that have slopes of 25 to 35 percent. The included areas range from 1/2 acre to 3 acres.

The permeability of this Lordstown soil is moderate. Available water capacity is low to moderate. Runoff is very rapid. Bedrock is at a depth of 20 to 40 inches. The surface layer is very strongly acid to slightly acid, and the subsoil is very strongly acid to medium acid.

Slope and the depth to bedrock make this soil generally unsuitable for farming. The soil is mostly wooded. The potential productivity for trees is fair to good, especially for species that withstand acid soil conditions and droughtiness. Slope limits the operation of woodland planting and harvesting equipment. Placing logging trails on the contour wherever possible helps to eliminate the hazard of trailside gullying.

Slope and the depth to bedrock are the major limitations of the soil for community development. Some areas are suitable for use as wildlife habitat.

Capability subclass: VIIe.

Ly—Lyons silt loam. This soil is deep, nearly level, and poorly drained or very poorly drained. It is along drainageways and on upland glacial till plains. The areas are oblong or circular and range from 5 to 20 acres.

Typically, this soil has a surface layer of very dark brown silt loam about 9 inches thick. The subsoil is mottled silt loam 23 inches thick. It is brown to dark brown in the upper part and grayish brown in the lower part. The substratum extends to a depth of 65 inches or more. It is mottled, brown silt loam in the upper part and dark grayish brown silty clay loam in the lower part.

Included with this soil in mapping are areas of Canandaigua and Derb soils and areas, mainly near the center of depressions, of soils that have a mucky surface layer. The areas of included soils are as much as 3 acres each.

This Lyons soil has a seasonal water table at or near the surface for prolonged periods. Permeability is moderate or moderately slow in the subsoil and slow or very slow in the substratum. Runoff is very slow. Available water capacity is moderate to high. The depth

to bedrock is generally more than 5 feet. The surface layer is medium acid to neutral, and the subsoil is slightly acid to mildly alkaline.

Undrained areas of this soil are poorly suited to farming. The high water table delays planting until early summer in undrained areas. Drainage outlets are often difficult to establish because of the low position of this soil on the landscape. The main management practices in drained and cultivated areas are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops; incorporating crop residue into the soil; and tillage at the proper soil moisture level. All help to improve tilth and maintain organic matter content.

Grazing when the soil is wet causes soil compaction and trampling of desirable plant species. Forage varieties that withstand a seasonal high water table generally are suitable for this soil.

This soil is mostly wooded, but the potential productivity for trees is poor. Prolonged wetness limits the use of equipment and causes high seedling mortality. It also restricts rooting, causing a hazard of uprooting during windy periods.

The seasonal high water table, the slow or very slow permeability in the substratum, and a high potential for frost action limit this soil for community development. Some areas are suitable for wetland wildlife habitat.

Capability subclass: IVw.

MaA—Manlius shaly silt loam, 0 to 3 percent slopes. This soil is nearly level, moderately deep, and well drained to excessively drained. It formed in glacial till derived from shale bedrock. It is on benches at the fringe of the upland plateau. Most areas are oval or oblong and range from 5 to 20 acres.

Typically, this soil has a surface layer of dark grayish brown shaly silt loam about 8 inches thick. The subsoil is yellowish brown very shaly silt loam 13 inches thick. The substratum is brown very shaly silt loam 10 inches thick. Shale bedrock is at a depth of 31 inches.

Included with this soil in mapping are areas of Orpark, Marilla, and Farnham soils. Also included are areas of soils similar to this Manlius soil but that are moderately well drained and have a seasonal high water table for brief periods in early spring. The areas of included soils range from 1/4 acre to 3 acres.

The permeability of this Manlius soil is moderate. Available water capacity is low. Runoff is slow. Bedrock is at a depth of 20 to 40 inches. Unless the soil is limed, the surface layer is extremely acid to strongly acid.

Although this soil is suited to cultivation, droughtiness often is a limitation in midsummer. The areas of wet included soils sometimes hinder early-season tillage. Subsurface drainage of those areas is often difficult to install because of the underlying bedrock. Shale fragments in the soil hinder planting of some crops and cause rapid wear of machinery. The main management practices in cultivated areas are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops; and using grasses and legumes in the cropping system. All help to maintain tilth and increase organic matter content.

This soil is suited to hay and pasture, especially to plant varieties that withstand soil droughtiness during the summer. Overgrazing during dry periods causes a loss of pasture plants.

The potential productivity for trees on this soil is fair to good, especially for species that withstand acid soil conditions and summer droughtiness.

The depth to bedrock is the main limitation of this soil for community development. Seasonal wetness is a limitation in the included areas of wet soils. Some areas of this soil are suitable for recreational uses, such as campsites or picnic areas.

Capability subclass: IIs.

MaB—Manlius shaly silt loam, 3 to 8 percent slopes. This soil is gently sloping, moderately deep, and well drained to excessively drained. It formed in glacial till derived from shale bedrock. It is on the sides of benches and rises at the fringe of the upland plateau. Most areas are oval or long and narrow and range from 5 to 20 acres.

Typically, this soil has a surface layer of dark grayish brown shaly silt loam about 8 inches thick. The subsoil is yellowish brown very shaly silt loam 13 inches thick. The substratum is brown very shaly silt loam 10 inches thick. Shale bedrock is at a depth of 31 inches.

Included with this soil in mapping are areas of Orpark and Marilla soils. Also included are small areas of soils similar to this Manlius soil but that are nearly level, are moderately well drained, and have a seasonal high water table for brief periods in early spring. The areas of included soils range from 1/2 acre to 3 acres.

The permeability of this Manlius soil is moderate. Available water capacity is low. Runoff is medium to slow. Bedrock is at a depth of 20 to 40 inches. Unless the soil is limed, the surface layer is extremely acid to strongly acid.

Although this soil is suited to cultivation, droughtiness often is a limitation in midsummer. The areas of wet included soils sometimes hinder early-season tillage. Subsurface drainage of those areas is often difficult to install because of the underlying bedrock. Shale fragments in the soil hinder planting of some crops and cause rapid wear of machinery. The main management practices in cultivated areas are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops; and using grasses and legumes in the cropping system. All help to maintain tilth and increase organic matter content.

This soil is suited to hay and pasture, especially to plant varieties that withstand soil droughtiness during the

summer. Overgrazing during dry periods causes a loss of pasture plants.

The potential productivity for trees on this soil is fair to good, especially for species that withstand acid soil conditions and summer droughtiness. Most areas of this soil are wooded.

The depth to bedrock is the main limitation of this soil for community development. Seasonal wetness is a limitation in the included areas of wet soils. Some areas of this soil are suitable for recreational uses, such as campsites or picnic areas.

Capability subclass: IIe.

MaD—Manlius shaly silt loam, 15 to 25 percent slopes. This soil is moderately steep, moderately deep, and well drained to excessively drained. It formed in glacial till derived from shale bedrock. It is on upper valley sides and the sides of gullies at the fringe of the upland plateau. Most areas are long and narrow and range from 5 to 30 acres.

Typically, this soil has a surface layer of dark grayish brown shaly silt loam about 8 inches thick. The subsoil is yellowish brown very shaly silt loam 13 inches thick. The substratum is brown very shaly silt loam 10 inches thick. Shale bedrock is at a depth of 31 inches.

Included with this soil in mapping are areas of Blasdell and Schuyler soils and soils in which bedrock is at a depth of less than 20 inches. The included areas range from 1/4 acre to 3 acres.

The permeability of this Manlius soil is moderate. Available water capacity is low. Runoff is rapid. Bedrock is at a depth of 20 to 40 inches. Unless the soil is limed, the surface layer is extremely acid to strongly acid.

Most of the acreage of this soil is in woodland. Some areas are in pasture.

Slope and droughtiness make this soil poorly suited to cultivated crops. Slope limits the use of equipment, and shale fragments in the soil hinder planting of some crops and cause rapid wear of machinery. The main management practices in cultivated areas are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; dominant use of cover crops and grasses and legumes in the cropping system; and cross-slope tillage. All help to maintain tilth and increase organic matter content.

This soil is suitable for hay, but slope limits harvesting. Pasture varieties that withstand soil droughtiness during the summer are suitable, but overgrazing during dry periods causes a loss of the pasture plants and increases erosion.

The potential productivity for trees on this soil is fair to good, especially for species that withstand acid soil conditions and summer droughtiness. Most areas are wooded, but slope limits the use of planting and harvesting equipment.

The depth to bedrock and the slope are the main limitations of this soil for community development.

Capability subclass: IVe.

MbE—Manlius very shaly silt loam, 25 to 35 percent slopes. This soil is steep, moderately deep, and well drained to excessively drained. It formed in glacial till derived from shale bedrock. It is on hillsides and valley sides of the upland plateau. Many areas along valley sides are deeply dissected by V-shaped gullies. Slopes mainly are smooth and convex. The areas are long and narrow or oblong and range from 5 to 15 acres.

Typically, this soil has a surface layer of dark grayish brown very shaly silt loam about 8 inches thick. The subsoil is yellowish brown very shaly silt loam 13 inches thick. The substratum is brown very shaly silt loam 10 inches thick. Shale bedrock is at a depth of 31 inches.

Included with this soil in mapping are areas of Blasdell and Schuyler soils and areas in which bedrock is within 20 inches of the surface or is exposed at the surface. Also included in mapping are areas of Manlius soils with slopes of less than 25 percent. The areas of included soils range from 1/4 acre to 3 acres.

The permeability of this Manlius soil is moderate. Available water capacity is low. Runoff is rapid to very rapid. Bedrock is at a depth of 20 to 40 inches. Unless the soil is limed, the surface layer is extremely acid to strongly acid.

Slope and the depth to bedrock make this soil generally unsuited to cultivated crops. Some areas are suitable for pasture, but slope limits pasture improvement and droughtiness results in poor-quality pasture grasses. Overgrazing increases the hazards of erosion and gullying.

This soil is mostly wooded; potential productivity for trees is fair to good, especially for species that withstand acid soil conditions and droughtiness. Slope limits the use of harvesting and planting equipment. Placing logging roads on the contour helps to control erosion.

Slope and the depth to bedrock are major limitations of this soil for community development.

Capability subclass: VIe.

MbF—Manlius very shaly silt loam, 35 to 50 percent slopes. This soil is very steep, moderately deep, and well drained to excessively drained. It formed in glacial till deposits derived from shale bedrock. It is on hillsides and valley sides of the upland plateau. Many areas along valley sides are deeply dissected by V-shaped gullies. Slopes mainly are smooth and convex. The areas are long and narrow. They range from 5 to 50 acres, but most are 5 to 30 acres.

Typically, this soil has a surface layer of dark grayish brown very shaly silt loam about 8 inches thick. The subsoil is yellowish brown very shaly silt loam 13 inches thick. The substratum is brown very shaly silt loam 10 inches thick. Shale bedrock is at a depth of 31 inches.

Included with this soil in mapping are areas of Blasdell and Schuyler soils and areas where bedrock is within 20

inches of the surface or is exposed at the surface. Also included in mapping are areas of Manlius soils with slopes of less than 35 percent. The areas of included soils range from 1/4 acre to 3 acres.

The permeability of this Manlius soil is moderate. Available water capacity is low. Runoff is very rapid. Bedrock is at a depth of 20 to 40 inches. Unless the soil is limed, the surface layer is extremely acid to strongly acid.

Slope and the depth to bedrock make this soil generally unsuitable for farming. Most areas are wooded; the potential productivity for trees is fair to good, especially for species that withstand droughtiness and acid soil conditions. Slope limits the use of woodland planting and harvesting equipment. Placing logging roads on the contour helps to control erosion.

Slope and the depth to bedrock are major limitations of this soil for community development.

Capability subclass: VIIe.

MdB—Mardin channery silt loam, 3 to 8 percent slopes. This soil is deep, gently sloping, and moderately well drained. It formed in loamy glacial till. The soil is on upland till plains and on the lower slopes of valley sides. The areas are oblong and range from 5 to 10 acres.

Typically, the surface layer of this soil is dark grayish brown channery silt loam about 8 inches thick. The upper part of the subsoil consists of friable, yellowish brown channery silt loam 5 inches thick. A 3-inch-thick layer of firm, pale brown channery silt loam is between the upper and lower part of the subsoil. The lower part of the subsoil is a mottled, very firm layer 34 inches thick. It is light olive brown channery loam and olive brown very channery loam. The substratum is very firm, olive brown very channery loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Williamson and Volusia soils. Also included are some wet spots and drainageways that are indicated by a special spot-symbol on the soil map. The areas of included soils range from 1/4 acre to 2 acres.

This Mardin soil has a perched seasonal high water table in the lower part of the subsoil early in spring. Permeability is moderate in the upper part of the subsoil and slow or very slow in the lower part of the subsoil and in the substratum. Available water capacity is moderate. Runoff is medium. The surface layer and the upper part of the subsoil range from extremely acid to slightly acid.

This soil is suited to cultivated crops, including some types of vegetables such as potatoes, but the very firm part of the subsoil restricts development of deep-rooted crops. Tillage is slightly delayed in the spring because of the seasonal high water table. Subsurface drainage of included wet spots allows earlier cultivation of many fields. The channery fragments in the surface layer hinder tillage and harvesting of some crops such as potatoes. Erosion is a hazard on long slopes and in intensively cultivated areas. The main management practices in cultivated areas are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops; mixing crop residue into the soil; tillage at the proper soil moisture content; and terracing and contour tillage. All help to control erosion and maintain tilth.

This soil is well suited to hay and pasture. Grazing when the soil is wet causes soil compaction and trampling of desirable plant species. Use of proper stocking rates, rotational grazing, and yearly mowing are the main pasture management practices.

The potential productivity for trees on this soil is fair to good. Most areas are wooded. Placing logging roads and skid trails across the slope wherever possible helps to prevent trailside gullying.

The main limitations of this soil for community development are the seasonal high water table and the slow or very slow permeability in the lower part of the subsoil and in the substratum.

Capability subclass: IIw.

MdC—Mardin channery silt loam, 8 to 15 percent slopes. This soil is deep, sloping, and moderately well drained. It formed in loamy glacial till. The soil is on uplands and side slopes of valleys. The areas are oblong and range from 5 to 20 acres.

Typically, the surface layer of this soil is dark grayish brown channery silt loam about 8 inches thick. The upper part of the subsoil consists of friable, yellowish brown channery silt loam 5 inches thick. A 3-inch-thick layer of firm, pale brown channery silt loam is between the upper and lower parts of the subsoil. The lower part of the subsoil is a mottled, very firm layer 34 inches thick. It is light olive brown channery loam and olive brown very channery loam. The substratum is very firm, olive brown very channery loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Williamson and Volusia soils. Also included are some wet spots and drainageways that are indicated by a special spot-symbol on the soil map. The areas of included soils range from 1/4 acre to 2 acres.

This Mardin soil has a perched seasonal high water table in the lower part of the subsoil early in spring. Permeability is moderate in the upper part of the subsoil and slow or very slow in the lower part of part of the subsoil and in the substratum. Available water capacity is moderate. Runoff is rapid. The surface layer and upper part of the subsoil range from extremely acid to slightly acid.

This soil is moderately suited to cultivated crops, including some vegetables, such as potatoes, but the very firm part of the subsoil restricts development of deep-rooted crops. Tillage is slightly delayed in the spring because of the seasonal high water table.

Subsurface drainage of included wet spots allows earlier cultivation of many fields. The channery fragments in the surface layer hinder tillage and the harvesting of potatoes and other root crops. Erosion is a hazard on long slopes and in intensively cultivated areas. The main management practices in cultivated areas are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops; mixing crop residue into the soil; tillage at the proper soil moisture content; and terracing and contour tillage. All help to control erosion and maintain tilth.

This soil is well suited to hay and pasture. Grazing when the soil is wet causes soil compaction and trampling of desirable plant species. Use of proper stocking rates, rotational grazing, and yearly mowing are the main pasture management practices.

The potential productivity for trees on this soil is fair to good. Most areas are wooded. Placing logging roads and skid trails across the slope wherever possible helps to prevent trailside gullying.

The main limitations of this soil for community development are the seasonal high water table, the slow or very slow permeability in the lower part of the subsoil and in the substratum, and slope.

Capability subclass: IIIe.

MdD—Mardin channery silt loam, 15 to 25 percent slopes. This soil is deep, moderately steep, and moderately well drained. It formed in loamy glacial till. The soil is in narrow strips on the side slopes of the upland plateau. The areas range from 5 to 25 acres.

Typically, the surface layer of this soil is dark grayish brown channery silt loam about 8 inches thick. The upper part of the subsoil consists of friable, yellowish brown channery silt loam 5 inches thick. A 3-inch-thick layer of firm, pale brown channery silt loam is between the upper and lower parts of the subsoil. The lower part of the subsoil is a mottled, very firm layer 34 inches thick. It is light olive brown channery loam and olive brown very channery loam. The substratum is very firm, olive brown very channery loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Volusia and Schuyler soils. The areas of included soils range from 1/2 acre to 3 acres.

This Mardin soil has a perched seasonal high water table in the lower part of the subsoil early in spring. Permeability is moderate in the upper part of the subsoil and slow or very slow in the lower part of the subsoil and in the substratum. Available water capacity is moderate. Runoff is rapid. The surface layer and the upper part of the subsoil range from extremely acid to slightly acid.

Slope makes this soil poorly suited to cultivated crops. The lower part of the subsoil restricts development of deep-rooted crops. The channery fragments in the surface layer hinder tillage and harvesting of some crops. If cultivated crops are grown, planting them in narrow strips alternated with sod crops and across the slope helps to control erosion. Using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops; and mixing crop residue into the soil further help to control erosion and to maintain tilth.

This soil is better suited to hay or pasture than to cultivated crops. Overgrazing causes a loss of pasture grasses and increased erosion. Use of proper stocking rates, rotational grazing, yearly mowing, and restricted grazing during wet periods are the main pasture management practices.

The potential productivity for trees on this soil is fair to good. Most areas are wooded. Placing logging roads and skid trails across the slope wherever possible helps to prevent trailside gullying.

The main limitations of this soil for community development are the seasonal high water table, the slow or very slow permeability in the lower part of the subsoil and in the substratum, and slope.

Capability subclass: IVe.

MfB—Marilla shaly silt loam, 3 to 8 percent slopes. This soil is deep, gently sloping, and moderately well drained. It is on the upland plateau. The areas are oblong and range from 5 to 15 acres.

Typically, this soil has a surface layer of dark grayish brown shaly silt loam about 8 inches thick. The subsoil is shaly silt loam 34 inches thick. The upper part is friable, mottled, and yellowish brown. The lower part is firm and olive brown. The substratum is olive gray to dark olive gray very shaly silt loam to a depth of 60 inches or more.

Included with this soil in mapping are areas of Schuyler, Derb, Manlius, and Farnham soils. The areas of included soils range from 1/2 acre to 3 acres.

This Marilla soil has a perched seasonal high water table above the firm part of the subsoil early in spring and during other wet periods. Permeability is very slow in the firm part of the subsoil and moderate above the firm part. Runoff is slow to medium. Available water capacity is low to moderate. In unlimed areas the surface layer and the upper part of the subsoil are strongly acid or very strongly acid.

Some of the acreage of this soil is farmed. A small acreage is wooded.

The soil is suited to cultivated crops. The dense layer in the subsoil restricts development of deep-rooted crops. The high water table in early spring sometimes delays tillage and planting, and the shale fragments in the surface layer restrict cultivation and cause rapid wear of machinery. Drainage is needed in some included areas of wet soils. The main management practices are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops and sod crops; mixing crop residue into the soil; cross-slope tillage; and tillage at the proper soil moisture

level. All help to improve tilth, minimize the erosion hazard, and increase organic matter content.

This soil is suited to pasture and hay. Grazing on this soil during wet periods causes soil compaction and trampling of desirable pasture grasses.

The potential productivity for trees on this soil is fair to good. Machine planting is practical on large areas.

The seasonal high water table and the very slow permeability in the firm part of the subsoil are the main limitations of the soil for community development.

Capability subclass: IIw.

MfC—Marilla shaly silt loam, 8 to 15 percent slopes. This soil is deep, sloping, and moderately well drained. It is on side slopes of shelflike areas of the upland plateau. The areas of this soil are irregular in shape and range from 5 to 20 acres.

Typically, this soil has a surface layer of dark grayish brown shaly silt loam about 8 inches thick. The subsoil is shaly silt loam 34 inches thick. The upper part is friable, mottled, and yellowish brown. The lower part is firm and olive brown. The substratum is olive gray to dark olive gray very shaly silt loam to a depth of 60 inches or more.

Included with this soil in mapping are areas of Mardin, Derb, and Manlius soils. The areas of included soils range from 1/2 acre to 3 acres.

This Marilla soil has a perched seasonal high water table above the firm part of the subsoil early in spring and during other wet periods. Permeability is very slow in the firm part of the subsoil and moderate above the firm part. Runoff is rapid. Available water capacity is low to moderate. In unlimed areas the surface layer and upper part of the subsoil are strongly acid or very strongly acid.

Most of the acreage of this soil is in woodland. A few areas are used for hay.

The soil is moderately suited to cultivated crops. The main limitations are slope, seasonal wetness, low fertility, the high content of shale fragments in the surface layer, and midsummer droughtiness. The firm part of the subsoil restricts development of deep-rooted crops. The main management practices in cultivated areas are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; cross-slope tillage; mixing crop residue into the soil; tillage at the proper soil moisture level; and using a cropping system that is dominantly cover crops and sod crops. All help to improve tilth, control erosion, and increase organic matter content.

This soil is suited to pasture and hay. Grazing during wet periods causes soil compaction and trampling of desirable pasture grasses.

The potential productivity for trees on this soil is fair to good. Machine planting of seedlings generally is practical in large areas. Placing skid trails across the slope helps to eliminate trailside gullying.

The seasonal high water table, the very slow permeability in the firm part of the subsoil, and slope are the main limitations of this soil for community development.

Capability subclass: IIIe.

Mg—Middlebury silt loam. This soil is deep, nearly level, and moderately well drained and somewhat poorly drained. It formed in alluvial deposits on flood plains. Slopes range from 0 to 3 percent but are mostly less than 2 percent. The areas are irregular in shape or long and narrow and generally are parallel to the adjacent stream. The areas range mainly from 5 to 100 acres, but most are 5 to 30 acres.

Typically, this soil has a surface layer of dark grayish brown silt loam about 9 inches thick. The subsoil is 26 inches thick. The upper part is dark brown silt loam; the middle part is mottled, dark brown silt loam; and the lower part is mottled, dark brown very fine sandy loam. The substratum extends to a depth of 60 inches or more. It is dark brown stratified sand and silt in the upper part and dark brown stratified fine sand and gravel in the lower part.

Included with this soil in mapping are areas of Tioga and Scio soils. The Tioga soils are on the higher parts of the flood plain, and the Scio soils are on benches that are usually not subject to flooding. Also included are small areas in slight depressions of soils that are similar to this Middlebury soil but that are more poorly drained. The areas of included soils are as much as 3 acres each.

This Middlebury soil is flooded during most years in early spring and in periods of very heavy rain. A seasonal high water table rises into the subsoil in the spring. Permeability is moderate in the subsoil. Runoff is slow. Available water capacity is high. The surface layer ranges from strongly acid to slightly acid, and the subsoil and substratum are medium acid to neutral.

This soil is suited to cultivated crops, especially to some types of vegetables, and most areas are cultivated. Flooding sometimes delays planting or causes crop damage, and the seasonal high water table delays tillage and planting, especially in low-lying areas. Installing subsurface drainage in areas where outlets can be established allows timely tillage. The main management practices are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops and sod crops; mixing crop residue into the soil; and tillage at the proper soil moisture content. All help to improve tilth and maintain organic matter content. Streambanks need protection in some areas to prevent lateral erosion (fig. 4).

This soil is suited to pasture and hay. Use of proper stocking rates, rotational and deferred grazing, and yearly mowing are the chief pasture management needs.

The potential productivity for trees on this soil is good.

Figure 4.—Streambank erosion in an area of Middlebury silt loam.

Flooding, seasonal wetness, and the high potential for frost action are the main limitations of this soil for community development.

Capability subclass: IIw.

Mh—Minoa very fine sandy loam. This soil is deep, nearly level, and somewhat poorly drained. It is in broad areas that were deltas or beaches of former glacial lakes and is also in small, low areas and along drainageways. The areas are irregular in shape and mostly range from 5 to 40 acres. Slopes range from 0 to 3 percent.

Typically, this soil has a surface layer of very dark grayish brown very fine sandy loam about 9 inches thick. The subsoil is mottled and is 31 inches thick. The upper part is light yellowish brown very fine sandy loam. The middle part is pale brown loamy very fine sand. The lower part is grayish brown loamy very fine sand. The substratum is light brownish gray loamy very fine sand to a depth of 60 inches or more.

Included with this soil in mapping are areas of Cosad, Galen, Elnora, Raynham, and Lamson soils. Also included are areas of soils that have layers of silt, clay, or compacted sand in the subsoil. The layers are several inches thick. A few areas are gently sloping. The areas of included soils range from 1/2 acre to 3 acres.

This Minoa soil has a seasonal high water table in the upper part of the subsoil. Permeability is moderate in the surface layer and subsoil and moderate or moderately rapid in the substratum. Internal drainage and runoff are slow. Available water capacity is high. The surface layer and upper part of the subsoil are strongly acid to neutral.

Most of the acreage of this soil is used for vegetables. Some areas are in woodland.

If properly drained, this soil is moderately suited to cultivated crops and some types of vegetables. Most areas respond well to subsurface drainage if adequate outlets can be established. The main management practices are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops; and using crops in the cropping system. All help to improve tilth and maintain organic matter content.

Undrained areas of this soil are suited to hay or pasture. However, overgrazing causes loss of pasture plants and grazing when the soil is wet causes compaction of the soil and trampling of desirable plant species. Use of proper stocking rates, rotational and restricted grazing, and yearly mowing are the chief needs in pasture management.

The potential productivity for trees on this soil is fair to good, especially for species that tolerate a seasonal high water table. Seasonal wetness causes high seedling mortality and restricts the use of equipment.

The seasonal high water table, low strength, and a tendency of cutbanks to cave are the main limitations of this soil for community development.

Capability subclass: IIIw.

NfA—Niagara silt loam, 0 to 3 percent slopes. This soil is deep, nearly level, and somewhat poorly drained. It is on broad, moderately low flats on the lake plain and in small areas elsewhere. The areas of this soil are irregular in shape and range from 5 to 50 acres.

Typically, this soil has a surface layer of dark brown silt loam about 11 inches thick. The subsoil is 16 inches thick. The upper 5 inches of the subsoil is mottled, yellowish brown silt loam. The lower 11 inches is mottled, dark brown silty clay loam and silt loam. The substratum extends to a depth of more than 60 inches. The upper part is dark brown silt loam. The lower part is olive brown coarse silt and very fine sand.

Included with this soil in mapping are areas of Niagara soils that are gravelly or stony at a depth of 40 to 60 inches. Also included are areas of Cosad, Raynham, Collamer, and Canandaigua soils. In some areas the surface layer is very fine sand or silty clay loam. The areas of included soils range from 1/2 acre to 3 acres.

This Niagara soil has a seasonal high water table in the upper part of the subsoil. Permeability is moderately slow in the subsoil and substratum. Runoff is slow. Available water capacity is high. Reaction ranges from strongly acid to neutral in the surface layer and from medium acid to mildly alkaline in the subsoil.

This soil is mainly used for cultivated crops and some types of vegetables. Some areas are in woodland.

Drained areas of this soil are moderately suited to most crops grown in the county except early-market and long-season varieties. Drainage is difficult to install in some areas because of the nearly level slopes, instability of cutbanks, and lack of suitable outlets. Compaction of the soil is a hazard if the soil is tilled when it is wet. The main management practices are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops; and using grasses and legumes in the cropping system. All help to maintain good tilth.

Undrained areas of this soil are suited to hay and pasture plants that withstand seasonal wetness. Grazing when the soil is wet causes soil compaction, restricts growth, and causes a loss of desirable pasture grasses. Restricting grazing in wet periods, rotational grazing, and yearly mowing are the main pasture management practices.

The potential productivity for trees on this soil is fair to good, especially for species that withstand seasonal wetness. Seasonal wetness limits the use of planting and harvesting equipment and causes high seedling mortality. Root development in this soil is generally adequate, but some trees are uprooted during windy periods.

The seasonal high water table, low strength, the moderately slow permeability, and the potential for frost action are the main limitations of this soil for community development.

Capability subclass: IIIw.

NfB—Niagara silt loam, 3 to 8 percent slopes. This soil is deep, gently sloping, and somewhat poorly drained. It formed in silty lake-laid deposits. It is mainly in moderately low, undulating areas on the lake plain. The areas of this soil are irregular in shape and range from 5 to 30 acres.

Typically, this soil has a surface layer of dark brown silt loam about 11 inches thick. The subsoil is 16 inches thick. The upper 5 inches of the subsoil is mottled, yellowish brown silt loam. The lower 11 inches is mottled, dark brown silty clay loam and silt loam. The substratum extends to a depth of more than 60 inches. The upper part is dark brown silt loam. The lower part is olive brown coarse silt and very fine sand.

Included with this soil in mapping are small areas of Niagara soils that are gravelly or stony at a depth of 40 to 60 inches and Niagara soils that are nearly level. Also included are areas of Collamer, Canandaigua, and Rhinebeck soils. In some areas the surface layer is very fine sand or silty clay loam, and in a few areas there are strata of gravel in the subsoil. The areas of included soils range from 1/2 acre to 3 acres.

This Niagara soil has a seasonal high water table in the upper part of the subsoil. Permeability is moderately slow in the subsoil and substratum. Runoff is medium. Available water capacity is high. Reaction ranges from strongly acid to neutral in the surface layer and from medium acid to mildly alkaline in the subsoil.

Most of the acreage of this soil is cultivated or in woodland.

Drained areas of this soil are moderately suited to many crops grown in the county with the exception of early-market and long-season varieties. Interceptor drains are suitable for diverting runoff and subsurface seepage, but drains in this soil commonly require close spacing because of the moderately slow permeability. Erosion is a hazard in intensively cultivated areas and on long slopes, and compaction of the soil is a hazard if the soil is tilled when it is wet. The main management practices are: using a conservation tillage system that

includes no-till farming, strip tillage, and stubble mulching; using grasses and legumes and cover crops in the cropping system; and tillage at the proper soil moisture content. All help to maintain tilth and control erosion.

Undrained areas of this soil are suited to hay and pasture plants that withstand seasonal wetness. Grazing when the soil is wet causes soil compaction, restricts growth, and causes a loss of desirable pasture grasses, resulting in further erosion.

The potential productivity for trees on this soil is fair to good. Seasonal wetness limits the use of planting and harvesting equipment and causes high seedling mortality. Root development in this soil is generally adequate, but some trees are uprooted during windy periods. Placing logging trails on the contour helps eliminate the hazard of trailside gullying.

The seasonal high water table, low strength, the moderately slow permeability, and the potential for frost action are the main limitations of this soil for community development.

Capability subclass: IIIw.

Nh—Niagara silt loam, till substratum. This soil is deep, nearly level, and somewhat poorly drained. It formed in silty lake-laid deposits. The areas of this soil are irregular in shape and range from 5 to 30 acres. Slopes range from 0 to 3 percent.

Typically, this soil has a surface layer of dark brown silt loam about 12 inches thick. The subsurface layer is mottled, grayish brown very fine sandy loam 2 inches thick. The subsoil is 14 inches thick. The upper 3 inches is mottled, yellowish brown silt loam. The lower 11 inches is mottled, dark brown silty clay loam and silt loam. The substratum extends to a depth of 60 inches or more. It is dark brown silt loam to a depth of 40 inches and is firm, olive brown shaly silty clay loam at a depth of more than 40 inches.

Included with this soil in mapping are areas of soils that are gravelly or loamy within 40 inches of the surface. Also included are areas of Collamer and Canandaigua soils. In some areas there are bands of gravel in the subsoil. The areas of included soils range from 1/2 acre to 3 acres.

This Niagara soil has a seasonal high water table in the upper part of the subsoil. Permeability is moderately slow in the subsoil and upper part of the substratum and slow or moderately slow in the firm part of the substratum. Runoff is slow. Available water capacity is high. Reaction ranges from strongly acid to neutral in the surface layer and from medium acid to mildly alkaline in the subsoil.

Drained areas of this soil are moderately suited to most crops grown in the county except early-market and long-season varieties. Drainage is difficult to install in some areas because of the nearly level slopes, instability of cutbanks, and lack of suitable outlets. Compaction of the soil is a hazard if the soil is tilled when it is wet. The main management practices are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops; and using grasses and legumes in the cropping system. All help to maintain good tilth.

Undrained areas of this soil are suited to hay and pasture plants that withstand seasonal wetness. Grazing when the soil is wet causes soil compaction, restricts growth, and causes a loss of desirable pasture grasses. Restricting grazing in wet periods, rotational grazing, and yearly mowing are the main pasture management practices.

The potential productivity for trees on this soil is fair to good, especially for species that withstand seasonal wetness. Seasonal wetness limits the use of planting and harvesting equipment and causes high seedling mortality. Root development in this soil is generally adequate, but some trees are uprooted during windy periods.

The seasonal high water table, low strength, the moderately slow permeability, and the potential for frost action are the main limitations of this soil for community development.

Capability subclass: IIIw.

OrA—Orpark silty clay loam, 0 to 3 percent slopes. This soil is moderately deep, nearly level, and somewhat poorly drained. It formed in acid glacial till deposits that overlie shale bedrock. Soft shale bedrock is at a depth of 20 to 40 inches. This soil is on ledges and ridgecrests of the upland plateau. Most areas range from 5 to 30 acres. The areas are generally long and narrow or irregular in shape.

Typically, the surface layer of this soil is dark grayish brown silty clay loam about 9 inches thick. The subsoil is light olive brown and olive brown silty clay loam 13 inches thick. The substratum is mottled, pale olive silty clay loam 5 inches thick. Olive-colored, soft shale bedrock is at a depth of 27 inches.

Included with this soil in mapping are areas of Derb and Angola soils and a few depressional wet spots that are indicated by a spot symbol on the soil map. The areas of included soils range from 1/4 acre to 2 acres.

This Orpark soil has a seasonal high water table in the upper part of the subsoil in the spring and during other wet periods. Permeability is moderate in the surface layer and slow or moderately slow in the subsoil. Available water capacity is moderate. Runoff is slow to medium. In unlimed areas the soil is strongly acid or very strongly acid.

Many areas of this soil are in woodland. Some areas are used for hay or pasture.

Drained areas of this soil are moderately suited to cultivated crops. However, subsurface drainage is difficlt to install because of the underlying bedrock, and even

with drainage, the suitability for crops is limited by low fertility and high acidity.

This soil commonly is better suited to hay and pasture than to cultivated crops. Grazing during wet periods causes compaction of the soil and trampling of desirable plants.

The potential productivity for trees on this soil is fair to good. Rooting is limited by the water table and the depth to bedrock; thus, some trees are uprooted in windy periods. Seasonal wetness also limits the use of planting and harvesting equipment and causes high seedling mortality.

The depth to bedrock, the seasonal wetness, and the permeability of the subsoil are major limitations of this soil for community development.

Capability subclass: IIIw.

OrB—Orpark silty clay loam, 3 to 8 percent slopes. This soil is moderately deep, gently sloping, and somewhat poorly drained. It formed in acid glacial till deposits that overlie shale bedrock. Soft shale bedrock is at a depth of 20 to 40 inches. This soil is on side slopes adjacent to nearly flat benches and is on the sides of ridge crests on the upland plateau. The areas range from 5 to 50 acres and are generally long and narrow or irregular in shape.

Typically, the surface layer of this soil is dark grayish brown silty clay loam about 9 inches thick. The subsoil is light olive brown and olive brown silty clay loam 13 inches thick. The substratum is mottled, pale olive silty clay loam 5 inches thick. Olive-colored, soft shale bedrock is at a depth of 27 inches.

Included with this soil in mapping are areas of Derb and Angola soils and a few depressional wet spots that are indicated by a spot symbol on the soil map. Also included are areas of Orpark soils that have slopes of more than 8 percent. The areas of included soils range from 1/4 acre to 2 acres.

This Orpark soil has a seasonal high water table in the upper part of the subsoil in the spring and during other wet periods. Permeability is moderate in the surface layer and slow or moderately slow in the subsoil. Available water capacity is moderate. Runoff is medium. In unlimed areas the soil is strongly acid or very strongly acid.

Many areas of this soil are in woodland. Some areas are used for hay or pasture.

Drained areas of this soil are moderately suited to cultivated crops. However, subsurface drainage is difficult to install because of the underlying bedrock, and even with drainage, the suitability for crops is limited by low fertility and high acidity. Erosion is a hazard in intensively cultivated areas. The main erosion-control practices are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; cross-slope tillage; and using cover crops and sod crops in the cropping system.

This soil commonly is better suited to hay and pasture than to cultivated crops. Grazing during wet periods causes compaction of the soil and trampling of desirable forage plants.

The potential productivity for trees on this soil is fair to good. Rooting is limited by the water table and the depth to bedrock; thus, some trees are uprooted in windy periods. Seasonal wetness also limits the use of planting and harvesting equipment and causes high seedling mortality. Placing logging trails across the slope helps eliminate any hazard of trailside gullying.

The depth to bedrock, seasonal wetness, and the permeability of the subsoil are major limitations of this soil for community development.

Capability subclass: IIIw.

OrC—Orpark silty clay loam, 8 to 15 percent slopes. This soil is moderately deep, sloping, and somewhat poorly drained. It formed in acid glacial till deposits that overlie shale bedrock. Soft shale bedrock is at a depth of 20 to 40 inches. This soil is on long, narrow areas on the sides of benches on the upland plateau. Most areas range from 5 to 30 acres.

Typically, the surface layer of this soil is dark grayish brown silty clay loam about 9 inches thick. The subsoil is light olive brown and olive brown silty clay loam 13 inches thick. The substratum is mottled, pale olive silty clay loam 5 inches thick. Olive-colored, soft shale bedrock is at a depth of 27 inches.

Included with this soil in mapping are small areas of Derb, Schuyler, and Angola soils. In some areas the soils are moderately steep, and in other areas bedrock is at a depth of less than 20 inches. Some seep spots, at the base of slopes, are indicated by a spot symbol on the soil map. The areas of included soils range from 1/4 acre to 3 acres.

This Orpark soil has a seasonal high water table in the upper part of the subsoil in the spring and during other wet periods. Permeability is moderate in the surface layer and slow or moderately slow in the subsoil. Available water capacity is moderate. Runoff is rapid. In unlimed areas the soil is strongly acid or very strongly acid.

Many areas of this soil are in woodland. Some areas are used for pasture or hay.

If this soil is drained and protected from erosion, it is moderately suited to cultivated crops. Subsurface drainage is difficult to install, however, because of the underlying bedrock, and even with drainage, the suitability for crops is limited by low fertility and high acidity. In places, interceptor drains help to divert runoff and seepage from higher adjacent soils.

This soil commonly is better suited to hay and pasture than to cultivated crops. Grazing during wet periods causes compaction of the soil and trampling of desirable forage plants.

The potential productivity for trees on this soil is fair to good. Rooting is limited both by the water table and the depth to bedrock; thus, some trees are uprooted in windy periods. Seasonal wetness also limits the use of planting and harvesting equipment and causes high seedling mortality. Placing logging trails across the slope helps eliminate any hazard of trailside erosion and gullying.

The depth to bedrock, slope, the permeability of the subsoil, and seasonal wetness are the main limitations of this soil for community development.

Capability subclass: IIIe.

Pa—Palms muck. This soil is deep, nearly level, and very poorly drained. It is in basinlike areas on the lowland lake plain and on the upland plateau. The areas are roughly oval and range from 5 to 30 acres. Slopes are less than 1 percent.

Typically, this soil has a surface layer of black, well decomposed muck about 12 inches thick. The subsurface layer is black to dark grayish brown, well decomposed muck 26 inches thick. The substratum is dark gray to gray loam to a depth of 60 inches or more.

Included with this soil in mapping are narrow areas of Canandaigua, Lamson, and Lyons soils. Also included in mapping are small areas of muck deposits that are deeper than 50 inches and are mainly near the center of some units. The areas of the included soils are as much as 3 acres each.

This Palms soil is subject to frequent flooding. It has a high water table at or near the surface for most of the year. Permeability is moderately slow to moderately rapid in the surface and subsurface layers and moderate or moderately slow in the substratum. Runoff and internal drainage are very slow. The available water capacity is high. Bedrock is at a depth of more than 6 feet. The surface and subsurface layers range from strongly acid to mildly alkaline.

Most of the acreage of this soil is in cattails and other water-tolerant grasses, sedges, brush, and trees.

Undrained areas of this soil generally are not suited to cultivated crops. Drained areas are well suited to many crops, particularly vegetables. The common type of drainage system consists of a combination of open ditches and subsurface drains. However, drainage is difficult to install in many areas because of the low position of this soil on the landscape and a lack of suitable outlets. Drained areas are subject to wind erosion; windbreaks and cover crops or sod crops help to minimize this hazard. The main management practices are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; use of cover crops; and tillage at the proper soil moisture content. All help to maintain tilth.

Undrained areas of this soil mainly are poorly suited to pasture or hay. Compaction of the soil and trampling of desirable grasses are the main management concerns in pastured areas.

The soil has fair to poor suitability for trees and is suitable only for species that withstand excessive wetness. The water table limits the use of equipment, causes high seedling mortality, and causes uprooting of trees during windy periods.

Flooding, low strength, the content of organic matter, and the high potential for frost action are the main limitations of this soil for community development.

Capability subclass: Vw.

Pc—Patchin silt loam. This soil is moderately deep, nearly level, and poorly drained and very poorly drained. It formed in a mantle of glacial till that overlies shale bedrock. It is on uplands in depressional areas that receive runoff from adjacent soils. The areas are oblong or irregular in shape. They range from 5 to 30 acres.

Typically, this soil has a surface layer of mottled, dark grayish brown silt loam about 10 inches thick. The subsurface layer is mottled, light brownish gray silt loam 4 inches thick. The subsoil is 9 inches thick. It is mottled, dark grayish brown silty clay loam in the upper part and mottled, grayish brown shaly silt loam in the lower part. Soft shale bedrock is at a depth of 23 inches.

Included with this soil in mapping are areas of somewhat poorly drained Derb soils on benches and somewhat poorly drained Orpark soils on adjacent foot slopes and benches. The areas of included soils range from 1/4 acre to 3 acres.

This Patchin soil has a seasonal high water table at or near the surface for prolonged periods. Permeability is moderately slow in the surface layer and slow in the subsoil. Internal drainage and runoff are slow. Available water capacity is moderate. Soft shale bedrock is at a depth of 20 to 40 inches. In unlimed areas the surface layer and subsoil are strongly acid or very strongly acid.

Undrained areas of this soil are poorly suited to cultivated crops. Drained areas are suitable for crops, but establishing adequate outlets is difficult because of the low position of this soil on the landscape and because the bedrock hinders the installation of subsurface drains. The main management practices in drained areas are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops; incorporating crop residue into the soil; and tillage at the proper soil moisture content. All help to maintain tilth and increase organic matter content.

Drained areas of this soil are poorly suited to hay but are suitable for pasture. Partial drainage improves the suitability for pasture. Grazing during wet periods causes compaction of the soil and trampling of desirable pasture grasses.

Most areas of this soil are wooded, but the potential productivity for trees is poor. The water table limits the use of equipment, limits root development, and causes

high seedling mortality. Because of restricted root development, trees can be uprooted by strong winds.

The seasonal high water table and depth to bedrock are the main limitations of the soil for community development. Some areas are suitable for wildlife habitat.

Capability subclass: IVw.

PhA—Phelps gravelly loam, 0 to 3 percent slopes. This soil is deep, nearly level, and moderately well drained. It formed in water-laid deposits of sand, silt, and gravel. It is on moderately low flats on outwash plains and on low terraces. The areas of this soil are irregular in shape and range from 5 to 30 acres.

Typically, this soil has a surface layer of very dark grayish brown gravelly loam about 10 inches thick. The subsoil is 22 inches thick. The upper 8 inches is mottled, brown gravelly loam, and the lower 4 inches is mottled, yellowish brown gravelly sandy loam. The substratum is stratified brown and grayish brown very gravelly loamy sand to a depth of 60 inches or more.

Included with this soil in mapping are areas of well drained Alton and somewhat poorly drained Red Hook soils. The Alton soils are on knolls. Red Hook soils are in slight depressions. Also included in mapping are small areas of Phelps soils that have a surface layer of fine gravelly loam and a few areas of gently sloping soils. The areas of included soils are as much as 3 acres each.

In early spring this Phelps soil has a seasonal high water table in the lower part of the subsoil. Permeability is moderate in the subsoil and moderately rapid to rapid in the substratum. Runoff is slow. Available water capacity is moderate. The surface layer and upper part of the subsoil are medium acid to neutral.

The soil is suited to cultivated crops, and most areas are used for vegetables. The seasonal high water table limits early-season tillage, and the gravel in the surface layer interferes with planting and cultivation of some crops and causes rapid wear of equipment. The main management practices are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops; incorporating crop residue into the soil; and tillage at the proper soil moisture level. All help to maintain tilth and improve organic matter content. This soil responds well to irrigation in the drier summer months, and wet spots usually are easy to drain.

This soil is well suited to pasture and hay. The prevention of overgrazing and of grazing when the soil is wet is the main management concern. Use of proper stocking rates, yearly mowing, and deferred and rotational grazing are the main pasture management practices.

The potential productivity for trees on this soil is good.

The seasonal high water table and a high potential for frost action are the main limitations of this soil for community development. The permeability of the substratum causes a hazard of ground-water pollution in areas used for septic tank absorption fields. The soil is a source of sand and gravel.

Capability subclass: IIw.

Pt—Pits, borrow. This unit mainly consists of excavated areas from which soil material has been removed and used for fill in other locations. The excavated areas mostly are 3 to 10 feet deep and have steep sides and a nearly level floor. Stones and boulders commonly are scattered on the pit floor, and some areas have small pools of water. The excavations commonly are irregular in shape and range from about 5 to 10 acres.

This unit generally is devoid of vegetation, but some of the older areas have a cover of bushes and grass. Determination of the suitability of an area for most uses requires onsite investigation.

Capability subclass: not assigned.

Pu—Pits, gravel. This unit mainly consists of excavated areas from which gravel has been removed for construction purposes. The pits are about 5 to 25 feet deep and have steep sides and a nearly level floor. Piles of stones and boulders and of sloughed material are commonly on the pit floor. Small pools of water are common in the lower part of some of the pits, particularly in the spring. The excavations commonly are irregular in shape and range from about 5 to 50 acres.

This unit generally is devoid of vegetation, but some of the older areas have a cover of bushes and grass. Determination of the suitability of an area for most uses requires onsite investigation.

Capability subclass: not assigned.

RaB—Rayne channery silt loam, 3 to 8 percent slopes. This soil is deep, gently sloping, and well drained. It formed in residual material derived from the underlying shale and siltstone bedrock. It is on ridgetops and the lower part of hillsides. The areas are oblong and range from 5 to 20 acres.

Typically, the surface layer is dark brown channery silt loam about 3 inches thick. The subsoil is 39 inches thick. The upper 17 inches is friable, brown and yellowish brown channery silt loam. The lower 22 inches is firm, brown channery silt loam. The substratum is firm, brown channery silt loam to a depth of 60 inches or more.

Included with this soil in mapping are areas of Gilpin, Wharton, and Ernest Variant soils. In some small areas large boulders are on the surface. The included areas range from 1/2 acre to 5 acres. Some areas of this unit are at a high elevation and generally have a shorter growing season than those at a lower elevation.

Permeability in this Rayne soil is moderate throughout. Runoff is medium. Available water capacity is high. In

unlimed areas the surface layer and subsoil are very strongly acid or strongly acid.

Most of the acreage of this soil is in woodland. A small acreage is used for cultivated crops and hay and pasture.

This soil is suited to cultivated crops. Small stone fragments in the surface layer hinder cultivation for some crops and cause rapid wear of machinery. The main management practices are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; incorporating crop residue into the soil; cross-slope tillage; and using cover crops and sod crops in the cropping system. All help to maintain tilth and increase organic matter content.

This soil is well suited to hay and pasture. Overgrazing restricts the growth of pasture plants and increases the hazard of erosion. Use of proper stocking rates, rotational grazing, and yearly mowing are the main pasture management needs.

The potential productivity for trees on this soil is good, especially for species that withstand acid soil conditions.

This soil is generally suitable for some types of community development, including use as a recreational site or as a building site. Bedrock at a depth of less than 60 inches in some areas is the main limitation for nonfarm use.

Capability subclass: IIe.

RaC—Rayne channery silt loam, 8 to 15 percent slopes. This soil is deep, sloping, and well drained. It formed in residual material derived from the underlying shale and siltstone bedrock. It is on ridgetops and the lower part of hillsides. The areas are oblong and range from 5 to 30 acres.

Typically, the surface layer is dark brown channery silt loam about 3 inches thick. The subsoil is 39 inches thick. The upper 17 inches is friable, brown and yellowish brown channery silt loam. The lower 22 inches part is firm, brown channery silt loam. The substratum is firm, brown channery silt loam to a depth of 60 inches or more.

Included with this soil in mapping are areas of Gilpin, Wharton, and Ernest Variant soils. In some small areas large boulders are on the surface. The included areas range from 1/2 acre to 5 acres. Some areas of this unit are at high elevations and generally have a shorter growing season than those at lower elevations.

Permeability in this Rayne soil is moderate throughout. Runoff is medium. Available water capacity is high. In unlimed areas the surface layer and subsoil are very strongly acid or strongly acid.

Most of the acreage of this soil is in woodland. A small acreage is used for hay and pasture.

This soil is moderately suited to cultivated crops. Slope and an erosion hazard are the main limitations. Small stone fragments in the soil interfere with planting of some fine-seeded crops and cause rapid wear of equipment. The main management practices in cultivated areas are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops; and using grasses and legumes in the cropping system. All help to maintain tilth and increase organic matter content. These practices and cross-slope tillage also help to control erosion.

This soil is well suited to hay and pasture. Overgrazing restricts the growth of pasture plants and increases the hazard of erosion. Use of proper stocking rates, rotational grazing, and yearly mowing are the main pasture management needs.

The potential productivity for trees on this soil is good, especially for species that withstand acid soil conditions. Placing logging roads and skid trails on the contour or across the slope helps to prevent trailside gullying.

Slope is the main limitation of this soil for community development. In some areas bedrock at a depth of less than 60 inches is a further limitation.

Capability subclass: IIIe.

RaD—Rayne channery silt loam, 15 to 25 percent slopes. This soil is deep, moderately steep, and well drained. It formed in residual material derived from the underlying shale and siltstone bedrock. It is on hillsides, the upper part of sides of valleys, and sides of streams. The areas are long and narrow and range from 5 to 50 acres.

Typically, the surface layer is dark brown channery silt loam about 2 inches thick. The subsoil is 40 inches thick. The upper 18 inches is friable, brown and yellowish brown channery silt loam. The lower 22 inches is firm, brown channery silt loam. The substratum is firm, brown channery silt loam to a depth of 60 inches or more.

Included with this soil in mapping are areas of Gilpin, Wharton, and Ernest Variant soils. In some small areas there are large boulders on the surface. The included areas range from 1/2 acre to 5 acres. Some areas of this unit are at high elevations and generally have a shorter growing season than those at lower elevations.

Permeability in this Rayne soil is moderate throughout. Runoff is rapid. Available water capacity is high. In unlimed areas the surface layer and subsoil are very strongly acid or strongly acid.

Slope and an erosion hazard make this soil poorly suited to cultivated crops. Small stone fragments in the soil hinder planting of some fine-seeded crops and cause rapid wear of equipment. The main management practices in cultivated areas are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops and grasses and legumes in the cropping system, and cross-slope tillage.

This soil is suitable for hay and pasture, but slope limits the use of hay harvesting equipment. Overgrazing of pastures causes increased erosion. Use of proper

stocking rates, rotational grazing, and yearly mowing are the main pasture management needs.

The potential productivity for trees on this soil is good, especially for species that withstand acid soil conditions. Most areas are wooded. Erosion is a hazard along skid trails. Placing logging roads and skid trails across the slope helps to eliminate the erosion hazard. The use of equipment is limited by slope.

Slope is the main limitation of this soil for community development. In some areas bedrock at a depth of less than 60 inches is a further limitation.

Capability subclass: IVe.

RaE—Rayne channery silt loam, 25 to 35 percent slopes. This soil is deep, steep, and well drained. It formed in residual material derived from the underlying shale and siltstone bedrock. It is on hillsides and the sides of valleys. Many areas on the sides of valleys are deeply dissected by V-shaped gullies. Slopes mainly are smooth and convex. The areas are long and narrow or oblong and range from 5 to 100 acres.

Typically, the surface layer is dark brown channery silt loam about 2 inches thick. The subsoil is 40 inches thick. The upper 18 inches is friable, brown yellowish brown channery silt loam. The lower 22 inches is firm, brown channery silt loam. The substratum is firm, brown channery silt loam to a depth of 60 inches or more.

Included with this soil in mapping are areas of Gilpin soils and areas where large boulders are on the surface. The included areas range from 1/2 acre to 5 acres. Some areas of this unit are at high elevations and have a shorter growing season than those at lower elevations.

Permeability in this Rayne soil is moderate throughout. Runoff is rapid. Available water capacity is high. In unlimed areas the surface layer and subsoil are very strongly acid or strongly acid.

Slope makes this soil generally unsuitable for cultivated crops or hay. Some areas are suitable for pasture, but pasture improvement is difficult because of the slope. Overgrazing results in further erosion and gullying.

This soil is mostly wooded. Potential productivity for trees is good, especially for species that tolerate acid soil conditions. Slope limits the operation of planting and harvesting equipment. Placing logging roads and skid trails on the contour helps eliminate the hazard of trailside gullying.

Slope is the main limitation of this soil for community development. In some areas bedrock at a depth of less than 60 inches is a further limitation.

Capability subclass: Ve.

RaF—Rayne channery silt loam, 35 to 65 percent slopes. This soil is deep, very steep, and well drained. It formed in residual material derived from the underlying shale and siltstone bedrock. It is on hillsides and the sides of valleys. Many areas on the sides of valleys are deeply dissected by V-shaped gullies. Slopes mainly are smooth and convex. The areas are long and narrow or oblong and range mainly from 5 to 100 acres.

Typically, the surface layer is dark brown channery silt loam about 1 inch thick. The subsoil is 41 inches thick. The upper 19 inches is friable, brown and yellowish brown channery silt loam. The lower 22 inches is firm, brown channery silt loam. The substratum is firm, brown channery silt loam to a depth of 60 inches or more.

Included with this soil in mapping are areas of Gilpin soils and areas with large boulders on the surface. The included areas range from 1/2 acre to 5 acres. Some areas of this unit are at high elevations and have a shorter growing season than those at lower elevations.

Permeability in this Rayne soil is moderate throughout. Runoff is very rapid. Available water capacity is high. In unlimed areas the surface layer and subsoil are very strongly acid or strongly acid.

Slope makes this soil generally unsuitable for farming. The soil is mostly wooded, and potential productivity for trees is good, especially for species that withstand acid soil conditions. Slope limits the operation of planting and harvesting equipment. Placing logging trails on the contour helps control the hazard of trailside gullying.

Slope is the main limitation of this soil for community development. In some areas bedrock at a depth of less than 60 inches is a further limitation.

Capability subclass: VIIe.

RbC—Rayne extremely bouldery silt loam, 8 to 15 percent slopes. This soil is deep, sloping, and well drained. It formed in residual material derived from the underlying shale and siltstone bedrock. It is on ridgetops and side slopes. Boulders on the surface are less than 6 feet apart. The areas of this soil are oblong and range from 5 to 8 acres.

Typically, the surface layer is dark brown channery silt loam about 2 inches thick. The subsoil is 40 inches thick. The upper 18 inches is friable, brown and yellowish brown channery silt loam. The lower 22 inches is firm, brown channery silt loam. The substratum is firm, brown channery silt loam to a depth of 60 inches or more.

Included with this soil in mapping are areas of Gilpin soils. Also included are areas that are nearly completely covered by stones and boulders. The included areas range from 1/4 to 1 acre. Some areas of this unit are at high elevations and have a shorter growing season than those at lower elevations.

Permeability in this Rayne soil is moderate throughout. Runoff is medium. Available water capacity is high. In unlimed areas the surface layer and subsoil are very strongly acid or strongly acid.

Use of this soil for cultivated crops or hay generally is impractical unless the boulders are removed from the surface. The boulders limit reseeding and the application of lime and fertilizer and make the soil poorly suited to

pasture. Rotational grazing helps to reduce the hazard of erosion.

The potential productivity for trees on this soil is good, and the soil mainly is wooded. The boulders make machine planting of seedlings generally impractical. Placing logging roads and skid trails on the contour or across the slope helps to minimize the hazards of trailside erosion and gullying.

Slope and the boulders on the surface are the major limitations of the soil for community development.

Capability subclass: VIIs.

RbD—Rayne extremely bouldery silt loam, 15 to 25 percent slopes. This soil is deep, moderately steep, and well drained. It formed in residual material derived from the underlying shale and siltstone bedrock. It is on sides of valleys and streams. Boulders on the surface are less than 6 feet apart. The areas of this soil are oblong and range from 5 to 40 acres.

Typically, the surface layer is dark brown channery silt loam about 2 inches thick. The subsoil is 40 inches thick. The upper 18 inches is friable, brown and yellowish brown channery silt loam. The lower 22 inches is firm, brown channery silt loam. The substratum is firm, brown channery silt loam to a depth of 60 inches or more.

Included with this soil in mapping are areas of Gilpin soils. Also included are areas that are nearly completely covered by stones and boulders. The included areas range from 1/4 to 1 acre. Some areas of this unit are at high elevations and have a shorter growing season than those at lower elevations.

Permeability in this Rayne soil is moderate throughout. Runoff is rapid. Available water capacity is high. In unlimed areas the surface layer and subsoil are very strongly acid or strongly acid.

Slope and the boulders on the surface make this soil generally unsuited to cultivated crops or hay. The removal of the boulders is generally not practical for crop production because of the slope.

This soil is poorly suited to pasture. The boulders and the slope make reseeding and applying lime and fertilizer impractical. Rotational grazing helps to maintain pasture grasses and reduce the erosion hazard.

The potential productivity for trees on this soil is good, and the soil mainly is wooded. The boulders make machine planting of seedlings generally impractical. Placing logging roads and skid trails on the contour or across the slope helps to minimize the hazards of trailside erosion and gullying.

Slope and the boulders on the surface are the major limitations of the soil for community development.

Capability subclass: VIIs.

RbE—Rayne extremely bouldery silt loam, 25 to 35 percent slopes. This soil is deep, steep, and well drained. It formed in residual material derived from the underlying shale and siltstone bedrock. It is on hillsides and on sides of valleys deeply dissected by V-shaped gullies. Boulders on the surface are less than 6 feet apart. The areas of this soil are oblong and range from 5 to 30 acres.

Typically, the surface layer is dark brown channery silt loam about 2 inches thick. The subsoil is 40 inches thick. The upper part is friable, brown and yellowish brown channery silt loam 18 inches thick. The lower part is firm, brown channery silt loam 22 inches thick. The substratum is firm, brown channery silt loam to a depth of 60 inches or more.

Included with this soil in mapping are areas of Gilpin soils. Also included are areas that are nearly completely covered by stones and boulders. The included areas range from 1/4 to 1 acre. Some areas of this unit are at high elevations and have a shorter growing season than those at lower elevations.

Permeability in this Rayne soil is moderate throughout. Runoff is rapid. Available water capacity is high. In unlimed areas the surface layer and subsoil are very strongly acid or strongly acid.

Slope and the boulders on the surface make this soil generally unsuited to cultivated crops or hay. The removal of the boulders for crop production is generally not practical because of the slope.

Some areas are suitable for poor-quality pasture, but pasture improvement is difficult because of slope and the boulders.

The potential productivity for trees on this soil is good, and the soil mainly is wooded. The boulders make machine planting of seedlings generally impractical.. Placing logging roads and skid trails on the contour or across the slope helps to minimize the hazards of trailside erosion and gullying.

Slope and the boulders on the surface are the major limitations of the soil for community development.

Capability subclass: VIIs.

RbF—Rayne extremely bouldery silt loam, 35 to 65 percent slopes. This soil is deep; very steep, and well drained. It formed in residual material derived from the underlying shale and siltstone bedrock. It occupies hillsides and sides of valleys. Many areas are deeply dissected by V-shaped gullies. Boulders on the surface are less than 6 feet apart. The areas of this soil are oblong and range from 5 to 30 acres.

Typically, the surface layer is dark brown channery silt loam about 1 inch thick. The subsoil is 41 inches thick. The upper part is friable, brown and yellowish brown channery silt loam 19 inches thick. The lower part is firm, brown channery silt loam 22 inches thick. The substratum is firm, brown channery silt loam to a depth of 60 inches or more.

Included with this soil in mapping are areas of Gilpin soils. Also included are areas that are nearly completely covered by stones and boulders. The included areas range from 1/4 to 1 acre. Some areas of this unit are at

high elevations and have a shorter growing season than those at lower elevations.

Permeability in this Rayne soil is moderate throughout. Runoff is very rapid. Available water capacity is high. In unlimed areas the surface layer and subsoil are very strongly acid or strongly acid.

Slope and the boulders on the surface make this soil generally unsuitable for farming. The soil is mostly wooded; potential productivity for trees is good. Slope limits the operation of woodland planting and harvesting equipment. Placing logging trails on the contour helps minimize the hazard of trailside gullying.

Slope and the boulders on the surface are the major limitations of the soil for community development.

Capability subclass: VIIe.

RcA—Raynham silt loam, 0 to 3 percent slopes. This soil is deep, nearly level, and somewhat poorly drained. It is mainly on broad plains in the lowlands and in pockets on the upland plateau. The areas of this soil are irregular in shape. Most range from 10 to 75 acres, but on the uplands the areas range from 5 to 30 acres.

Typically, this soil has a surface layer of dark grayish brown silt loam about 8 inches thick. The subsoil is mottled, yellowish brown silt loam 18 inches thick. The upper part of the substratum, at a depth of 26 to 42 inches, is mottled, yellowish brown silt loam. The lower part of the substratum is grayish brown fine sand to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Minoa and Niagara soils. In some areas, particularly on uplands, the soils have a subsoil that is more acid than the subsoil of this Raynham soil. The areas of included soils range from 1/2 acre to 3 acres.

This Raynham soil has a seasonal high water table in the upper part of the subsoil. Permeability is moderate or moderately slow in the subsoil and slow in the substratum. Internal drainage is slow. Runoff is slow. Available water capacity is high. The surface layer and subsoil are strongly acid to neutral.

Most of the acreage of this soil is used for vegetables. Some areas are in woodland.

Drained areas of this soil are easy to till and are suitable for many crops. In undrained areas, seasonal wetness delays planting until late spring and compaction is a hazard if the soil is tilled when wet. The main management practices are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops; and using grasses and legumes in the cropping system. All help to maintain good tilth.

Without adequate drainage, this soil is best suited to hay or pasture. The prevention of overgrazing and of grazing when the soil is wet is the major pasture management concern. Overgrazing causes a loss of pasture plants, and grazing when the soil is wet causes soil compaction and restricted growth. Use of proper stocking rates, rotational and restricted grazing, and yearly mowing are the main pasture management practices.

The potential productivity for trees on this soil is fair to poor. Seasonal wetness causes high seedling mortality and restricts the use of planting and harvesting equipment. Rooting is also restricted by seasonal wetness, and thus trees are susceptible to uprooting during windy periods.

The seasonal high water table, the slow permeability in the substratum, the potential for frost action, and low strength are the main limitations of the soil for community development. The sides of excavations and trenches in this soil are unstable and tend to slump or erode.

Capability subclass: IIIw.

RcB—Raynham silt loam, 3 to 8 percent slopes. This soil is deep, gently sloping, and somewhat poorly drained. It is mainly on broad, undulating plains in the lowlands and in pockets on the upland plateau. The areas of this soil are irregular in shape and range from 5 to 50 acres, but on the uplands most areas are less than 20 acres.

Typically, this soil has a surface layer of dark grayish brown silt loam about 8 inches thick. The subsoil is mottled, yellowish brown silt loam 18 inches thick. The upper part of the substratum, at a depth of 26 to 42 inches, is mottled, yellowish brown silt loam. The lower part of the substratum is grayish brown fine sand to a depth of 60 inches or more.

Included with this soil in mapping are areas of Minoa and Collamer soils. In some areas, particularly on the uplands, the soils have a subsoil that is more acid than the subsoil of this Raynham soil. The areas of the included soils range from 1/2 acre to 2 acres.

This Raynham soil has a seasonal high water table in the upper part of the subsoil. Permeability is moderate or moderately slow in the subsoil and slow in the substratum. Internal drainage is slow. Runoff is medium. Available water capacity is high. The surface layer and subsoil are strongly acid to neutral.

Most of the acreage of this soil is used for vegetables. Some areas are in woodland.

Drained areas of this soil are easy to till and are suitable for many crops. In undrained areas, seasonal wetness delays planting until late spring and compaction is a hazard if the soil is tilled when wet. Erosion is a hazard in intensively cultivated areas and where the subsoil is exposed in open ditches. The main management practices are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; cross-slope tillage; and using cover crops and grasses and legumes in the cropping system. All help to maintain tilth and control the erosion hazard.

Without adequate drainage, this soil is best suited to hay or pasture. The prevention of overgrazing and of

grazing when the soil is wet is the major pasture management concern. Overgrazing causes a loss of pasture plants, and grazing when the soil is wet causes soil compaction and restricted growth. Use of proper stocking rates, rotational and restricted grazing, and yearly mowing are the main pasture management practices.

The potential productivity for trees on this soil is fair to poor. Seasonal wetness causes high seedling mortality and restricts the use of planting and harvesting equipment. Rooting is also restricted by seasonal wetness, and thus trees are susceptible to uprooting during windy periods.

The seasonal high water table, the slow permeability in the substratum, the potential for frost action, and low strength are the main limitations of the soil for community development. The sides of excavations and trenches in this soil are unstable and tend to slump or erode.

Capability subclass: IIIw.

Re—Red Hook silt loam. This soil is deep, nearly level, and somewhat poorly drained. It is on moderately low flats on outwash plains and older stream terraces. The areas are generally oblong or irregular in shape. They range mainly from 5 to 50 acres. Slopes range from 0 to 3 percent.

Typically, this soil has a surface layer of very dark grayish brown silt loam about 10 inches thick. The subsoil is 13 inches thick. It is yellowish brown loam in the upper part and brown loam in the lower part. The substratum at a depth of 23 to 45 inches is dark gray shaly loam. At a depth of 45 to 60 inches or more, it is gray stratified shaly sandy loam.

Included with this soil in mapping are areas of Phelps, Rhinebeck, and Halsey soils. Also included are spots of soils that are similar to this Red Hook soil but that have stratified sand and gravel at a depth of 40 inches. The included areas range from 1/2 acre to 3 acres.

This Red Hook soil has a seasonal high water table in the upper part of the subsoil in the spring and other wet periods. Permeability is moderate throughout the soil. Runoff is slow. Available water capacity is low to moderate. Reaction in the surface layer ranges from strongly acid to slightly acid.

Most of the acreage of this soil is in woodland and pasture.

Drained areas of this soil are moderately suited to cultivated crops. Subsurface drainage generally is suitable if adequate outlets are available. The main management practices are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops; incorporating crop residue into the soil; and tillage at the proper soil moisture level. All help to improve tilth and maintain organic matter.

Undrained areas are suitable for pasture and hay if varieties that withstand seasonal wetness are used. Restricting grazing during wet periods helps to prevent soil compaction and trampling of desirable forage species.

The potential productivity for trees on this soil is fair to good, especially for species that withstand seasonal wetness. Machine planting of seedlings is practical in large areas, but seedling mortality is high because of seasonal wetness. The restricted rooting caused by the seasonal high water table makes uprooting of trees during windy periods a hazard.

The seasonal high water table and a high potential for frost action are the main limitations of this soil for communtiy development. Excavations in this soil are unstable, especially when the soil is wet.

Capability subclass: IIIw.

RgA—Rhinebeck silt loam, 0 to 3 percent slopes. This soil is deep, nearly level, and somewhat poorly drained. It is on the lowland lake plain and in a few valleys. The areas are irregular in shape and range from 5 to 50 acres.

Typically, this soil has a surface layer of dark grayish brown silt loam about 9 inches thick. The subsoil is mottled silty clay 28 inches thick. It is light yellowish brown in the upper part and brown in the lower part. The substratum is dark grayish brown silty clay to a depth of 60 inches or more.

Included with this soil in mapping are areas of Hudson, Churchville, Niagara, and Canadice soils. The areas of included soils range from 1/2 acre to 3 acres.

This Rhinebeck soil has a seasonal high water table in the upper part of the subsoil in the spring and other wet periods. Permeability and runoff are slow. Available water capacity is moderate to high. The surface layer is strongly acid to neutral.

Most of the acreage of this soil is in woodland. Some areas are used for hay or cultivated crops.

The soil is moderately suited to cultivated crops. The seasonal high water table is the main limitation. Drainage of the soil commonly requires a system of open ditches combined with subsurface drains that are closely spaced to overcome the slow permeability. Crusting and clodding are hazards if the soil is tilled when it is wet. The main management practices are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops; incorporating crop residue into the soil; and tillage at the proper soil moisture content. All help to maintain tilth and improve organic matter content.

This soil is suitable for pasture and hay, but the suitability is increased when the soil is at least partially drained. Forage species that withstand seasonal wetness are needed in undrained areas. Grazing during wet periods causes soil compaction and trampling of the grasses.

The potential productivity for trees on this soil is fair to good, especially for species that withstand a seasonal high water table. Machine planting of seedlings is practical in large areas when the soil is dry.

The seasonal high water table and slow permeability are the main limitations of this soil for community development. The soil has high potential for frost action, and the sides of excavations are unstable.

Capability subclass: IIIw.

RkA—Rhinebeck gravelly loam, 0 to 3 percent slopes. This soil is deep, nearly level, and somewhat poorly drained. It formed in clayey, lake-laid sediments mantled with thin gravelly deposits. It is on low terraces on the lowland lake plain. The areas are irregular in shape and range from 5 to 20 acres.

Typically, this soil has a surface layer of dark grayish brown gravelly loam about 9 inches. The subsoil is mottled silty clay 28 inches thick. It is light yellowish brown in the upper part and brown in the lower part. The substratum is dark grayish brown silty clay to a depth of 60 inches or more.

Included with this soil in mapping are areas of Red Hook soils. Also included are areas of Rhinebeck soils that do not have gravel in the surface layer or in which the upper part of the subsoil is gravelly loam. Poorly drained Canadice soils are in a few depressions and along some drainageways. The areas of included soils are as much as 3 acres each.

This Rhinebeck soil has a seasonal high water table in the upper part of the subsoil in the spring and other wet periods. Permeability and runoff are slow. Available water capacity is moderate to high. The surface layer is strongly acid to neutral.

Most of the acreage of this soil is in woodland. Some drained areas are farmed.

Drained areas of this soil are moderately suited to cultivated crops. Drainage of this soil commonly requires a combination of open ditches and subsurface drains; closely spacing the drains and backfilling tile drains help to increase the suitability for crops. Gravel in the surface layer hinders cultivation for some crops and causes rapid wear of machinery. The main management practices are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops; incorporating crop residue into the soil; and tillage at the proper soil moisture level. All help to maintain tilth and increase organic matter content.

This soil is suitable for hay and pasture, especially for plants that can withstand seasonal wetness. Partial drainage increases the suitability for pasture. Overgrazing causes restricted growth, and grazing when the soil is wet causes soil compaction and trampling of desirable plant species.

The potential productivity for trees on this soil is fair to good, especially for species that withstand a seasonal high water table. Seasonal wetness limits the use of planting and harvesting equipment.

The seasonal high water table and slow permeability are the main limitations of this soil for community development. The soil has high potential for frost action, and the sides of excavations are unstable.

Capability subclass: IIIw.

ScB—Schuyler silt loam, 3 to 8 percent slopes. This soil is deep, gently sloping, and moderately well drained. It formed in glacial till derived mainly from silty shale and small amounts of siltstone and sandstone. The soil is on hilltops and side slopes of valleys. Slopes are generally long, smooth, and convex. The areas of this soil are as much as 30 acres each.

Typically, this soil has a surface layer of very dark grayish brown silt loam about 6 inches thick. The subsoil is 36 inches thick. It is dark yellowish brown and yellowish brown silt loam in the upper part and is mottled, light olive brown and olive shaly silt loam in the lower part. The substratum is 6 inches thick. It is olive very shaly silt loam interbedded with soft shale bedrock. Shale bedrock is at a depth of 48 inches.

Included with this soil in mapping are areas of Derb, Mardin, and Lordstown soils. Also included are areas of soils in which bedrock is at a depth of less than 40 inches. The areas of included soils are as much as 3 acres each.

This Schuyler soil has a seasonal high water table in the subsoil for brief periods in early spring. Permeability is moderate in the surface layer, moderate or moderately slow in the subsoil, and moderately slow or slow in the substratum. Runoff is medium. Available water capacity is moderate to high. Bedrock is at a depth of 40 to 60 inches. In unlimed areas the surface layer and subsoil range from extremely acid to medium acid.

This soil is suited to cultivated crops. Tillage is delayed in the spring because of seasonal wetness; tile drainage in low spots allows early cultivation on most fields. Erosion is a hazard on long slopes in intensively cultivated areas. The main management practices are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops; and mixing crop residue into the soil. All help to control erosion and maintain tilth. Plowing when the soil is wet causes poor tilth.

The soil is well suited to hay and pasture. Grazing during wet periods causes soil compaction and trampling of desirable forage plants. Rotational and restricted grazing, yearly mowing, and use of proper stocking rates are the main pasture management practices.

The potential productivity for trees on this soil is fair to good, and most areas are wooded. Placing logging roads and skid trails across the slope helps to prevent trailside gullying. Brush removal and planting in early spring when the soil is moist help to improve the rate of seedling survival.

The seasonal high water table and the permeability of the subsoil and substratum are the main limitations of the soil for community development.

Capability subclass: IIe.

ScD—Schuyler silt loam, 15 to 25 percent slopes. This soil is deep, moderately steep, and moderately well drained. It formed in glacial till deposits on the sides of valleys and hills. Slopes are generally smooth, convex, and long. The areas are mostly long and narrow and range from 5 to 20 acres.

Typically, this soil has a surface layer of very dark grayish brown silt loam about 6 inches thick. The subsoil is 36 inches thick. It is dark yellowish brown and yellowish brown silt loam in the upper part and is mottled, light olive brown and olive shaly silt loam in the lower part. The substratum is 6 inches thick. It is olive very shaly silt loam interbedded with soft shale bedrock. Shale bedrock is at a depth of 48 inches.

Included with this soil in mapping are areas of Orpark, Derb, and Marilla soils, all of which have slopes of mainly less than 15 percent. The areas of included soils are as much as 3 acres each.

This Schuyler soil has a seasonal high water table in the subsoil for brief periods in early spring. Permeability is moderate in the surface layer, moderate or moderately slow in the subsoil, and moderately slow or slow in the substratum. Runoff is medium. Available water capacity is moderate to high. Bedrock is at a depth of 40 to 60 inches. In unlimed areas the surface layer and subsoil range from extremely acid to medium acid.

Slope and a severe erosion hazard make this soil poorly suited to cultivated crops. The soil has limited suitability for pasture and hay. Slope makes the use of equipment difficult for harvesting hay and the improvement of pasture. Overgrazing increases the hazard of erosion. Restricting grazing during wet periods helps to prevent soil compaction and trampling of desirable pasture plants.

The potential productivity for trees on this soil is fair to good, especially for species that tolerate acid soil conditions. Most of the acreage is wooded. Slope limits the use of equipment. Placing logging trails across the slope helps to eliminate trailside erosion and gullying.

Slope, seasonal wetness, the moderately slow or slow permeability, and a high potential for frost action are the main limitations of this soil for community development.

Capability subclass: IVe.

Sd—Scio silt loam. This soil is deep, nearly level, and moderately well drained. It formed in water- or wind-deposited material that is on terraces near flood plains of large creeks. The areas mainly are oblong or irregular in shape. They range from 5 to 100 acres, but most are 5 to 40 acres. Slopes range from 0 to 3 percent.

Typically, this soil has a surface layer of dark brown silt loam about 10 inches thick. The subsoil is silt loam 24 inches thick. It is yellowish brown in the upper part, mottled and dark yellowish brown in the middle part, and mottled and brown in the lower part. The substratum is mottled, brown silt loam, gravelly sandy loam and gravelly loamy sand to a depth of 60 inches or more.

Included with this soil in mapping are areas of Unadilla, Raynham, and Collamer soils. Also included in mapping are a few areas that are subject to rare flooding by adjacent streams. The included areas range from 1/2 acre to 3 acres.

In early spring this Scio soil has a seasonal high water table in the lower part of the subsoil. Permeability is moderate in the subsoil and upper part of the substratum and moderately rapid to rapid in the lower part of the substratum. Internal drainage and runoff are slow to medium. Available water capacity is high. In unlimed areas the surface layer and subsoil range from very strongly acid to medium acid.

The soil is suited to cultivated crops and vegetables, and most areas are used for crops. The seasonal high water table sometimes delays tillage and planting in the spring. Drainage of the wetter included soils allows efficient use of many fields. The main management practices are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops; incorporating crop residue into the soil; and tillage at the proper soil moisture content. All help to maintain tilth and increase organic matter content.

This soil is well suited to hay and pasture. Use of proper stocking rates, rotational and deferred grazing, and yearly mowing are the principal pasture management needs. Grazing when the soil is wet causes compaction of the soil and trampling of desirable pasture plants.

The potential productivity for trees on this soil is good, especially for species that withstand acid soil conditions. Machine planting of seedlings is practical in large areas.

The seasonal high water table is the main limitation of this soil for community development. The permeability in the lower part of the substratum causes a hazard of ground-water pollution in areas used for septic tank absorption fields. The sides of excavations in this soil are unstable, particularly when the soil is wet. Some areas of this soil are suitable for recreational use.

Capability subclass is IIw.

To—Tioga silt loam. This soil is deep, nearly level, and well drained. It formed in recent alluvium and is on higher parts of flood plains along major streams. The areas are mostly long and narrow. They range from 5 to 100 acres, but most are 5 to 40 acres. Slopes range from 0 to 3 percent.

Typically, this soil has a surface layer of very dark grayish brown silt loam about 10 inches thick. The subsoil is 41 inches thick. It is dark yellowish brown silt loam in the upper part and is mottled, dark yellowish

brown sandy loam in the lower part. The substratum is mottled, dark yellowish brown sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are areas of moderately well drained and somewhat poorly drained Middlebury soils on the lower part of the flood plain. Also included are soils that have more silt in the subsoil than this Tioga soil and that do not have underlying sand or gravel. Some areas have a surface layer of gravelly silt loam. The areas of included soils are as much as 3 acres each.

This Tioga soil is subject to flooding in some years. A seasonal high water table is in the upper part of the substratum in early spring and is somewhat controlled by the level of the adjacent stream. Permeability is moderate or moderately rapid in the surface layer and subsoil and moderate to rapid in the substratum. Runoff is slow. Available water capacity is moderate to high. The soil is strongly acid to neutral in the surface layer and subsoil.

Most of the acreage of this soil is used for vegetables. Some areas are wooded or used for pasture.

This soil is well suited to field crops and to vegetables and is well suited to specialty crops that require irrigation. Although the soil is subject to flooding, the floods usually occur in early spring and do not interfere with crop production. Some streambanks need protection, such as riprap, to prevent lateral cutting and erosion. The main management practices are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops, incorporating crop residue into the soil; and tillage at proper soil moisture level. All help to maintain tilth and organic matter content. Using cover crops and sod crops in the cropping system protects the soil from scouring during periods of flooding.

This soil is also well suited to pasture and hay. Overgrazing causes a loss of pasture grasses. Use of proper stocking rates, rotational and deferred grazing, and yearly mowing are the main pasture management practices.

The potential productivity for trees on this soil is good, especially for species that require acid soil conditions.

The hazard of flooding is the main limitation of this soil for community development. Flooding and the permeability in the substratum cause a hazard of ground-water pollution in areas used for septic tank absorption fields. Some areas are suitable for recreational use, and the soil is a source of topsoil.

Capability class: I.

Ua—Unadilla silt loam. This soil is deep, well drained, and nearly level. It is on stream terraces. The areas are mostly long and narrow. They range from 5 to 100 acres, but areas of 5 to 40 acres are common. Slopes range from 0 to 3 percent.

Typically, the surface layer is dark grayish brown silt loam about 9 inches thick. The subsoil is 29 inches thick. The upper part is yellowish brown silt loam 9 inches thick. The lower part is dark yellowish brown very fine sandy loam 20 inches thick. The substratum is brown very fine sandy loam and fine sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are areas of moderately well drained Scio soils and somewhat poorly drained Raynham soils. Also included are areas of Allard soils and soils that have a surface layer of gravelly silt loam. The areas of included soils are as much as 3 acres each.

The permeability of this Unadilla soil is moderate in the surface layer and subsoil and moderately rapid to rapid in the substratum. Runoff is slow to medium. Available water capacity is high. In unlimed areas the surface and subsoil are very strongly acid to medium acid.

The soil is well suited to hay and pasture, vegetables (fig. 5), and cultivated crops, including deep-rooted crops. Most areas are used for vegetables. Crusting of the surface layer is a hazard if the soil is irrigated. Mixing crop residue into the soil and using cover crops and sod crops in the cropping system help to maintain tilth and organic matter content. Some included wet spots require tile drainage.

The potential productivity for trees on this soil is good.

This soil has few limitations for community development, but the permeabiity of the substratum causes a hazard of ground-water pollution in areas used for septic tank absorption fields. Some areas are well suited to recreational uses, and the soil is a source of topsoil.

Capability class: I.

VaB—Valois gravelly silt loam, 3 to 8 percent slopes. This soil is deep, gently sloping, and well drained. It is on undulating areas where glacial till is mixed with glacial outwash deposits. The areas are oblong and range from 5 to 10 acres.

Typically, this soil has a surface layer of dark grayish brown gravelly silt loam about 8 inches thick. The subsoil is 43 inches thick. It is yellowish brown gravelly silt loam in the upper part, yellowish brown gravelly loam in the middle part, and brown gravelly sandy loam in the lower part. The substratum is grayish brown very gravelly sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are areas of Mardin and Chenango soils. Also included in mapping are areas of Arkport soils. The areas of included soils range from 1/2 acre to 3 acres.

The permeability of this Valois soil is moderate in the surface layer and upper part of the subsoil and moderate or moderately rapid in the lower part of the subsoil and in the substratum. Runoff is medium. Available water capacity is moderate. In unlimed areas the surface layer and subsoil are very strongly acid to medium acid.

Figure 5.—Snap beans in an area of Unadilla silt loam.

Most of the acreage of this soil is in woodland, but some areas are cultivated.

The soil is suited to cultivated crops. Gravel fragments and cobblestones in the surface layer hinder cultivation for some crops and cause rapid wear of machinery. Erosion is a slight hazard in intensively cultivated areas. The main management practices are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; incorporating crop residue into the soil; cross-slope tillage; and using cover crops and sod crops in the cropping system. All help to maintain tilth, increase organic matter content, and reduce the erosion hazard.

This soil is well suited to hay and pasture. Use of proper stocking rates, rotational grazing, and yearly mowing are the main pasture management needs.

The potential productivity for trees on this soil is fair to good, especially for species that withstand acid soil conditions.

The soil is suitable for some types of community development. Many areas are suitable for recreational use.

Capability subclass: IIe.

VpA—Volusia channery silt loam, 0 to 3 percent slopes. This soil is deep, nearly level, and somewhat poorly drained. It formed in glacial till deposits. It is on plains on the upland plateau. The areas are oblong or irregular in shape and range from 5 to 50 acres.

Typically, this soil has a surface layer of very dark grayish brown channery silt loam about 9 inches thick. The subsurface layer is mottled, light brownish gray channery silt loam 6 inches thick. The subsoil is a very firm layer of mottled, olive brown channery loam. The substratum is mottled, dark grayish brown very channery loam to a depth of 60 inches or more.

Included with this soil in mapping are areas of Mardin, Chippewa, and Derb soils. Also included in mapping are small areas of Volusia soils that have a surface layer

with no stone fragments. The areas of included soils are as much as 3 acres.

This Volusia soil has a perched seasonal high water table above the subsoil. Permeability is moderate above the subsoil and slow or very slow in the substratum. Runoff is medium to slow. Available water capacity is low. The surface layer and subsurface layer are very strongly acid to slightly acid.

The soil is moderately suited to cultivated crops. Seasonal wetness and stone fragments in the soil are the main limitations. Drainage usually is needed for crops, but establishing outlets is difficult in many areas of this soil. Drains usually require close spacing to overcome the slowly permeable subsoil. The stone fragments interfere with the cultivation of some crops and cause rapid wear of machinery. In drained areas and areas suitable for farming, the main management practices are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops; incorporating crop residue into the soil; and tillage at the proper soil moisture level. All help to maintain tilth and increase organic matter content.

The soil is moderately suited to hay and pasture. Partial drainage increases the suitability for forage crops. In undrained areas, varieties that withstand seasonal wetness are best suited to this soil. Grazing during wet periods causes trampling of the pasture grasses and compaction of the soil.

The potential productivity for trees on this soil is fair to good, especially for species that withstand seasonal wetness. Most areas are wooded. Machine planting of seedlings is practical in large areas of this soil; however, seasonal wetness and gravel in the soil limit the use of equipment. Seasonal wetness is the cause of high seedling mortality, and because of the restricted rooting depth trees can be uprooted during windy periods.

The seasonal high water table, the slow or very slow permeability in the subsoil, and the high potential for frost action are the main limitations of this soil for community development.

Capability subclass: IIIw.

VpB—Volusia channery silt loam, 3 to 8 percent slopes. This soil is deep, gently sloping, and somewhat poorly drained. It formed in acid glacial till deposits. It is on foot slopes and other areas on the upland plateau that commonly receive seepage or runoff from higher adjacent soils. The areas are oblong and range from 5 to 30 acres.

Typically, this soil has a surface layer of very dark grayish brown channery silt loam about 9 inches thick. The subsurface layer is mottled, light brownish gray channery silt loam 6 inches thick. The subsoil is a very firm layer of mottled, olive brown channery loam. The substratum is mottled, dark grayish brown very channery loam to a depth of 60 inches or more.

Included with this soil in mapping are areas of Mardin, Chippewa, and Derb soils. Also included in mapping are small areas of Volusia soils that have a surface layer with no stone fragments. The areas of included soils are as much as 3 acres each.

This Volusia soil has a perched seasonal high water table above the subsoil. Permeability is moderate above the subsoil and slow or very slow in the substratum. Runoff is medium. Available water capacity is low. The surface layer and subsurface layer are very strongly acid to slightly acid.

The soil is moderately suited to some cultivated crops. Seasonal wetness, an erosion hazard, and stone fragments in the soil are the main limitations. Drainage is usually needed for crops on this soil. Interceptor drains help to divert runoff and seepage from adjacent higher soils. Drains require close spacing to overcome the slow permeability in the subsoil. The stone fragments interfere with the cultivation of some crops and cause rapid wear of machinery. Erosion is a hazard in intensively cultivated areas. In drained areas and areas suitable to farming, the main management practices are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops; contour tillage; incorporating crop residue into the soil; and tillage at the proper soil moisture level. All help to maintain tilth, reduce the erosion hazard, and increase organic matter content.

This soil is moderately suited to hay and pasture. Drainage improves the suitability for forage crops. In undrained areas, plant varieties that withstand seasonal wetness are best suited to this soil. Deferred grazing during wet periods prevents trampling of the pasture plants and compaction of the soil.

The potential productivity of trees on this soil is fair to good, especially for species that withstand seasonal wetness. Most areas are wooded. Machine planting of seedlings is practical in large areas of this soil; however, seasonal wetness and the stone fragments limit the use of equipment. Seasonal wetness and the restricted rooting depth cause high seedling mortality and a hazard of uprooting during windy periods.

The seasonal high water table, the slow or very slow permeability in the subsoil, and the high potential for frost action are the main limitations of this soil for community development.

Capability subclass: IIIw.

VpC—Volusia channery silt loam, 8 to 15 percent slopes. This soil is deep, sloping, and somewhat poorly drained. It formed in acid glacial till deposits. It is on side slopes and in other areas on the upland plateau that commonly receive seepage or runoff from higher adjacent soils. The areas are oblong and range from 5 to 30 acres.

Typically, this soil has a surface layer of very dark grayish brown channery silt loam about 9 inches thick.

The subsurface layer is mottled, light brownish gray channery silt loam 6 inches thick. The subsoil is a very firm layer of mottled, olive brown channery loam. The substratum is mottled, dark grayish brown very channery loam to a depth of 60 inches or more.

Included with this soil in mapping are small intermingled areas of Mardin, Chippewa, and Fremont soils. Also included in mapping are small areas of Volusia soils that have no stone fragments in the surface layer. The individual areas of the included soils are as much as 3 acres in size.

This Volusia soil has a perched seasonal high water table above the very firm part of the subsoil. Permeability is moderate above the very firm part of the subsoil and slow or very slow in the very firm part and in the substratum. Runoff is rapid. Available water capacity is low. The surface layer and subsurface layer are very strongly acid to slightly acid.

The soil is moderately suited to some cultivated crops. Seasonal wetness, an erosion hazard, and stone fragments in the soil are the main limitations. Drainage is usually needed for crops on this soil. Interceptor drains help to divert runoff and seepage from adjacent higher soils. Drains require close spacing to overcome the slow permeability in the subsoil. The stone fragments interfere with the cultivation of some crops and cause rapid wear of machinery. Erosion is a hazard in intensively cultivated areas. In drained areas and areas suitable for farming, the main management practices are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops; contour tillage; incorporating crop residue into the soil; and tillage at the proper soil moisture level. All help to maintain tilth, reduce the erosion hazard, and increase organic matter content.

This soil is moderately suited to hay and pasture. Drainage improves the suitability for forage crops. In undrained areas, plant varieties that withstand seasonal wetness are best suited to this soil. Deferred grazing during wet periods prevents trampling of the pasture plants and compaction of the soil.

The potential productivity for trees on this soil is fair to good, especially for species that withstand seasonal wetness. Most areas are wooded. Machine planting of tree seedlings is practical in large areas of this soil; however, seasonal wetness, the stone fragments, and slope limit the use of equipment. Seasonal wetness and the restricted rooting depth cause a high seedling mortality and cause uprooting during windy periods.

Slope, the seasonal high water table, the slow or very slow permeability in the subsoil, and the high potential for frost action are the main limitations of this soil for community development.

Capability subclass: IIIe.

Wa—Wallington silt loam. This soil is deep, nearly level, and somewhat poorly drained. It formed in gravel-free, silty deposits. It is on remnant stream terraces. The areas of this soil are irregular in shape and range from 5 to 30 acres. Slopes range from 0 to 3 percent.

Typically, this soil has a surface layer of dark grayish brown silt loam about 2 inches thick. The subsoil extends to a depth of 60 inches or more. The upper part is mottled, dark yellowish brown and yellowish brown silt loam. The middle part is a firm and dense layer of grayish brown and brown silt loam and fine sandy loam. The lower part is gray, strong brown, and red loam.

Included with this soil in mapping are areas of Raynham, Brinkerton Variant, and Scio soils. The areas of included soils are as much as 3 acres each.

This Wallington soil has a perched seasonal high water table above the firm part of the subsoil. Permeability is moderate in the surface layer and the upper part of the subsoil and slow in the middle and lower parts of the subsoil. Runoff is slow. Available water holding capacity is moderate. In unlimed areas the surface layer and subsoil are medium acid to very strongly acid.

This soil is moderately suited to cultivated crops if drainage is provided. Compaction of the soil is a hazard if the soil is tilled when wet. The main management practices are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; incorporating crop residue into the soil; and using cover crops. All help to maintain tilth.

Without drainage, this soil is suited to hay or pasture plants that withstand seasonal wetness. Overgrazing and grazing when the soil is wet are the major concerns in pasture management. Grazing when the soil is wet causes soil compaction and restricts plant growth. Overgrazing results in the loss of desirable plant species. Use of proper stocking rates, rotational grazing, yearly mowing, and restricted grazing during wet periods are the main pasture management practices.

The potential productivity for trees on this soil is fair to good, and most areas are wooded. Seasonal wetness causes a high seedling mortality and restricts the use of planting and harvesting equipment. Rooting is restricted by the water table, and thus trees on this soil are susceptible to uprooting during windy periods.

Seasonal wetness, the slow permeability in the firm part of the subsoil, the high potential for frost action, and low strength are the main limitations of this soil for community development. The sides of excavations in this soil are unstable.

Capability subclass: IIIw.

Wd—Wayland silt loam. This soil is deep, nearly level, and poorly drained and very poorly drained. It formed in silty alluvium on the lowest parts of flood plains. The areas are mostly oblong and parallel to the adjacent stream. They range from 5 to 100 acres, but most are 5 to 30 acres.

Typically, this soil has a surface layer of very dark grayish brown silt loam about 9 inches thick. The subsoil is mottled, dark gray silt loam 19 inches thick. The substratum extends to a depth of 60 inches or more. It is mottled, dark gray silt loam in the upper part and is dark gray to dark grayish brown stratified silt loam and very fine sand in the lower part.

Included with this soil in mapping are areas of Middlebury soils. Also included are areas of soils that have a mucky surface layer and soils that are underlain by sand and gravel at a depth of less than 36 inches. The areas of included soils range from 1/4 acre to 3 acres.

This Wayland soil has a seasonal high water table at or near the surface for prolonged periods throughout the year. The level of the water table is somewhat controlled by the level of the nearby stream. Flooding is common, particularly in the spring and other periods of heavy runoff. Permeability is moderately slow or moderate in the surface layer and slow in the subsoil and substratum. Runoff is slow. Available water capacity is high. The surface layer is strongly acid to mildly alkaline.

Most of the acreage of this soil is in water-tolerant brush and grasses.

The soil is generally unsuited to most crops because of the prolonged high water table and hazard of flooding. Drainage increases the suitability but generally is difficult to apply because of the lack of suitable outlets. In drained areas the main management practices are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops; incorporating crop residue into the soil; and tillage at the proper soil moisture content. All help to maintain organic matter content and tilth. The use of sod crops and cover crops helps to protect the soil from scouring by floodwater.

In undrained areas this soil has limited suitability for pasture grasses that withstand prolonged wetness. Restricting grazing during wet periods prevents soil compaction and trampling of desirable pasture grasses.

The potential productivity for trees on this soil is fair to poor, and the soil is suitable only for species that tolerate wetness. Frequent flooding and the prolonged high water table limit the use of equipment and cause a high seedling mortality.

Flooding, the high water table, and the high potential for frost action are the major limitations of this soil for community development. Some areas have good potential for the development of wetland wildlife habitat.

Capability subclass: Vw.

WhC—Wharton silt loam, 8 to 15 percent slopes. This soil is deep, sloping, and moderately well drained. It formed in residual material that derived from weathered shale and siltstone. It is on the lower part of side slopes. The areas are rectangular and range from 3 to 10 acres.

Typically, the surface layer is very dark grayish brown silt loam about 4 inches thick. The upper part of the subsoil is yellowish brown channery silt loam 18 inches thick. The middle part is mottled, brown channery silty clay loam 8 inches thick. The lower part is firm, olive brown silt loam 8 inches thick. The substratum is firm, brown silt loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Rayne, Brinkerton Variant, and Ernest Variant soils. The areas of the included soils range from 1/2 acre to 2 acres. Some areas of this unit are at high elevations and generally have a shorter growing season than those at lower elevations.

This Wharton soil has a perched seasonal high water table above the firm part of the subsoil in early spring. Permeability is moderate in the surface layer and moderately slow to slow in the subsoil and substratum. Bedrock is at a depth of at least 40 inches. Available water capacity is high. Runoff is medium to rapid. In unlimed areas the surface layer and subsoil are extremely acid to strongly acid.

This soil is moderately suited to cultivated crops commonly grown in the area, but slope limits the use of large tillage and harvesting equipment, and careful management is needed to control runoff and erosion. Contour tillage and using diversions to intercept runoff help to control erosion. Incorporating crop residue into the soil; using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; cultivating at the proper soil moisture content; and using cover crops and sod crops in the cropping system help to maintain tilth and also to control erosion.

This soil is well suited to hay and pasture. Grazing when the soil is wet causes soil compaction and trampling of desirable plant species.

The potential productivity for trees on this soil is good, especially for species that tolerate acid soil conditions. Most areas are wooded. Placing logging roads and skid trails across the slope helps to prevent the hazard of trailside gullying, and restricting the use of heavy equipment during wet periods helps to eliminate excess compaction.

The main limitations of this soil for community development are the seasonal high water table, the moderately slow or slow permeability in the subsoil, and slope.

Capability subclass: IIIe.

WhD—Wharton silt loam, 15 to 25 percent slopes. This soil is deep, moderately steep, and moderately well drained. It formed in residual material that derived from weathered shale and siltstone. This soil is on the lower part of side slopes. The areas are rectangular and range from 3 to 30 acres.

Typically, the surface layer is very dark grayish brown silt loam about 4 inches thick. The upper part of the subsoil is yellowish brown channery silt loam 18 inches

thick. The middle part is mottled, brown channery silty clay loam 8 inches thick. The lower part is firm, olive brown silt loam 8 inches thick. The substratum is firm, brown silt loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Rayne, Brinkerton Variant, and Ernest Variant soils. The areas of included soils range from 1/2 acre to 2 acres. Some areas of this unit are at a high elevation and generally have a shorter growing season than those at a lower elevation.

This Wharton soil has a perched seasonal high water table above the firm part of the subsoil in early spring. Permeability is moderate in the surface layer and moderately slow to slow in the subsoil and substratum. Bedrock is at a depth of at least 40 inches. Available water capacity is high. Runoff is rapid. In unlimed areas the surface layer and subsoil are extremely acid to strongly acid.

Slope, the rapid runoff, and an erosion hazard make this soil poorly suited to cultivated crops. Slope makes the operation of farm equipment difficult and hazardous. The main erosion-control practices in areas used for crops are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops; and using diversions to divert runoff.

This soil is suited to pasture. Grazing during wet periods causes soil compaction and trampling of desirable plant species.

The potential productivity for trees on this soil is good, and most areas are wooded. Erosion is a hazard, particularly along skid trails. Placing logging roads and skid trails across the slope helps to prevent trailside gullying. Restricting the use of heavy equipment during wet periods helps to eliminate excess compaction.

The main limitations of this soil for community development are the seasonal high water table, the moderately slow or slow permeability in the subsoil, and slope.

Capability subclass: IVe.

WmB—Williamson silt loam, 3 to 8 percent slopes. This soil is deep, gently sloping, and moderately well drained. It formed in silty, stone-free deposits. It is on knolls and ridges. Some areas are dissected by intermittent streams. The areas range from 5 to 50 acres, but most are 5 to 20 acres.

Typically, this soil has a surface layer of dark brown silt loam about 7 inches thick. The subsoil is 38 inches thick. The upper part is dark yellowish brown silt loam. The middle part is mottled, pale brown silt loam. The lower part is a dense, firm layer of brown and yellowish brown very fine sandy loam. The substratum extends to a depth of 60 inches or more. It is yellowish brown silt loam in the upper part and brown loamy very fine sand in the lower part.

Included with this soil in mapping are areas of Arkport, Collamer, and Wallington soils. The areas of included soils are as much as 3 acres each.

This Williamson soil has a perched seasonal high water table above the lower part of the subsoil. Permeability is moderate in the surface layer and upper part of the subsoil and slow in the lower part of the subsoil and in the substratum. Runoff is medium to rapid. Available water capacity is moderate. In unlimed areas the surface layer and subsoil are medium acid to very strongly acid.

This soil is suited to cultivated crops, including some vegetable crops, but drainage commonly is needed in areas of the included wetter soils. The main management practices are: using a conservation tillage system that includes no-till farming, strip tillage, and stubble mulching; using cover crops; cross-slope tillage; incorporating crop residue into the soil; and tillage at the proper soil moisture content. All help to maintain tilth, improve organic matter content, and control erosion.

This soil is well suited to hay and pasture; however, overgrazing on this soil causes a loss of pasture plants and increased erosion. Use of proper stocking rates, rotational grazing, yearly mowing, and deferment of grazing during wet periods are the main pasture management concerns.

The potential productivity for trees on this soil is fair to good, especially for species that tolerate acid soil conditions. Most areas are wooded. Placing logging trails across the slope helps minimize the hazards of erosion and trailside gullying.

The slow permeability in the lower part of the subsoil and in the substratum, seasonal wetness, and a high potential for frost action are the main limitations of this soil for community development. Sides of excavations in this soil slump and erode, particularly when the soil is wet.

Capability subclass: IIe.

Prime Farmland

Prime farmland is one of several kinds of important farmlands defined by the U.S. Department of Agriculture. It is of major importance in providing the Nation's short- and long-range needs for food and fiber. The supply of high quality farmland is limited, and the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, must encourage and facilitate the use of our Nation's prime farmland with wisdom and foresight.

Prime farmland, as defined by the U.S. Department of Agriculture, is the land that is best suited to producing food, feed, forage, fiber, and oilseed crops. It has the soil quality, growing season, and moisture supply needed to enconomically produce a sustained high yield of crops when it is treated and managed using acceptable farming methods. Prime farmland produces the highest yields with minimal inputs of energy and economic resources, and farming it results in the least damage to the environment.

Prime farmland may now be in crops, pasture, woodland, or other land, but not urban and built-up land or water areas. It must either be used for producing food or fiber or be available for these uses.

Prime farmland usually has an adequate and dependable supply of moisture from precipitation or irrigation. It also has a favorable temperature and growing season and acceptable levels of acidity or alkalinity. It has few or no large rocks and is permeable to water and air. Prime farmland is not excessively erodible or saturated with water for long periods and is not flooded during the growing season. The slope range is mainly from 0 to 6 percent. For more detailed information on the criteria for prime farmland consult the local staff of the Soil Conservation Service.

About 21,500 acres, or nearly 50 percent of the survey area, meets the soil requirements for prime farmland. The areas of prime farmland are throughout the survey area, but most are in the major valleys.

The soil map units that make up prime farmland in the Seneca Nation of Indians are listed in table 5. This list does not constitute a recommendation for a particular land use. The extent of each listed map unit is shown in table 4. The location is shown on the detailed soil maps in the back of this publication. The soil qualities that affect use and management are described in the section "Detailed Soil Map Units."

Soils that have a seasonal high water table may qualify for prime farmland if this limitation is overcome by drainage. Such soils are listed in table 5, and the need for drainage is shown in parentheses. Onsite evaluation is necessary to see if the limitation has been overcome.

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; for 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. It can also be used to designate areas of prime farmland.

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

Dr. Shaw Reid, Cornell University Agronomy Department, assisted with this section.

General management needed for crops and pasture is suggested in this section. The system of land capability classification used by the Soil Conservation Service is explained, and the estimated yields of the main crops and hay 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 "Detailed Soil Map Units." Specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

Drainage is a major management need on over half of the acreage that can be used for cropland in the survey area. Some soils are so wet that the production of crops common to the area is generally not possible without the installation of extensive drainage systems. Poorly drained and very poorly drained Canadice, Canandaigua, Chippewa, Halsey, Lamson, Lyons, Palms, and Wayland soils are examples of those kinds of soils.

Seasonal wetness interferes with early planting, growth, and harvesting of most crops on somewhat poorly drained soils. The somewhat poorly drained soils in the survey area are Churchville, Minoa, Niagara, Raynham, Rhinebeck, and Volusia soils. Crops grown on those soils respond well to drainage, and yields on drained areas of those soils are often as high as those on naturally well drained soils.

Many lowland soils that are well drained and moderately well drained, such as Allard, Collamer, Elnora, Galen, Hudson, and Scio soils, contain small inclusions of wetter soils that require random subsurface drains to make management of fields more uniform.

The design of drainage systems varies with the kind of soil. A combination of surface and subsurface drainage is needed in most areas of poorly drained and very poorly drained soils. Establishing drainage outlets is often difficult and expensive because of the low position of these soils on the landscape. Surface drainage can include such practices as open ditches, grassed waterways, land smoothing, and bedding systems, while subsurface drainage mainly consists of tile or plastic drains.

Drains must be more closely spaced in soils with slow permeability than in more permeable soils. Subsurface drainage is slow in Canadice and Rhinebeck soils, for example. These soils may also require surface drainage. Soils with more rapid permeability, such as Lamson, Halsey, and Red Hook soils, respond well to subsurface drains if adequate outlets are available. Some wet, sloping soils can be improved by using interceptor drains that divert surface runoff and downslope subsurface

seepage away from the area. Derb and Volusia soils are examples of those kinds of soils.

Erosion is a major or potential hazard on about 20 percent of the cropland in the survey area. The hazard of erosion is related to the slope and erodibility of the soil. Other factors, such as the amount and intensity of rainfall, type of plant cover, length of slope, and tillage practices, also have a strong influence on the amount of soil erosion.

The loss of soil through erosion causes a loss of nutrients and water in the soil, gully formation on hillsides, deterioration of tilth, and sedimentation of streams and reservoirs. Further, soil productivity is reduced when the surface layer is lost and increasing amounts of the subsoil are incorporated into the plow layer. This is especially true of soils with a fine textured or moderately fine textured subsoil, such as Hudson and Rhinebeck soils, and soils with compact subsoil that restricts the depth of rooting, such as Mardin and Volusia soils. Erosion also reduces the organic matter content and productivity of such droughty soils as Colonie and Alton soils. Orpark and Manlius soils are moderately deep to bedrock and thus are permanently damaged by erosion.

The effectiveness of a particular combination of soil conservation practices differs from one soil to another, and different combinations can be equally effective on the same soil. Erosion-control practices provide a protective cover for the soils, reduce the rate of runoff, and increase the amount of water infiltration. Soils with short, irregular slopes—as is typical of the Collamer and Valois soils—require a conservation tillage system that includes no-till farming and stubble mulching, using cover crops, leaving crop residue on the surface, and using a cropping system with a large proportion of sod-forming crops. Those practices, along with contour tillage, stripcropping, terracing, and using diversions, also help to control erosion on sloping Marilla and Derb soils, which have long, smooth, uniform slopes.

Most soils that have slopes of more than 3 percent require some measures to control water erosion. Soils that are high in silt content and that do not have stone fragments, such as Allard, Niagara, and Collamer soils, are the most susceptible to erosion.

Soil blowing, or wind erosion, is a hazard on sandy Colonie and Elnora soils, particularly when the surface layer is dry and the soil has no plant cover. Using windbreaks and a plant cover, regulating the water table, and using irrigation are effective in reducing wind erosion.

Droughtiness, or low available water capacity, limits the suitability for crops on about 20 percent of the soils in the survey area. Sandy and gravelly soils, soils with a restrictive layer (fragipan), and soils that are shallow or moderately deep to bedrock tend to have a low capacity for water storage and are droughty. Gravelly Chenango soils, sandy Colonie soils, Volusia soils with a fragipan, and moderately deep Manlius soils are examples of soils that have low available water capacity.

Maintaining or increasing organic matter content and improving soil structure help to increase the available water capacity of droughty soils. Using green-manure crops, mixing crop residues into the soil, and adding animal wastes to the soil are practices that build up organic matter levels and improve structure.

Tilth contributes to the emergence of seedlings, the infiltration of water into the soil, root development, and the ease of cultivation. Soils with good tilth usually have granular structure and are porous.

Tillage practices have a strong influence on soil tilth. Alton and Chenango soils, which are deep, well drained or excessively drained, and coarse textured or moderately coarse textured, can be tilled with little resulting reduction of tilth. However, the wetter and finer textured soils, such as Rhinebeck and Niagara soils, must be tilled at the proper soil moisture content to prevent deterioration of the natural soil structure. Plowing or cultivating these kinds of soils when they are wet compacts the soil and results in a hard crust and clods on the surface when the soil dries.

Cultivation at the proper soil moisture content; using cover crops, green-manure crops, and sod crops in the cropping system; mixing crop residue into the soil; and using manure are management practices that help to keep the soil granular and porous and in good tilth.

Fertility is important for all of the soils in the Seneca Nation of Indians. The amount of lime and fertilizer needed depends on the natural content of lime and plant nutrients in the soil, on the needs of the particular crop, and on the level of desired yield.

The average organic matter content is about 4 percent in the surface layer of the soils in the survey area. Poorly drained and very poorly drained soils, such as Canandaigua and Wayland soils, have a somewhat higher than average organic matter content. Some nitrogen from the organic matter is available to plants, but much of it is in complex forms and not usable by plants until it is decomposed by soil micro-organisms. In most areas it is necessary to apply nitrogen fertilizer to supplement the nitrogen available from the organic matter in the soil. Management practices that tend to build up organic matter levels, such as the use of green-manure crops, sod crops, and crop residue, help to improve the nitrogen content of the soil.

Nitrogen is lost through leaching in rapidly permeable Chenango soils, for example, or by denitrification on wetter and less permeable Canadice soils. Thus, applying small amounts of nitrogen at timely intervals is important for maximum use by plants.

Most soils are low in natural phosphorus content, especially coarse textured soils, such as Colonie and Chenango soils. The addition of appropriate amounts of phosphate in the form of commercial fertilizers is essential for crops on these soils.

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 6. 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 6 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 for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The 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. Only class and subclass are used in this survey. 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 few 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, 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-4 or IIIe-6. Cabability units are not used in this survey area.

The capability classification of each map unit is given in the section "Detailed Soil Map Units" and in table 6.

Woodland Management and Productivity

Table 7 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; *c*, clay in the upper part of the soil; *s*, sandy texture; 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, c, s, and r.

In table 7, *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 few trees may be blown down by strong winds; *moderate*, that some trees will be blown down during periods of excessive soil wetness and strong winds; and *severe*, that many trees are blown 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 50 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.

Recreation

The soils of the survey area are rated in table 8 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 8, 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 8 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 11 and interpretations for dwellings without basements and for local roads and streets in table 10.

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 and horseback riding 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

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 9, 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, bromegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are asters, goldenrod, beggarweed, and quackgrass.

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, apple, hawthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are honeysuckle, autumn-olive, and crabapple.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, fir, cedar, and juniper.

Shrubs are bushy woody plants that produce fruit, buds, twigs, bark, and foliage. In this survey area the soils were not rated for shrubs.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland

plants are smartweed, wild millet, wildrice, 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 rabbit, 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, deer, and bear.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, mink, and beaver.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. 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 to 6 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 10 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, and the available water capacity in the upper 40 inches of the soil 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 11 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 11 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 24 and 72 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 filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

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 11 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 11 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 6 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 12 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 and topsoil. They are rated as a probable or improbable source of sand and gravel. 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 5 or 6 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 or 6 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 index 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 natural aggregates suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In table 12, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific

purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

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 low in content of soluble salts, 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, stones, or soluble salts, 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 13 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are 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 increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

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.

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.

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.

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 Index Properties

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 Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture (*7*). These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (*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.

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 ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The

estimates are based on test data from the survey area or from nearby areas and on field examination.

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.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, and plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earth-moving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3 bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

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.

Organic matter is the plant and animal residue in the soil at various stages of decomposition.

In table 15, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter of a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

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.

Some soils in table 16 are assigned to two hydrologic soil groups. Dual grouping is used for one of two reasons: (1) Some soils have a seasonal high water table but can be drained. In this instance the first letter applies to the drained condition of the soil and the second letter to the undrained condition. (2) In some soils that are less than 20 inches deep to bedrock, the first letter applies to areas where the bedrock is impervious and the second letter to areas where the bedrock is impervious or where bedrock makes up more than 25 percent of the surface area of the soil.

Flooding, the temporary inundation of an area, is caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, nor is water in swamps and marshes.

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 the average, no more than once in 2 years; and *frequent* that it occurs, on the average, 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, artesian, 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. An *artesian* water table is under hydrostatic head, generally beneath an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole. 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 given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is specified as either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

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.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (*8*). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 17 shows the classification of the soils in the survey area. 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 Inceptisol.

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 Aquept (*Aqu*, meaning water, plus *ept*, from Inceptisol).

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 Haplaquepts (*Hapl*, meaning minimal horizonation, plus *aquept*, the suborder of the Inceptisols 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 *Aeric* identifies the subgroup that is better aerated than is typical for the great group. An example is Aeric Haplaquepts.

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 coarse-loamy, mixed, nonacid, mesic Aeric Haplaquepts.

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 Their Morphology

In this section, each soil series recognized in the survey area is described. Some of the soil series described are in Erie County, New York. 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 (*8*). 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 "Detailed Soil Map Units."

Allard Series

The Allard series consists of deep, well drained soils that formed in a mantle of silty deposits underlain by stratified glacial outwash. The Allard soils are on primary terraces along streams and are on higher secondary terraces. Slope ranges from 0 to 8 percent.

Allard soils are closely associated with Arkport, Chenango, Alton, and Unadilla soils and flooded Tioga and Middlebury soils. The Allard soils are more silty than the Arkport soils, do not have the gravel content of the

Chenango or Alton soils, and do not have the deep silty deposits of the Unadilla soils. The Allard soils are adjacent to but higher than the Tioga and Middlebury soils and are not subject to flooding.

Typical pedon of Allard silt loam, 0 to 3 percent slopes, in the town of Concord, 0.7 mile west of the junction of Zoar Valley Road and Grote Road, 100 feet north of Zoar Valley Road:

Ap—0 to 9 inches; dark brown (10YR 3/3) silt loam; weak fine and medium granular structure; very friable; many fine roots; 2 percent coarse fragments; medium acid; abrupt smooth boundary.

B21—9 to 12 inches; strong brown (7.5YR 5/6) silt loam; weak fine and medium subangular blocky structure; very friable; many fine roots; many fine pores; strongly acid; clear wavy boundary.

B22—12 to 17 inches; yellowish brown (10YR 5/4) silt loam; weak and moderate fine and medium subangular blocky structure; friable; common fine roots; many fine pores; strongly acid; gradual wavy boundary.

B23—17 to 27 inches; yellowish brown (10YR 5/4) silt loam; moderate medium subangular blocky structure; friable; few roots; few pores; 5 percent coarse fragments; few high-chroma mottles at contact with IIC horizon; strongly acid; gradual wavy boundary.

IIC—27 to 60 inches; brown (10YR 4/3) and light brownish gray (10YR 6/2) very gravelly loamy sand; single grain; loose; few roots; 60 percent coarse fragments; few cobblestones; medium acid.

The thickness of the solum and the depth to sandy or gravelly material range from 20 to 36 inches. The depth to bedrock is more than 5 feet. The solum typically is free of coarse fragments but has a few pebbles or thin gravelly layers in some pedons.

The Ap horizon has hue of 10YR, value of 3 to 5, and chroma of 2 to 4. It is silt loam to fine sandy loam. Reaction is very strongly acid to medium acid in unlimed areas.

The B horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 8. It is very fine sandy loam or silt loam. Structure is weak or moderate, subangular blocky or granular, or the horizon is massive. Consistence mainly is very friable or friable, but in some pedons the lower part of the B horizon is firm. Some pedons contain lamellae or irregularly shaped bodies that are slightly darker, have a higher clay content, and are more firm than the matrix, but such layers are less than 6 inches thick. Some pedons have high-chroma mottles below a depth of 24 inches. Reaction is very strongly acid to medium acid.

The IIC horizon has hue of 7.5YR to 2.5Y, value of 3 to 5, and chroma of 2 to 4. It is loamy sand or sandy and gravelly material dominated by particles that are coarser than fine sand. The coarse-fragment content ranges from 0 to 70 percent, by volume. Reaction is strongly acid to neutral.

Allard Variant

The Allard Variant consists of deep, moderately well drained soils that formed in a mantle of silty deposits underlain by stratified glacial outwash. The Allard Variant soils are on terraces and old alluvial fans in the Allegany Reservation. Slope ranges from 0 to 15 percent.

Allard Variant soils are associated with Allard, Unadilla, Chenango, Raynham, Scio, and flooded Middlebury soils. The Allard Variant soils are not so well drained as the Allard or Unadilla soils, do not have the gravel content of the Chenango soils, are better drained than the Raynham soils, and do not have the deep, silty deposits of the Scio soils. The Allard Variant soils are on terraces adjacent to the Middlebury soils but are higher and are not subject to flooding.

Typical pedon of Allard Variant silt loam, 0 to 3 percent slopes, in the town of Olean, city of Olean, 250 feet south of Park Street:

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; very friable; many fine roots; less than 2 percent coarse fragments; strongly acid; abrupt smooth boundary.

B21—9 to 23 inches; yellowish brown (10YR 5/4) silt loam; weak medium subangular blocky structure; very friable; common roots; less than 2 percent coarse fragments; strongly acid; clear smooth boundary.

B22t—23 to 36 inches; brown (10YR 5/3) silty clay loam; common medium distinct light brownish gray (10YR 6/2) and yellowish brown (10YR 5/8) mottles; moderate medium and fine subangular blocky structure; friable to slightly firm; thin patchy grayish brown (10YR 5/2) clay films on faces of peds and in pores; few roots; less than 2 percent coarse fragments; strongly acid; abrupt smooth boundary.

IIC—36 to 60 inches; brown (10YR 4/3) very gravelly loamy sand; massive; loose; 55 percent gravel; strongly acid.

The thickness of the solum and the depth to sandy or gravelly material range from 20 to 40 inches. The depth to bedrock is more than 5 feet. The solum is typically free of coarse fragments but contains a few pebbles or thin gravelly layers in some pedons. The substratum is 0 to 70 percent coarse fragments.

The Ap horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 or 3. Reaction in unlimed areas is very strongly acid to medium acid.

The B horizon has hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 3 to 6. It is silt loam or silty clay loam. Structure is weak or moderate, fine and medium

subangular blocky. Consistence is very friable to firm. Reaction is very strongly acid to medium acid.

The IIC horizon has hue of 7.5YR to 2.5Y, value of 3 to 5, and chroma of 2 to 4. It is loose loamy sand or sand in the fine-earth fraction. Reaction is very strongly acid to medium acid.

Alton Series

The Alton series consists of deep, well drained to somewhat excessively drained soils that formed in glacial outwash and beach deposits. The Alton soils are on terraces, beach ridges, and kames. Slope ranges from 0 to 15 percent.

Alton soils are closely associated with moderately well drained Phelps soils. Alton soils are similar to Chenango and Blasdell soils but are less acid than the Chenango soils and have a lower shale fragment content and are less acid than the Blasdell soils. Alton soils commonly are near Arkport, Colonie, and Allard soils but have a higher gravel content than those soils.

Typical pedon of Alton fine gravelly loam, 3 to 8 percent slopes, in the town of Alden, 0.1 mile west of the junction of West Main Street and Sandridge Road, at the edge of a gravel pit:

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) fine gravelly loam; moderate fine granular structure; very friable; many fine and medium roots; 30 percent coarse fragments; slightly acid (limed); abrupt smooth boundary.

B21—9 to 18 inches; yellowish brown (10YR 5/4) fine gravelly loam; weak fine subangular blocky structure; friable; common fine and medium roots; common fine pores; 30 percent coarse fragments; medium acid; clear wavy boundary.

B22—18 to 30 inches; dark yellowish brown (10YR 4/4) fine very gravelly sandy loam; weak medium subangular blocky structure; very friable; few fine roots; common fine pores; some pockets with clay films around pebbles; 40 percent coarse fragments; slightly acid; clear wavy boundary.

IIC1—30 to 46 inches; dark brown (10YR 3/3) fine very gravelly loamy sand; single grain; loose; few fine roots; 40 percent coarse fragments; slightly acid; clear wavy boundary.

IIC2—46 to 60 inches; dark brown (10YR 3/3) fine very gravelly loamy sand; stratified at 50 inches; single grain; 40 percent coarse fragments; mildly alkaline.

The solum thickness ranges from 30 to 60 inches. Carbonates are at a depth of 40 to 80 inches. The depth to bedrock is more than 5 feet. Coarse fragments consist mainly of pebbles less than 1/2 inch to 2 inches long. The content, by volume, of coarse fragments is 20 to 35 percent in the A horizon, 20 to 50 percent in the upper part of the B horizon, and 40 to 60 percent in the lower part of the B horizon and in the C horizon. Fine sand and coarser sand make up 50 to 70 percent of the fine-earth fraction of the solum.

The Ap horizon has hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 2 to 4. It is fine gravelly loam or fine gravelly fine sandy loam. Reaction is very strongly acid or strongly acid in unlimed areas.

The B horizon has hue of 10YR to 7.5YR, value of 3 to 6, and chroma of 3 to 6. The fine-earth fraction of the B horizon above 20 inches ranges from sandy loam to loam; below 20 inches it is coarser than loam. Some pedons do not have patchy clay films. The B horizon is strongly acid to neutral. Acidity commonly decreases with increased depth.

The C horizon has hue of 7.5YR to 2.5Y, value of 3 to 5, and chroma of 2 to 4. It is stratified gravel and sand, very gravelly loamy sand, or very gravelly sand. It is derived dominantly from limestone and some sandstone and shale. Reaction is neutral to mildly alkaline.

Angola Series

The Angola series consists of moderately deep, somewhat poorly drained soils that formed in glacial till deposits. Shale bedrock is at a depth of 20 to 40 inches. The Angola soils are on till plains. Slope ranges from 0 to 3 percent.

Angola soils are associated with Derb, Volusia, and Orpark soils. The Angola soils are not so deep to bedrock as the Derb or Volusia soils and are less acid than the Orpark soils.

Typical pedon of Angola silt loam, 0 to 3 percent slopes, in the town of Orchard Park, 0.3 mile west of the intersection of Abbott Road and U.S. Route 20:

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) silt loam; light brownish gray (10YR 6/2) dry; moderate medium granular structure; friable; many fine roots and pores; 5 percent coarse fragments; slightly acid; clear smooth boundary.

A2—9 to 11 inches; grayish brown (2.5Y 5/2) silt loam; many fine and medium distinct yellowish brown (10YR 5/4) and olive brown (2.5Y 4/4) mottles; few light grayish brown (2.5Y 6/2) skeletans; weak fine subangular blocky structure; friable; many fine roots and pores; 5 percent coarse fragments; slightly acid; clear wavy boundary.

B2tg—11 to 26 inches; dark grayish brown (2.5Y 4/2) silty clay loam; ped interiors with many (50 percent) fine and medium disinct yellowish brown (10YR 5/4, 5/6) and common light brownish gray (2.5Y 6/2) mottles; moderate medium subangular blocky structure; firm; common fine roots that decrease with depth; common fine pores; grayish brown (2.5Y 5/2) clay films in pores and along some ped faces; 10 percent coarse fragments; neutral in the lower part; clear smooth boundary.

C—26 to 30 inches; dark grayish brown (2.5Y 4/2) shaly silt loam; common fine and medium distinct olive brown (2.5Y 4/4) and light olive brown (2.5Y 5/4) mottles; weak medium platy structure; firm; few pores, most have clay linings; 25 percent coarse fragments; mildly alkaline; gradual smooth boundary.
IIR—30 inches; olive brown (2.5Y 4/4) to dark olive gray (5Y 3/2) brittle shale bedrock; horizontal strata; calcareous.

The solum thickness ranges from 20 to 30 inches, and bedrock is at a depth of 20 to 40 inches. The bedrock is brittle, soft or hard, neutral or calcareous shale. Coarse fragments make up 0 to 15 percent, by volume, of the A horizon, 2 to 30 percent of the B horizon, and 15 to 50 percent of the C horizon.

The Ap horizon has hue of 10YR, value of 3 or 4, and chroma of 1 or 2. It is silt loam or silty clay loam. Consistence is friable or firm. Reaction is medium acid to mildly alkaline. Some pedons do not have an A2 horizon.

The matrix of the B horizon has hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 2 to 4. Ped faces have chroma of 2 or less if the matrix chroma is greater than 2. In at least one subhorizon, more than 40 percent, by volume, has chroma of more than 2. The horizon ranges from loam to silty clay loam and their shaly analogs. Clay films are on vertical and horizontal ped faces and are thicker in the lower part of the horizon. Reaction is medium acid to mildly alkaline.

The C horizon has hue of 10YR to 5Y, value of 3 or 4, and chroma of 2 or 3. It ranges from shaly silt loam or shaly loam to very shaly silty clay loam. Some pedons have lime films on ped faces. Reaction is slightly acid to moderately alkaline.

The R horizon consists of olive, brown, gray, or black shale bedrock.

Arkport Series

The Arkport series consists of deep, well drained soils that formed in glaciolacustrine and glaciofluvial deposits dominated by fine sand and very fine sand. The Arkport soils are on remnant deltas that commonly are dissected. Slope ranges from 8 to 40 percent.

Arkport soils are in a drainage sequence with moderately well drained Galen soils, somewhat poorly drained Minoa soils, and poorly drained and very poorly drained Lamson soils. Arkport soils are similar to Allard, Collamer, and Colonie soils. The Arkport soils are not so silty in the subsoil as the Allard and Collamer soils and do not have the extremely high sand content of the Colonie soils.

Typical pedon of Arkport very fine sandy loam, 8 to 15 percent slopes, in the town of Concord, 5 miles southwest of the village of Springville, on the east side of Grote Road and 0.3 mile north of Zoar Valley Road:

Ap—0 to 4 inches; very dark grayish brown (10YR 3/2) very fine sandy loam, light grayish brown (10YR 6/2) crushed and dry; moderate medium granular structure; very friable; many fine and medium roots; very strongly acid; clear smooth boundary.
B21—4 to 15 inches; strong brown (7.5YR 5/6) very fine sandy loam, yellowish brown (10YR 5/4) in lower part; very weak very fine granular structure; very friable; common fine and medium roots; many pores; strongly acid; clear wavy boundary.
B22—15 to 23 inches; brown (10YR 5/3) very fine sandy loam; weak very fine subangular blocky structure; friable; few fine and medium roots; common pores; medium acid; clear wavy boundary.
A2&B23t—23 to 56 inches; pale brown (10YR 6/3) loamy very fine sand (A2); massive; very friable; dark brown (10YR 4/3) loam (B23t); weak fine angular blocky structure; friable; clay-bridged lamellae about 1 inch thick at intervals of 3 to 6 inches; few roots; many pores; slightly acid; gradual wavy boundary.
C—56 to 70 inches; light grayish brown (10YR 6/2) strata of loamy fine sand and very fine sand; single grain; firm, very friable when removed; neutral grading to mildly alkaline in the lower part.

The solum thickness ranges from 40 to 80 inches. The depth to carbonates ranges from 36 inches to more than 120 inches. Bedrock is at a depth of 5 feet or more. The depth to the uppermost lamellate layer ranges from 15 to 30 inches. Very fine sand and silt make up 30 to 80 percent of the soil, and fine sand and coarser sand more than 15 percent. The content of coarse fragments is 0 to 5 percent, by volume.

The Ap horizon has hue of 10YR, value of 3 or 4, and chroma of 2 or 3. It is loamy very fine sand, very fine sandy loam, or fine sandy loam. It has weak or moderate, fine to coarse granular structure and is very friable or friable. Reaction ranges from very strongly acid through neutral.

The B2 horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 3 to 6. It is loamy fine sand, loamy very fine sand, or very fine sandy loam. It is massive or single grain or has very weak or weak, fine or medium, granular or subangular blocky structure. Consistence is loose to friable. Reaction ranges from very strongly acid to neutral.

The A2 part of the A2&B2t horizon has hue of 10YR or 7.5YR, value of 5 to 7, and chroma of 2 to 4. The A2 part is fine sand to loamy very fine sand. It is structureless or has weak or very weak granular or subangular blocky structure and is loose or very friable.

The B2t part of the A2&B2t horizon is silt loam or very fine sandy loam to loamy fine sand. Its color is similar to that of the B2 horizon, but value is as low as 3. It is massive or has weak fine blocky or thin platy structure

and is friable or firm. The A2&B2t horizon ranges from strongly acid to neutral.

The C horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 2 to 4. It is fine sand to loamy very fine sand. It is massive or single grain and has loose to friable consistence. It ranges from medium acid to mildly alkaline.

Blasdell Series

The Blasdell series consists of deep, well drained soils that formed in outwash deposits dominated by fragments from local shale bedrock. The Blasdell soils are on terraces, deltas, and beach ridges. Slopes ranges from 3 to 8 percent.

Blasdell soils are in a drainage sequence with moderately well drained Farnham soils and are similar to Alton, Manlius, Marilla, and Chenango soils. The Blasdell soils have a higher shale content in the subsoil than the Alton or Chenango soils, are deeper to bedrock than the Manlius soils, and do not have the fragipan that is in Marilla soils.

Typical pedon of Blasdell shaly silt loam, 3 to 8 percent slopes, in the town of Hamburg, 1/2 mile west of the village of Hamburg and 1,000 feet south of Ridge Road:

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) shaly silt loam; weak fine granular structure; very friable; many fine roots; 30 percent coarse fragments; strongly acid; abrupt smooth boundary.

B21—8 to 15 inches; yellowish brown (10YR 5/6) very shaly silt loam; weak very fine subangular blocky structure; very friable; common fine roots; many pores; 60 percent coarse fragments; very strongly acid; clear smooth boundary.

B22—15 to 25 inches; yellowish brown (10YR 5/4) very shaly silt loam; weak fine subangular blocky structure; very friable; few fine roots; many pores; 60 percent coarse fragments about 2 inches in diameter; very strongly acid; clear wavy boundary.

B23—25 to 36 inches; dark yellowish brown (10YR 4/4) very shaly loam; very weak fine subangular blocky structure; very friable; few roots in upper part; many pores; 60 percent coarse fragments, mostly with rounded edges; strongly acid; gradual smooth boundary.

C—36 to 60 inches; brown (10YR 4/3) very shaly loam; massive; friable; pockets of sandy loam interspersed in the shaly strata; 70 percent coarse fragments; strongly acid.

The solum thickness ranges from 30 to 50 inches. The depth to bedrock is 5 feet or more. Coarse fragments, dominantly shale, make up 15 to 35 percent, by volume, of the A horizon, 35 to 65 percent of the B horizon, and 35 to 75 percent of the C horizon.

The Ap horizon has hue of 10YR to 2.5Y and chroma of 2 to 4. It is shaly silt loam or shaly loam. Structure is weak fine granular to moderate medium subangular blocky. Consistence is friable or very friable. Reaction ranges from very strongly acid to medium acid in unlimed areas.

The B horizon has hue of 7.5YR to 5Y. It is very shaly loam or very shaly silt loam. Structure ranges from very weak through moderate, fine or medium subangular blocky or granular. Consistence ranges from loose through firm. Reaction ranges from very strongly acid to medium acid.

The C horizon has hue of 10YR to 5Y, value of 3 to 5, and chroma of 2 to 4. It is very shaly loam or very shaly silt loam. It is massive or single grain and has loose, friable, or firm consistence. Reaction ranges from strongly acid to slightly acid at a depth of less than 80 inches.

Brinkerton Variant

The Brinkerton Variant consists of deep, somewhat poorly drained soils that formed in silty colluvium derived from shale, siltstone, and some sandstone. The Brinkerton Variant soils are on foot slopes and colluvial fans. Slope ranges from 3 to 25 percent.

Brinkerton Variant soils and moderately well drained Ernest Variant soils formed in similar material. Brinkerton Variant soils are associated with Rayne, Wharton, and Caneadea soils. The Brinkerton Variant soils are not so well drained as the Rayne or Wharton soils, which are on upper valley sidewalls, and they do not have the high clay content of the Caneadea soils.

Typical pedon of Brinkerton Variant silt loam, 8 to 15 percent slopes, in the Allegany Indian Reservation, town of Great Valley, 2 miles east of Killbuck, 1/2 mile west of Thorpe Hollow Road and 150 yards north of New York Route 17:

A1—0 to 3 inches; very dark grayish brown (10YR 3/2) silt loam; moderate fine granular structure; friable; many roots; less than 2 percent coarse fragments; strongly acid; abrupt smooth boundary.

B21—3 to 15 inches; yellowish brown (10YR 5/4) silt loam; weak medium and fine subangular blocky structure; friable; 2 percent coarse fragments; common roots; strongly acid; abrupt wavy boundary.

IIB22t—15 to 38 inches; brown (10YR 4/3) channery silt loam; common medium distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; 20 percent coarse fragments; grayish brown (10YR 5/2) faces of peds; thin patchy clay films in pores and on ped faces; few iron and manganese stains; strongly acid; clear smooth boundary.

IIC—38 to 60 inches; brown (10YR 4/3) channery loam; common medium distinct yellowish brown (10YR

5/6) mottles; massive; firm; 25 percent coarse fragments; strongly acid.

The solum thickness ranges from 20 to 50 inches. The depth to bedrock is more than 60 inches. The content of coarse fragments ranges from 0 to 5 percent in the A horizon and upper part of the B horizon and from 10 to 35 percent in the lower part of the B horizon and in the C horizon.

The A horizon has hue of 10YR to 2.5Y, value of 2 or 3, and chroma of 2 or 3. It is silt loam or loam and has weak or moderate, fine or medium granular structure. Reaction is very strongly acid or strongly acid.

The B horizon has hue of 7.5YR to 2.5Y, value of 3 to 5, and chroma of 2 to 6. It is silt loam or silty clay loam. It has weak or moderate, fine and medium subangular blocky structure. Consistence is very friable or friable. Reaction is very strongly acid or strongly acid.

The IIB horizon has hue of 7.5YR to 2.5Y, value of 3 to 5, and chroma of 2 to 4. It ranges from loam to silty clay loam in the fine-earth fraction. It has weak or moderate, fine or medium subangular blocky structure. Consistence is firm or very firm. Reaction is very strongly acid or strongly acid.

The IIC horizon has hue, value, chroma, and texture similar to those of the IIB horizon. The IIC horizon is massive and has firm or very firm consistence. Reaction ranges from very strongly acid to medium acid.

Canadice Series

The Canadice series consists of deep, poorly drained soils that formed in glacial lake sediments that have a high content of clay. The soils overlie calcareous, shaly glacial till in some areas. The Canadice soils are in slight depressions in old glacial lake basins. Slope ranges from 0 to 3 percent.

Canadice soils formed in parent material similar to that of the associated Rhinebeck soils, but Canadice soils are slightly wetter. Canadice soils are also associated with Canandaigua, Collamer, and Niagara soils. The Canadice soils have a higher clay content in the subsoil than the Canandaigua soils. They are not so well drained as and have a higher clay content than the Collamer or Niagara soils.

Typical pedon of Canadice silt loam, in the town of Concord, 500 feet north of Zoar Valley Road at Fyre Bridge:

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam; few fine faint brown (10YR 5/3) root stains; moderate fine granular structure; friable; many roots; neutral (limed); abrupt smooth boundary.

B21gt—8 to 25 inches; grayish brown (2.5Y 5/2) silty clay; many fine distinct light olive brown (2.5Y 5/8) mottles; strong coarse prismatic structure parting to moderate medium angular blocky; firm, plastic, slightly sticky; common roots; grayish brown (10YR 5/2) clay films on ped faces; neutral; clear wavy boundary.

B22gt—25 to 38 inches; grayish brown (2.5Y 5/2) silty clay; many fine distinct yellowish brown (10YR 5/8) mottles; strong coarse prismatic structure parting to moderate medium angular blocky; firm, plastic, slightly sticky; common roots; gray (10YR 6/1) clay films on ped faces; neutral; clear wavy boundary.

B3g—38 to 53 inches; grayish brown (2.5Y 5/2) silty clay; many medium distinct yellowish brown (10YR 5/8) mottles; moderate coarse prismatic structure; firm, plastic, slightly sticky; few roots; gray (10YR 5/1) ped faces; neutral; clear wavy boundary.

C—53 to 65 inches; dark grayish brown (10YR 4/2) silty clay; common medium distinct yellowish brown (10YR 5/6) mottles and common medium distinct gray (10YR 5/1) mottles; massive; firm, plastic, slightly sticky; mildly alkaline, calcareous.

The solum thickness and depth to carbonates range from 36 to 60 inches. The depth to bedrock is 5 feet or more. The soils generally are free of coarse fragments, but some pedons contain a small amount of fine gravel, generally as a surficial mantle. In areas where the substratum is glacial till, the coarse fragment content is as much as 35 percent, by volume.

The Ap horizon has hue of 10YR or 2.5Y, value of 2 to 4 when moist and 6 or more when dry, and chroma of 1 to 3. The Ap horizon is silt loam or silty clay loam. Reaction is very strongly acid to slightly acid in unlimed areas.

The B horizon has ped faces with hue of 2.5Y or 10YR, value of 5 or 6, and chroma of 0 to 2. Ped interiors have value of 4 or 5 and chroma of 1 or 2 and contain mottles with chroma of 4 or higher. The B horizon is clay, silty clay, or silty clay loam. Structure is moderate to strong, coarse or very coarse prismatic or weak to moderate, medium or coarse angular blocky. Reaction is strongly acid to mildly alkaline.

The C horizon has hue, value, chroma, and texture similar to those of the B horizon. Mottles are few to common and faint to distinct. The horizon generally is massive, but in places it has varves containing very fine sand. In some areas, glacial till is at a depth of about 3 1/2 feet. The texture of the till substratum is shaly clay to shaly silty clay loam. Reaction is strongly acid to moderately alkaline.

Map unit Cb is a taxadjunct to the Canadice series because it is more acid and has slightly higher chroma in the B3 and C horizons than is defined for the series. These differences do not affect use and management.

Canandaigua Series

The Canandaigua series consists of deep, poorly drained and very poorly drained soils that formed in lake-laid deposits. The Canandaigua soils are on lowland lake

plains and in upland depressions. Slope ranges from 0 to 3 percent.

Canandaigua soils are in a drainage sequence with better drained Collamer and Niagara soils and are associated with Lamson, Lyons, and Canadice soils. The Canandaigua soils do not have the sand content of the Lamson soils, have a lower clay content than the Canadice soils, and do not have the gravel content of the Lyons soils.

Typical pedon of Canandaigua silt loam, in the town of Clarence, 1/2 mile east of the junction of Northfield Road and Wolcottsburg Road:

Ap—0 to 9 inches; very dark gray (10YR 3/1) silt loam, gray (10YR 5/1) dry; moderate fine granular structure; very friable; many fine roots; many fine pores; neutral; abrupt smooth boundary.

B21g—9 to 11 inches; gray (10YR 5/1) silt loam; common medium distinct dark yellowish brown (10YR 4/4) and yellowish brown (10YR 5/6) mottles; distinct gray (2.5YR 5/1) ped faces; weak very coarse prismatic structure parting to weak medium subangular blocky; friable; many fine roots; common fine pores; neutral; abrupt wavy boundary.

B22g—11 to 25 inches; gray to grayish brown (10YR 5/1, 5/2) silt loam; many medium distinct dark yellowish brown (10YR 4/4) and very strong brown (7.5YR 5/6) mottles; moderate very coarse prismatic structure parting to moderate medium angular and subangular blocky; few fine roots; few fine pores; few thin clay films on ped faces and lining few pores; neutral; clear wavy boundary.

B23g—25 to 37 inches; brown (7.5YR 5/2) silt loam; many medium distinct yellowish brown (10YR 5/4) and strong brown (7.5YR 5/6) mottles; indistinct light brownish gray (10YR 6/2) ped faces; moderate medium blocky structure arranged in weak thick plates within weak very coarse prisms; firm; few fine pores; few indistinct gray (10YR 5/1) clay films on ped faces and lining some pores; mildly alkaline; gradual irregular boundary.

C—37 to 60 inches; light brownish gray (10YR 6/2) silt loam; common distinct yellowish brown (10YR 5/4) mottles that become few and faint with depth; weak thin and medium platy structure; firm; moderately alkaline, calcareous.

The thickness of the solum ranges from 20 to 40 inches, and the depth to carbonates ranges from 18 to 60 inches. The depth to bedrock is greater than 5 feet. The content of coarse fragments ranges from 0 to 3 percent. Ped faces in the B and C horizons have chroma of 2 or less.

The Ap or A1 horizon has hue of 10YR to 2.5Y, value of 2 or 3, chroma of 1 or 2. Value is 5 or less when the horizon is dry. The horizon is silt loam, very fine sandy loam, or mucky silt loam. Reaction is strongly acid to mildly alkaline.

The B horizon has hue of 5YR to 2.5Y, value of 4 to 6, and chroma of 1 to 2. It mainly is very fine sandy loam to silty clay loam; some subhorizons have less or more clay, but the average clay content in the 10- to 40-inch control section is 18 to 35 percent. The B horizon mainly has moderate or weak blocky structure that is within coarse or very coarse prisms in most places. The lower part of the B horizon has platy structure in some pedons. There are common to many, distinct and prominent mottles in the B horizon. Reaction is very strongly acid to mildly alkaline.

The C horizon has the same hue and value as the B horizon, but the range in chroma is 1 to 4. The C horizon mainly is silt loam or very fine sandy loam. Thin layers or bands that have a wide range in texture are in the C horizon of some pedons. Reaction ranges from very strongly acid to moderately alkaline.

Map unit Ce is a taxadjunct to the Canandaigua series because the soil is more acid throughout than is defined for the series. This difference does not affect use and management.

Caneadea Series

The Caneadea series consists of deep, somewhat poorly drained soils that formed in slackwater and lacustrine deposits. Caneadea soils are on low terraces along the Allegheny River Valley. Slope ranges from 0 to 8 percent.

Caneadea soils formed in the same kind of parent material as did the associated poorly drained Canadice soils. Caneadea soils are also associated with Canandaigua, Brinkerton Variant, and Wallington soils. The Caneadea soils are better drained and contain more clay than the Canandaigua soils, do not have the contrasting colluvial material of the Brinkerton Variant soils, and do not have the fragipan of the Wallington soils.

Typical pedon of Caneadea silty clay loam, 0 to 3 percent slopes, in the town of Salamanca, 1/4 mile north of the hamlet of Shongo, 50 feet east of Broad Street arterial, 1/4 mile north of Breed Run Road:

A1—0 to 3 inches; dark brown (10YR 3/3) silt clay loam; weak fine granular structure; friable; many fine roots; less than 2 percent coarse fragments; strongly acid; clear smooth boundary.

B21t—3 to 11 inches; grayish brown (10YR 5/2) silty clay; gray (10YR 6/1) ped faces; many medium yellowish red (5YR 5/8) mottles; weak coarse prismatic structure parting to weak coarse subangular blocky; firm; thin patchy clay flows on prisms and ped faces; common roots; less than 2 percent coarse fragments; strongly acid; clear smooth boundary.

B22t—11 to 17 inches; gray (10YR 5/1) silty clay; gray (10YR 6/1) ped faces; many medium distinct

yellowish red (5YR 5/8) mottles; weak very coarse prismatic structure; firm; thin clay flows on prisms; few roots along prism faces; less than 2 percent coarse fragments; strongly acid; clear smooth boundary.

B3—17 to 28 inches; strong brown (7.5YR 5/8) silty clay loam; many medium distinct grayish brown (10YR 5/2) mottles; gray (10YR 6/1) ped faces; weak coarse subangular blocky structure; firm; less than 2 percent coarse fragments; strongly acid; clear smooth boundary.

C1—28 to 37 inches; strong brown (7.5YR 5/8) silty clay loam; many medium distinct gray (10YR 6/1) and dark yellowish brown (10YR 4/4) mottles; massive; firm; less than 2 percent coarse fragments; strongly acid; diffuse boundary.

C2—37 to 47 inches; dark yellowish brown (10YR 4/4) silty clay loam; many medium distinct strong brown (7.5YR 5/8) and gray (10YR 6/1) mottles; massive; firm; less than 2 percent coarse fragments; strongly acid; clear wavy boundary.

IIC3—47 to 60 inches; dark yellowish brown (10YR 4/4) loam; common medium distinct light brownish gray (10YR 6/2) mottles; friable; massive; 10 percent coarse fragments; strongly acid.

The solum thickness ranges from 28 to 50 inches. The depth to bedrock is more than 5 feet. The depth to contrasting material is greater than 40 inches. The content of coarse fragments is less than 2 percent to a depth of 40 inches and 5 to 15 percent in some areas at a depth of more than 40 inches. Reaction is very strongly acid or strongly acid throughout in unlimed areas.

The A horizon has hue of 10YR, value of 3 or 4, and chroma of 2 to 4. It is silt loam or silty clay loam.

The Bt horizon has hue of 10YR to 2.5Y, value of 4 or 5, and chroma of 1 or 2. The B3 horizon has hue of 7.5YR, value of 4 or 5, and chroma of 4 to 8. The B horizon is silty clay loam, clay loam, silty clay, or clay. Structure is moderate, medium or coarse subangular blocky or weak or moderate, medium or coarse prismatic.

The C horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 1 to 8. It mainly is silty clay loam, silty clay, or clay. Loam is at a depth of more than 40 inches in many pedons. The material is massive and firm.

The Caneadea soils in this survey area are a taxadjunct because of the reaction of the soil, the thickness of the solum, the color of the B3 and C horizons, and the texture of the C horizon. These differences do not affect use and management.

Castile Series

The Castile series consists of deep, moderately well drained soils that formed in glacial outwash deposits that have a high content of sand and gravel. The Castile soils are on terraces, outwash plains, and remnant deltas. Slope ranges from 0 to 3 percent.

Castile soils formed in the same kind of material as did the better drained Chenango soils. The Castile soils are associated with and are better drained than the Red Hook and Halsey soils.

Pedon of Castile gravelly loam, 3 to 8 percent slopes, in the town of Concord, 75 feet east of the B&O Railroad crossing and 660 feet south of Genesee Road (representative of the Castile series in this survey area):

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) gravelly loam, light brownish gray (10YR 6/2) dry; moderate medium granular structure; very friable; many fine and very fine roots; 25 percent coarse fragments; medium acid; abrupt smooth boundary.

B21—8 to 19 inches; dark brown (10YR 4/3) gravelly loam; moderate medium subangular blocky structure; friable; common fine and few medium roots; 25 percent coarse fragments; medium acid; clear wavy boundary.

IIB22—19 to 31 inches; dark yellowish brown (10YR 4/4) very gravelly loam; few medium distinct light brownish gray (2.5Y 6/2) mottles; weak medium subangular blocky structure; very friable; common very fine roots; common coarse silt nodules with few coarse distinct strong brown (7.5YR 5/6) mottles; 55 percent coarse fragments; medium acid; gradual wavy boundary.

IIC—31 to 65 inches; brown (10YR 5/3) very gravelly sandy loam; single grain; loose; few fine roots; weakly stratified; 70 percent coarse fragments, 5 to 10 percent of which are more than 3 inches in diameter; slightly acid.

The solum thickness ranges from 24 to 40 inches. The depth to bedrock is more than 5 feet. The coarse fragments are mainly gravel, cobblestones, channery fragments, and flagstones. They make up 15 to 35 percent, by volume, of the A horizon, 20 to 60 percent of the B horizon, and 35 to 70 percent of the C horizon.

The Ap horizon has hue of 10YR or 2.5Y, value of 3 to 5, and chroma of 2 or 3. It is gravelly loam or gravelly silt loam. Structure is weak or moderate granular. Reaction ranges from very strongly acid to medium acid.

The B2 horizon has hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 3 or 4. Mottles with chroma of 2 or less are at a depth of 15 to 24 inches. The B2 horizon ranges from gravelly silt loam to very gravelly sandy loam. Structure is granular or subangular blocky. Consistency is very friable or friable. A B3 horizon is in some pedons. Reaction in the B horizon ranges from very strongly acid to medium acid.

The C horizon ranges from very gravelly loam to very gravelly sand. In some pedons the C horizon is stratified. Reaction is strongly acid to neutral.

Chenango Series

The Chenango series consists of deep, well drained to somewhat excessively drained soils that formed in water-sorted deposits on outwash plains and associated moraines, terraces, deltas, remnant beaches, and alluvial fans. Slope ranges fom 0 to 40 percent.

Chenango soils are in a drainage sequence with moderately well drained Castile soils and somewhat poorly drained Red Hook soils and formed in similar kinds of material. Chenango soils are also associated with Allard, Alton, and Valois soils. The Chenango soils do not have the thick, silty mantle typical of the Allard soils, are more acid than the Alton soils, and have a well-sorted gravelly substratum in contrast to the random sorting in the substratum of Valois soils.

Typical pedon of Chenango gravelly loam, 3 to 8 percent slopes, in a field in the town of Concord, 1 mile south of State Route 39 and 1/2 mile west of Hoffman Road:

Ap—0 to 8 inches; dark brown (10YR 3/3) gravelly loam, very pale brown (10YR 7/3) crushed and dry; weak to moderate fine granular structure; very friable; many fine roots; 30 percent coarse fragments; strongly acid; abrupt smooth boundary.

B21—8 to 13 inches; yellowish brown (10YR 5/4) gravelly loam; weak medium subangular blocky and moderate fine granular structure; very friable; common fine roots; common medium pores; 34 percent coarse fragments; strongly acid; clear wavy boundary.

B22—13 to 22 inches; dark brown (10YR 4/3) very gravelly loam; weak fine and medium subangular blocky structure; friable; common fine roots; common medium pores; 40 percent coarse fragments; strongly acid; gradual wavy boundary.

B23—22 to 30 inches; dark brown (10YR 4/3) very gravelly loam; weak medium subangular blocky structure; friable; few fine roots; common fine pores; 50 percent coarse fragments; strongly acid; gradual wavy boundary.

IIC—30 to 60 inches; dark brown (10YR 4/3) and light brownish gray (10YR 6/2) very gravelly loamy sand; single grain; friable; firm in place; 60 percent coarse fragments, mainly gravel and some cobblestones; strongly acid.

The solum thickness ranges from 24 to 36 inches. Bedrock is at a depth of 5 feet or more. Coarse fragments are mainly gravel, but some are cobblestones, channery fragments, and flagstones. The volume of coarse fragments ranges from 15 to 30 percent in the A horizon, from 20 to 60 percent in the B horizon, and from 30 to 70 percent in the C horizon.

The Ap horizon has hue of 10YR or 2.5Y, value of 3 to 5, and chroma of 2 or 3. It is loam, silt loam, or sandy loam or their gravelly or channery analogs. Reaction in unlimed areas is strongly acid or very strongly acid.

The B horizon has hue of 2.5Y to 7.5YR, value of 4 or 5, and chroma of 3 to 6. Chroma above 4 is in only the uppermost part of the B horizon in some pedons.

The B horizon mainly is fine sandy loam, loam, or silt loam or their gravelly, channery, very gravelly, or very channery analogs. In some pedons the upper part of the B horizon is sandy loam. The B horizon has very weak or weak subangular blocky or very weak granular structure. Consistence is very friable to firm. Reaction is very strongly acid to medium acid.

The C horizon is stratified sand and gravel. The fine-earth fraction ranges from coarse sand to loamy fine sand. This horizon becomes less acid as depth increases, but reaction is strongly acid to a depth of at least 40 inches. In some pedons it ranges to mildly alkaline below a depth of 40 inches.

Unit Ch is a taxadjunct to the Chenango series because the soil is less than 10 percent coarse fragments in the upper part of the B horizon. This difference does not affect use and management.

Chippewa Series

The Chippewa series consists of deep, poorly drained soils that formed in glacial till deposits dominated by siltstone, sandstone, and shale fragments. Slopes range from 0 to 3 percent.

Chippewa soils and Mardin and Volusia soils formed in the same kind of parent material. The Chippewa and Lyons soils are on similar landscape positions, but the Lyons soils do not have a fragipan.

Typical pedon of Chippewa silt loam, in the town of Concord, 0.7 mile east of NY Route 240 and 800 feet north of Genesee Road:

A1—0 to 7 inches; very dark gray (10YR 3/1) silt loam; weak medium granular structure; friable; many fine roots; 5 percent coarse fragments; slightly acid; abrupt smooth boundary.

A2g—7 to 13 inches; grayish brown (2.5Y 5/2) silt loam; common fine and medium distinct yellowish brown (10YR 5/4) mottles; weak medium subangular blocky structure; friable; common fine roots; few fine pores; 10 percent coarse fragments; slightly acid; clear wavy boundary.

Bxg—13 to 36 inches; dark grayish brown (2.5Y 4/2) channery silt loam; common medium distinct yellowish brown (10YR 5/4) mottles; moderate prisms 5 to 15 inches in diameter that become weaker and larger with depth; 1/2 to 1 1/2-inch wide gray (10YR 5/1, 6/1) streaks with thin brown (7.5YR 5/4) borders surround prisms; weak medium and coarse subangular blocky structure within prisms; firm; brittle; few roots in upper part; common fine pores lined with grayish brown (2.5Y 5/2) clay

films; few clay coats on ped faces in lower part; 20 percent coarse fragments, increasing in amount with depth; neutral; gradual wavy boundary.

Cg—36 to 60 inches; very dark grayish brown (2.5Y 3/2) channery silt loam; few fine and medium distinct yellowish brown (10YR 5/4) mottles; weak medium and thick platy structure; very firm; very few pores; 25 percent coarse fragments; weakly calcareous; mildly alkaline.

The solum thickness ranges from 36 to 56 inches. The depth to the fragipan ranges from 8 to 20 inches. The depth to bedrock is more than 5 feet. Coarse fragments make up 0 to 15 percent of the A horizon and 20 to 50 percent of the Bx and C horizons.

The A1 or Ap horizon has hue of 10YR or 2.5Y, value of 2 through 4, and chroma of 1 or 2. It is loam or silt loam. Reaction is very strongly acid to slightly acid.

The A2 horizon has hue of 10YR through 5Y, value of 4 through 6, and chroma of 0 through 2, and it is mottled. It is loam or silt loam. The A2 horizon has very weak to moderate, fine or medium, subangular blocky structure, or the material is massive. It is friable or firm. In some pedons the A2 horizon is partially or wholly replaced by a mottled Bg horizon with texture similar to that of the A2g horizon. Reaction is very strongly acid to slightly acid.

The Bx horizon mainly has hue of 10YR to 5Y, value of 3 to 6, and chroma of 1 or 2. In some pedons the subhorizons below a depth of 30 inches have chroma of 3 or 4. The Bx horizon ranges from silty clay loam to fine sandy loam or the channery or very channery analogs. It has moderate or strong prismatic structure parting to very weak to moderate subangular blocky, or the material within the prisms is massive. The horizon is firm or very firm and is brittle. Reaction is strongly acid to neutral.

The Cg horizon is similar to the Bx horizon in color and texture. The material is massive or has weak or moderate platy structure. It is firm or very firm. Reaction is medium acid to moderately alkaline.

Churchville Series

The Churchville series consists of deep, somewhat poorly drained soils that formed in thin deposits of fine-textured glacial lake sediments overlying glacial till. Slopes range from 0 to 8 percent.

Churchville soils are associated with Canadice, Niagara, and Rhinebeck soils. The Churchville soils have thinner deposits of clayey sediments than the Rhinebeck soils, are better drained than the Canadice soils, and have more clay in the subsoil than the Niagara soils.

Typical pedon of Churchville silt loam, 0 to 3 percent slopes, in the town of Clarence, 500 feet north of the junction of Connor and County Roads, northwest of the hamlet of Clarence Center:

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) silt loam, light brownish gray (10YR 6/2) dry; moderate fine and medium granular structure; slightly hard, friable; many fine roots; many pores; neutral; abrupt smooth boundary.

A2—9 to 11 inches; pinkish gray (7.5YR 6/2) silt loam; common fine faint gray (10YR 5/1) mottles and medium distinct strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; friable; many fine roots; many pores; slightly acid; clear smooth boundary.

B&A—11 to 15 inches; reddish brown (5YR 4/4) silty clay loam; moderate medium subangular blocky structure; firm; few fine roots; common fine pores; pinkish gray (7.5YR 6/2) silt loam interfingering between peds and occurring as thin horizontal lamellae comprising 12 percent of the cross section; pores inside peds have clay film linings; neutral; clear wavy boundary.

B2t—15 to 26 inches; reddish brown (5YR 4/3) silty clay; common medium distinct yellowish red (5YR 5/6) and light gray (10YR 6/1) mottles; moderate medium blocky structure; firm, sticky; few fine roots in upper part; common fine pores; dark reddish gray (5YR 4/2) ped faces; continuous clay films on vertical and horizontal ped faces and lining pores; mildly alkaline; clear smooth boundary.

IIC—26 to 60 inches; reddish gray (5YR 5/2) gravelly loam; few medium distinct brown (7.5YR 5/4) mottles; moderate thick platy structure; very firm; few fine pores; 25 percent coarse fragments; calcareous; moderately alkaline.

The solum thickness and depth to the IIC horizon range from 20 to 36 inches. The depth to bedrock is more than 60 inches. The volume of coarse fragments ranges from 0 to 5 percent in the A and B horizons and from 10 to 35 percent in the IIC horizon. Hue in the solum ranges from 5YR to 2.5Y. Dominant chroma of more than 2 are in some subhorizons between the Ap horizon and a depth of 30 inches.

The Ap horizon has moist value of 3 to 5, dry value of 6 or 7, and chroma of 2 or 3. It is silt loam or silty clay loam. Reaction is medium acid to neutral.

The A2 horizon has value of 4 to 6 and chroma of 2 to 4 and has common to many mottles of higher and lower chroma. It is silt loam or silty clay loam. Structure is weak or moderate blocky or platy. Consistence is friable or firm. Reaction ranges from medium acid to neutral.

The B&A horizon has ped coats similar in color and texture to the A2 horizon. Ped interiors have value of 4 or 5 and chroma of 2 to 4.

The B2t horizon has ped coats with chroma of 2 or less. Ped interiors of the B2t horizon have value of 4 or 5 and chroma of 3 or 4 and have mottles of higher and lower chroma that range from few to many and from faint to distinct. The horizon is clay loam, silty clay loam,

or silty clay. Structure is moderate to strong, medium to coarse blocky. Clay films range from patchy to continuous on horizontal and vertical ped faces. The B2t horizon is slightly acid to mildly alkaline.

The IIC horizon is loam, silt loam, or silty clay loam or their gravelly analogs. Mottles are few or common and faint or distinct. Consistence is firm or very firm. Reaction ranges from mildly alkaline to moderately alkaline.

Collamer Series

The Collamer series consists of deep, moderately well drained soils that formed in glacial lake sediments dominated by silt and very fine sand. The Collamer soils are on the lowland lake plain and in some areas are underlain by a glacial till substratum. Slopes range from 3 to 15 percent.

Collamer soils and Niagara and Canandaigua soils formed in the same kind of material. Collamer soils are associated with Raynham, Scio, Hudson, and Rhinebeck soils. The Collamer soils have a higher clay content and are better drained than the Raynham soils, are not so acid as the Scio soils, have a lower clay content than the Hudson soils, and are better drained and coarser textured than the Rhinebeck soils.

Typical pedon of Collamer silt loam, 3 to 8 percent slopes, in the town of Amherst, near Tonawanda Creek Road and 0.7 mile east of NY Route 270:

Ap—0 to 10 inches; dark grayish brown (10YR 4/2) silt loam; moderate medium granular structure; very friable; many fine roots; slightly acid; abrupt smooth boundary.

A2—10 to 12 inches; pale brown (10YR 6/3) silt loam; common medium distinct strong brown (7.5YR 5/6) mottles; weak thin platy structure; firm; many roots; many fine pores; slightly acid; clear wavy boundary.

B&A—12 to 15 inches; brown (7.5YR 4/4) silt loam (B); common fine distinct brown (7.5YR 5/4) mottles; weak fine and medium subangular blocky structure; firm; common fine roots; many fine pores; pale brown (10YR 6/3) silt loam (A) surrounding peds; clay films lining many pores; slightly acid; clear irregular boundary.

B21t—15 to 20 inches; brown (7.5YR 4/4) silt loam; common fine and medium distinct yellowish brown (10YR 5/6) mottles; weak fine and medium subangular blocky structure; firm; common fine roots; common fine pores; clay films lining most pores and along some ped faces; pale brown (10YR 6/3) material extending along some vertical ped faces; neutral; clear wavy boundary.

B22t—20 to 32 inches; dark yellowish brown (10YR 4/4) silty clay loam; common medium distinct strong brown (7.5YR 5/6) and pinkish gray (7.5YR 6/2) mottles; moderate medium subangular blocky structure; firm; few fine roots; few fine pores; clay films lining all pores and on many ped faces; neutral in upper part, mildly alkaline in lower part; clear wavy boundary.

C—32 to 60 inches; brown (7.5YR 5/2) silt loam; 25 percent varves of very fine sand and silty clay loam; common medium and coarse faint strong brown (7.5YR 5/6) mottles; moderate medium platy structure; firm; streaks of pinkish gray (7.5YR 7/2) lime segregated on some plate faces; weakly calcareous, mildly alkaline.

The thickness of the solum and the depth to carbonates range from 24 to 48 inches. These soils are typically free of coarse fragments, but a few stones or pebbles make up as much as 5 percent of some pedons. Bedrock is at a depth of more than 60 inches.

The Ap horizon has hue of 10YR or 7.5YR, value of 3 to 5 when moist, and chroma of 2 or 3. The A2 horizon has value of 5 or 6 and chroma of 3 or 4. Mottles are few to common. The A horizon ranges from fine sandy loam to silt loam. Reaction ranges from strongly acid to neutral.

In the B&A horizon the range in color and texture of the A part is similar to that of the A2 horizon, and the B part has the same range in color as the Bt horizon.

The Bt horizon has hue of 5YR to 2.5Y, value of 4 or 5, and chroma of 3 or 4. Mottles are few to common and faint to distinct. Mottles with chroma of 2 or less are in the upper 10 inches of the Bt horizon. The Bt horizon is silt loam or silty clay loam and has a clay content ranging from 18 to 35 percent. Reaction is medium acid to mildly alkaline.

The C horizon has hue of 2.5Y to 5YR, value of 4 or 5, and chroma of 2 to 4. It is stratified silt, very fine sand, and silty clay loam. Glacial till is at a depth of 3 1/2 to 5 feet in some pedons. The C horizon is slightly acid to moderately alkaline.

Colonie Series

The Colonie series consists of deep, well drained to somewhat excessively drained soils that formed in lake-laid or windblown deposits dominated by fine sand. The Colonie soils are on remnant beaches, sandbars, and deltas of glacial lakes and on dunelike landforms. Slopes range from 3 to 15 percent.

Colonie soils and Elnora soils formed in the same kind of parent material. Colonie soils are associated with Arkport, Galen, and Minoa soils. The Colonie soils do not have the thick, clay-enriched lamellae typical of the Arkport soils and are better drained than the Galen or Minoa soils.

Typical pedon of Colonie loamy fine sand, 3 to 8 percent slopes, in the town of Newstead, 1 mile west of Sand Hill:

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) loamy fine sand; weak fine granular structure; very friable; strongly acid; abrupt smooth boundary.
B21—7 to 13 inches; strong brown (7.5YR 5/6) loamy fine sand; very weak very fine granular structure; very friable; many fine roots; many pores; strongly acid; clear wavy boundary.
B22—13 to 28 inches; yellowish brown (10YR 5/4) loamy fine sand; very weak very fine granular structure; very friable; few common fine roots; common fine pores; strongly acid; gradual wavy boundary.
B23—28 to 60 inches; pale brown (10YR 6/3) fine sand; single grain; loose; brown (7.5YR 4/4) 1/2 inch bands of loamy fine sand and fine sandy loam that are 2 to 10 inches apart; massive; friable; medium acid; gradual smooth boundary.
C—60 to 70 inches; light brownish gray (10YR 6/2) fine sand; some thin strata of medium sand; loose; single grain; very friable; slightly acid.

The solum thickness ranges from 48 to 65 inches. Bedrock is at a depth of more than 60 inches. Coarse fragments are generally absent, but fine gravel makes up as much as 3 percent, by volume, of some horizons.

The Ap horizon has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 2 or 3. It is loamy fine sand or fine sand. Structure is weak or very weak granular. Reaction is strongly acid to slightly acid.

The B horizon has hue of 10YR to 5YR, value of 4 to 6, and chroma of 3 to 6. Chroma decreases as depth increases. The B horizon mainly is loamy fine sand or fine sand, but some pedons contain thin subhorizons of very fine sand. The material is single grain or has very weak fine granular structure, and it is very friable or loose. Reaction is strongly acid to slightly acid. Below a depth of 24 inches, the soil contains lamellae 1/16 inch to 3 inches thick that are friable to firm; these bands total less than 6 inches in thickness. Some of these lamellae have slightly more clay than the horizon above or below. The lamellae have hue of 7.5YR or 5YR, value of 3 to 5, and chroma of 3 or 4.

The C horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 2 to 4. It mainly is loamy fine sand or fine sand. The C horizon is mottled in some places below a depth of 45 inches. Contrasting layers of silt, clay, or gravel are at a depth of more than 48 inches in some pedons.

Cosad Series

The Cosad series consists of deep, somewhat poorly drained soils that formed in sandy sediments and the underlying clayey, lake-laid deposits. The Cosad soils are on glacial lake plains. Slopes range from 0 to 3 percent.

Cosad soils are near Colonie, Elnora, and Rhinebeck soils. The Cosad soils are not so well drained as the Colonie or Elnora soils and have a sandy surface mantle that is not typical of the Rhinebeck soils.

Typical pedon of Cosad loamy fine sand, in the town of Amherst, 0.2 mile south of Dodge Road and 100 feet east of Casey Road:

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) loamy fine sand; moderate fine granular structure; very friable; many fine and medium roots; slightly acid; abrupt smooth boundary.
B21—9 to 21 inches; yellowish brown (10YR 5/4) loamy fine sand; common coarse distinct strong brown (7.5YR 5/6) mottles and few fine distinct light brownish gray (10YR 6/2) mottles; very weak coarse subangular blocky structure; very friable; common roots; slightly acid; clear wavy boundary.
B22—21 to 24 inches; brown (7.5YR 5/4) fine sandy loam; many medium distinct strong brown (7.5YR 5/8) mottles and common medium distinct light grayish brown (10YR 6/2) mottles; weak coarse subangular blocky structure; friable; common fine roots; neutral; abrupt wavy boundary.
IIB3—24 to 32 inches; brown (7.5YR 5/4) silty clay; common fine distinct light gray (7.5YR 6/0) mottles and strong brown (7.5YR 5/8) mottles; coarse prismatic structure parting to moderate coarse angular blocky; firm; few very fine roots; slightly effervescent; mildly alkaline; clear wavy boundary.
IIC1—32 to 60 inches; reddish brown (5YR 5/3) and brown (7.5YR 5/2) silty clay; massive; firm; plastic and sticky; strongly effervescent; moderately alkaline.

The thickness of the solum ranges from 18 to 36 inches. The sandy mantle that overlies the clayey deposits is 18 to 40 inches thick. The depth to bedrock is more than 60 inches.

The Ap or A1 horizon has hue of 10YR or 2.5Y or is neutral, has value of 2 or 3, and has chroma of 0 to 2. It is loamy fine sand, fine sand, or sand. The A horizon has weak or moderate granular structure and very friable or friable consistence. Reaction ranges from strongly acid to slightly acid.

The B2 horizon has hue of 5YR to 2.5Y, value of 4 to 6, and chroma of 2 to 4. It has few to common mottles of higher and lower chroma; the mottles at a depth of less than 18 inches have chroma of 2 or less. The horizon mainly is loamy fine sand or coarser; however, thin subhorizons of very fine sand, loamy very fine sand, or fine sandy loam are in some pedons. Reaction ranges from strongly acid to neutral.

The IIC and IIB3 horizons have hue of 2.5YR to 5GY, value of 3 to 6, and chroma of 1 to 4. They range from silty clay loam to clay. The IIC horizon is massive or varved; the IIB3 horizon has blocky or prismatic structure. Below a depth of 40 inches, thin laminae of silt

and very fine sand are in some pedons. Reaction ranges from neutral to moderately alkaline.

The Cosad soils in this survey area are a taxadjunct to the Cosad series because of soil structural development in the upper part of the underlying clayey deposits and because of the fine sandy loam in the lower part of the B2 horizon. These differences do not affect the use and management of the soils.

Derb Series

The Derb series consists of deep, somewhat poorly drained soils that formed in glacial till deposits derived from soft shale and siltstone bedrock. The Derb soils are on glacial till plains and glaciated, dissected plateaus. Slopes range from 0 to 15 percent.

Derb soils are associated with Volusia and Orpark soils. The Derb soils do not have the fragipan typical of the Volusia soils and are deeper to shale bedrock than the Orpark soils. Derb soils are near Manlius soils, but they are deeper to bedrock and not so well drained.

Typical pedon of Derb silt loam, 3 to 8 percent slopes, in the town of Eden, 1,000 feet east of NY Route 75 and 150 feet south of Hardt Road:

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) silt loam; moderate medium granular structure; friable; many fine roots; less than 5 percent fine shale fragments; strongly acid; abrupt smooth boundary.

B21—6 to 14 inches; brown (10YR 5/3) silt loam; many (30 percent) medium prominent strong brown (7.5YR 5/6) mottles; moderate medium subangular structure; friable; common roots; light brownish gray (2.5Y 6/2) ped faces; 5 percent fine shale fragments; strongly acid; clear wavy boundary.

B22—14 to 24 inches; brown (10YR 5/3) silty clay loam; many (30 percent) medium prominent strong brown (7.5YR 5/8) mottles; moderate coarse prismatic structure parting to moderate medium angular blocky; firm; few roots; olive gray (5Y 5/2) ped faces; 5 percent weathered shale fragments; very strongly acid; clear wavy boundary.

B3—24 to 38 inches; olive (5Y 5/4) silty clay loam; many medium distinct yellowish brown (10YR 5/8) mottles; moderate coarse prismatic structure parting to moderate thin and medium platy; firm; few roots; light olive gray (5Y 6/2) ped faces; 5 percent shale fragments; very strongly acid; clear smooth boundary.

C—38 to 60 inches; olive (5Y 5/4) silty clay loam; common medium distinct light gray (2.5Y 7/1) and yellowish brown (10YR 5/8) mottles; weak medium platy structure; firm; 10 percent shale fragments; strongly acid.

The solum thickness ranges from 24 to 40 inches. The depth to shale bedrock is more than 40 inches. In many places soft shale bedrock is between depths of 40 and 60 inches. Coarse fragments make up 0 to 10 percent of the A and B horizons and 5 to 20 percent of the C horizon. Reaction in unlimed areas ranges from very strongly acid to strongly acid throughout the soil.

The Ap horizon has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 2 or 3. It is silt loam or silty clay loam. Consistence is very friable or friable.

The B2 horizon has hue of 10YR to 5Y, value of 4 to 6, and chroma of 2 to 4. Faces of peds dominantly have chroma of 2 or less. The horizon is silt loam or silty clay loam in the fine-earth fraction. It has prismatic or blocky structure and friable or firm consistence.

The B3 horizon has the same color and texture range as the B2 horizon. Structure is prismatic or platy.

The C horizon has the same hue and value as the B horizon, but chroma is 1 to 4. The horizon is silt loam or silty clay loam or their shaly analogs. The material is massive, or it has weak or moderate platy structure.

Elnora Series

The Elnora series consists of deep, moderately well drained soils that formed in lacustrine or windblown deposits of fine sand. These soils are on remnant sandbars and beaches on the lowland lake plain. Slopes range from 0 to 8 percent.

Elnora soils formed in the same kind of parent material as better drained Colonie soils. Elnora soils are associated with well drained Arkport soils, moderately well drained Galen soils, and somewhat poorly drained Minoa soils. The Elnora soils do not have the clay bands in the subsoil that are typical of the Arkport soils and Galen soils, and they are better drained than the Minoa soils.

Typical pedon of Elnora loamy fine sand, 3 to 8 percent slopes, in the town of Amherst, 1.5 miles northwest of the junction of Klein and Transit Roads:

Ap—0 to 4 inches; very dark grayish brown (10YR 3/2) loamy fine sand; weak fine and very fine granular structure; very friable; common fine and medium roots; very strongly acid; abrupt smooth boundary.

B21—4 to 10 inches; strong brown (7.5YR 5/8) loamy fine sand; weak very fine granular structure; very friable; few fine and medium roots; many pores; very strongly acid; clear wavy boundary.

B22—10 to 17 inches; yellowish brown (10YR 5/6) loamy fine sand; weak fine granular structure; very friable; few medium roots; common pores; strongly acid; clear wavy boundary.

B23—17 to 24 inches; yellowish brown (10YR 5/4) loamy fine sand; few medium faint dark yellowish brown (10YR 4/4) mottles; very weak fine subangular blocky structure; friable; few fine pores; strongly acid; clear wavy boundary.

C1—24 to 42 inches; pale brown (10YR 6/3) fine sand; common medium and coarse faint strong brown

(7.5YR 5/6) mottles and few medium faint light gray (10YR 7/2) mottles; structureless; single grain; very friable; few fine pores; medium acid; gradual boundary.

C2—42 to 60 inches; grayish brown (10YR 5/2) fine sand; common medium distinct strong brown (7.5YR 5/6) mottles; structureless; single grain; loose; slightly acid.

The depth to texturally contrasting material or bedrock is more than 5 feet. Coarse fragments commonly are absent, but some pedons have subhorizons as much as 12 inches thick that contain up to 15 percent pebbles.

The Ap or A1 horizon has hue of 10YR or 2.5Y, value of 3 to 5, and chroma of 2 or 3. The A horizon dominantly is loamy fine sand but ranges to very fine sandy loam in some pedons. Reaction ranges from very strongly acid to slightly acid.

The B horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 8. It is loamy fine sand or fine sand. Structure is very weak to weak, granular, subangular blocky, or platy. Consistence is very friable or friable. Reaction ranges from very strongly acid to slightly acid.

The C horizon has hue of 7.5YR to 2.5Y, value of 3 to 6, and chroma of 1 to 4. It is loamy fine sand or fine sand. It is massive or single grain, or it has weak platy structure. Reaction ranges from strongly acid to neutral.

Ernest Variant

The Ernest Variant consists of deep, moderately well drained soils that formed in silt-mantled colluvial deposits derived mainly from shale and siltstone. Slopes range from 3 to 25 percent.

Ernest Variant soils formed in the same kind of parent material as did the associated, somewhat poorly drained Brinkerton Variant soils. The other associated soils are Rayne, Gilpin, and Caneadea soils. The Ernest Variant soils are not so well drained as the Rayne soils, are deeper to bedrock than the Gilpin soils, and have a lower clay content than the Caneadea soils.

Typical pedon of Ernest Variant silt loam, 8 to 15 percent slopes, in the town of Great Valley, 2 miles east of Killbuck, near Thorpe Hollow Road, and 100 feet east of N.Y Route 17:

A1—0 to 2 inches; very dark grayish brown (10YR 3/2) silt loam; moderate fine granular structure; friable; less than 2 percent coarse fragments; many roots; very strongly acid; abrupt smooth boundary.

B1—2 to 10 inches; brown (10YR 5/3) silt loam; weak medium subangular blocky structure; friable; less than 2 percent coarse fragments; common roots; strongly acid; clear wavy boundary.

B21—10 to 20 inches; yellowish brown (10YR 5/4) silt loam; moderate fine and medium subangular blocky structure; friable; less than 2 percent coarse fragments; common roots; strongly acid; clear wavy boundary.

IIB22t—20 to 28 inches; yellowish brown (10YR 5/4) silty clay loam; common medium faint mottles and distinct yellowish brown (10YR 5/6) and light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; firm; thin patchy clay films on ped faces; 10 percent coarse fragments; many black manganese concretions; few roots; strongly acid; clear wavy boundary.

IIB3—28 to 46 inches; grayish brown (10YR 5/2) shaly clay loam; common medium distinct yellowish brown (10YR 5/6) mottles; moderate coarse prismatic structure; firm; 15 percent coarse fragments; strongly acid.

IIC—46 to 60 inches; grayish brown (10YR 5/2) shaly silty clay loam; massive; firm; 15 percent coarse fragments; medium acid.

The solum thickness ranges from 30 to 60 inches. The depth to bedrock is 60 inches or more. The thickness of the silty mantle ranges from 18 to 36 inches. Coarse fragments make up from 0 to 5 percent of the A horizon and the upper part of the B horizon and from 5 to 25 percent of the lower part of the B horizon and the C horizon.

The A horizon has hue of 10YR, value of 3 to 4, and chroma of 2 to 4. It is silt loam or silty clay loam. It has weak or moderate, fine or medium granular structure. Reaction in unlimed areas ranges from very strongly acid to strongly acid.

The B horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6. It is silt loam or silty clay loam. It has weak or moderate, fine or medium subangular blocky structure. Consistence is very friable or friable. Reaction is very strongly acid or strongly acid.

The IIB horizon has hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 2 to 6. It ranges from loam to silty clay loam in the fine-earth fraction. It has weak or moderate, fine to coarse subangular blocky or prismatic structure. Reaction is very strongly acid or strongly acid.

The IIC horizon has the same hue, value, chroma, and texture as the IIB horizon. Reaction ranges from very strongly acid to medium acid.

Farnham Series

The Farnham series consists of deep, moderately well drained soils that formed in water-sorted deposits dominated by rounded shale fragments. The soils are on stream terraces, outwash plains, and glacial lake beaches. Slopes range from 3 to 8 percent.

Farnham soils formed in the same kind of parent material as well drained Blasdell soils. Farnham soils are associated with Unadilla and Allard soils on lower terraces and Middlebury and Tioga soils on flood plains, but they have a higher shale fragment content than

those soils. Farnham soils are associated with Marilla and Manlius soils near glacial till uplands but do not have the fragipan typical of the Marilla soils and are deeper to bedrock than the Manlius soils.

Pedon of Farnham shaly silt loam, 0 to 3 percent slopes, in the town of Hamburg, 0.7 mile east-northeast of the intersection of U.S. Route 20 and Lakeview Road, and 100 feet west of a landfill (representative of the Farnham series in this survey area):

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) shaly silt loam; moderate fine granular structure; very friable; many fine roots; 25 percent coarse fragments; strongly acid; abrupt smooth boundary.

B21—7 to 14 inches; dark brown (7.5YR 4/4) shaly silt loam; weak fine subangular blocky structure; very friable; many fine roots; 35 percent coarse fragments; very strongly acid; clear wavy boundary.

B22—14 to 21 inches; dark brown (10YR 4/3) very shaly loam; weak fine subangular blocky structure; very friable; many fine roots; 50 percent coarse fragments; strongly acid; diffuse wavy boundary.

B23—21 to 38 inches; dark brown (10YR 4/3) very shaly loam; few fine faint grayish brown (10YR 5/2) mottles; weak fine subangular blocky structure; very friable; 55 percent coarse fragments; strongly acid; diffuse wavy boundary.

C—38 to 60 inches; grayish brown (10YR 5/2) very shaly loam; common medium distinct yellowish brown (10YR 5/8) mottles; massive; friable; 60 percent coarse fragments; strongly acid to a depth of 40 inches, slightly acid below that depth.

The solum thickness ranges from 24 to 48 inches. The depth to bedrock is more than 60 inches. Coarse fragments dominantly of shale make up, by volume, 15 to 35 percent of the A horizon, 15 to 60 percent of the B horizon, and 45 to 70 percent of the C horizon. The texture of the fine-earth fraction throughout the soil ranges from loam to silt loam.

The Ap horizon has hue of 10YR or 2.5Y and value of 3 or 4. Structure ranges from weak or moderate fine granular to weak or moderate medium subangular blocky. Consistence is friable or very friable. Reaction in unlimed areas ranges from very strongly acid to medium acid.

The B horizon has hue of 7.5YR to 5Y, value of 4 or 5, and chroma of 3 to 6. Mottles are in the lower part. Structure ranges from very weak through moderate, fine or medium subangular blocky. Consistence is very friable to firm. Reaction ranges from very strongly acid to medium acid.

The C horizon has hue of 10YR to 5Y, value of 3 to 5, and chroma of 2 to 4. Consistence is friable or firm. Reaction ranges from strongly acid to slightly acid to a depth of less than 80 inches.

Fluvaquents

Fluvaquents consist of moderately deep and deep, somewhat poorly drained and poorly drained soils that formed in recent alluvial deposits. The soils are adjacent to streams and are subject to frequent flooding. Slopes range from 0 to 3 percent but are mostly less than 2 percent.

Fluvaquents are in an undifferentiated group with Udifluvents and commonly are near Tioga, Middlebury, and Wayland soils. Fluvaquents are in the part of the flood plain where the adjacent stream, through scouring, cutting, and lateral erosion, commonly shifts the soil deposits from place to place.

Because of the variability of Fluvaquents, a typical pedon is not provided. These soils have little or no soil profile development. The solum consists of the surface layer, which is 1 to 10 inches thick. The depth to bedrock is mainly 20 inches to 60 inches or more. Coarse fragments, mainly gravel, shale, cobblestones, and flagstones, make up 0 to 60 percent of the soil, by volume. The soils are very strongly acid to mildly alkaline. The organic matter content decreases irregularly with depth.

The surface layer has hue of 5YR to 2.5Y or is neutral; it has value of 2 to 5 and chroma of 0 or 2. The texture is quite variable, ranging from sandy loam to silty clay loam and their shaly, gravelly, cobbly, or very gravelly analogs.

The substratum has hue of 5YR to 2.5Y or is neutral, value of 3 to 6, and chroma of 0 to 5. Mottles are common. The texture mainly ranges from coarse sandy loam to silty clay loam and their gravelly, flaggy, cobbly, or very gravelly analogs. Some pedons have thin strata of sandy material. Consistence is friable or loose.

Fremont Series

The Fremont series consists of deep, somewhat poorly drained soils that formed in upland glacial till deposits derived from siltstone, sandstone, and shale. The soils are on side slopes of the upland plateau in the Oil Springs Reservation. Slopes range from 3 to 8 percent.

Fremont soils and moderately well drained Schuyler soils formed in similar parent material. Fremont soils are associated with somewhat poorly drained Volusia soils and poorly drained Chippewa soils but do not have the fragipan in the subsoil that is typical of those soils.

Typical pedon of Fremont silt loam, 3 to 8 percent slopes, in the town of Lyndon, 200 yards east of Sabo Road and 60 feet south of Clark Road:

Ap—0 to 10 inches; dark grayish brown (10YR 4/2) silt loam; weak medium granular structure; very friable; many roots; 10 percent coarse fragments; strongly acid; abrupt smooth boundary.

B21—10 to 15 inches; brown (10YR 5/3) silt loam; common medium distinct gray (10YR 6/1) and strong brown (7.5YR 5/6) mottles; weak medium and coarse subangular blocky structure; friable; common roots; 10 percent coarse fragments; strongly acid; clear smooth boundary.

B22—15 to 21 inches; light brownish gray (2.5Y 6/2) channery silty clay loam; many coarse distinct strong brown (7.5YR 5/6) mottles and light brownish gray (10YR 6/2) ped coats; moderate coarse subangular blocky structure; firm; 20 percent coarse fragments; strongly acid; gradual smooth boundary.

B23—21 to 35 inches; yellowish brown (10YR 5/4) channery silty clay loam; common medium distinct light brownish gray (10YR 6/2) mottles and ped faces; moderate medium subangular blocky structure; 20 percent coarse fragments; strongly acid; clear smooth boundary.

C—35 to 60 inches; light olive brown (2.5Y 5/4) channery silty clay loam; common medium distinct light brownish gray (10YR 6/2) mottles; massive; firm; 20 percent coarse fragments; strongly acid.

The solum thickness ranges from 26 to 40 inches. The depth to bedrock is more than 60 inches. The content of coarse fragments ranges from 10 to 35 percent in the solum and from 20 to 60 percent in the substratum.

The Ap horizon has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 2 or 3. It is silt loam or silty clay loam. Reaction in unlimed areas is very strongly acid to medium acid.

The B horizon has hue of 10YR to 5Y, value of 4 to 6, and chroma of 2 to 4. It is silt loam or silty clay loam. Mottles are common to many, medium and coarse, and distinct. Structure is weak or moderate, fine to coarse subangular blocky. Consistence ranges from friable to firm. Reaction is very strongly acid to medium acid.

The hue, value, and chroma and texture of the C horizon are similar to those of the B horizon. Reaction of the C horizon is strongly acid to neutral.

Galen Series

The Galen series consists of deep, moderately well drained soils that formed in sandy deposits on deltas and beaches of former glacial lakes. Slopes range from 0 to 8 percent.

Galen soils and the well drained Arkport soils and somewhat poorly drained Minoa soils formed in the same kind of parent material. Galen soils are associated with Elnora, Cosad, and Scio soils. The Galen soils are not so sandy as the Elnora soils, do not have the clayey substratum typical of the Cosad soils, and are not so silty as the Scio soils.

Typical pedon of Galen very fine sandy loam, 0 to 3 percent slopes, in the town of Newstead, 300 feet west of NY Route 94, and 0.3 mile north of the intersection of Brucker Road and NY Route 93:

Ap—0 to 8 inches; dark brown (10YR 3/3) very fine sandy loam; moderate fine granular structure; very friable; nonsticky; common very fine roots; strongly acid; abrupt smooth boundary.

B21—8 to 13 inches; brownish yellow (10YR 6/6) fine sandy loam; common fine distinct strong brown (7.5YR 5/8) mottles; weak coarse subangular blocky structure parting to fine granular; very friable; nonsticky; few very fine roots; compact in place; medium acid; clear wavy boundary.

B22—13 to 24 inches; brown (10YR 5/3) loamy fine sand; few fine prominent strong brown (7.5YR 5/8) mottles and common medium distinct yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure parting to weak fine granular; very friable; nonsticky; compact in place; medium acid; clear irregular boundary.

A'2&B23t—24 to 36 inches; brown (10YR 5/3) loamy fine sand (A'2); dark yellowish brown (10YR 4/4) fine sandy loam (B23t) lamellae 1/8 to 3/4 inch thick, totaling 7 inches in thickness; common medium distinct yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; friable; nonsticky; leached root and worm channels 1 to 2 millimeters in diameter filled with light gray (10YR 7/2) loamy fine sand; distinct clay bridging in B part; medium acid; gradual wavy boundary.

C—36 to 60 inches; pale brown (10YR 6/3) fine sand; common medium faint yellowish brown (10YR 5/6) mottles and common medium faint light brownish gray (10YR 6/2) mottles; single grain; loose; thin strata of very fine sand; slightly acid.

The thickness of the solum ranges from 36 to 60 inches. The depth to carbonates is 48 to 84 inches in most pedons. The depth to bedrock is more than 5 feet. The content of coarse fragments of fine gravel is 0 to 3 percent, by volume.

The Ap horizon has hue of 10YR to 7.5YR, value of 3 to 5, and chroma of 2 or 3. It is mainly very fine sandy loam, but in some pedons it is fine sandy loam or loamy very fine sand. The horizon is friable or very friable and ranges in reaction from strongly acid to neutral.

The B2 horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 3 to 6. It ranges from fine sand to very fine sandy loam. It has weak granular or subangular blocky structure. Reaction is medium acid to neutral. Some pedons do not have a B2 horizon.

An A2 or A'2 horizon is in some pedons. The A'2 or A2 horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 3 or 4; mottles have chroma of more than 2. The horizon ranges from fine sand or loamy very fine sand to fine sandy loam. It is massive or has weak or moderate granular or subangular blocky structure. It is friable or very friable and is medium acid to neutral in reaction.

The A&B horizon ranges from weak coarse subangular blocky structure to massive. The B part consists of lamellae ranging from 6 to 15 inches in thickness. The lamellae have hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 3 or 4. The lamellae range from loamy fine sand to very fine sandy loam and are firm or friable. The A part has colors similar to those of the A2 horizon. The A part is loamy fine sand, loamy very fine sand, and fine sand. It is very friable or loose and is medium acid to neutral.

The C horizon is mainly stratified fine sand and very fine sand but has thin silty layers in some pedons. It ranges from medium acid to mildly alkaline. In some areas the A&B horizon rests directly on a IIC horizon consisting of loamy glacial till.

Gilpin Series

The Gilpin series consists of moderately deep, well drained soils that formed in weathered interbedded shale, siltstone, and sandstone. The soils are on hilltops and side slopes where the topography is influenced by the underlying bedrock. Slope ranges from 3 to 65 percent.

Gilpin soils are associated with Rayne, Wharton, and Ernest Variant soils. The Gilpin soils are better drained than the Wharton or Ernest Variant soils and are shallower to bedrock than the Rayne soils.

Typical pedon of Gilpin shaly silt loam, 15 to 25 percent slopes, in the town of Allegany, 1.4 miles south of County Route 60, and 240 feet east of Two Mile Road:

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) shaly silt loam; weak medium granular structure; very friable; 20 percent coarse fragments; strongly acid; abrupt smooth boundary.

B1—8 to 12 inches; yellowish brown (10YR 5/6) shaly silt loam; moderate medium subangular blocky structure; friable; clay films in some pores; 20 percent coarse fragments; strongly acid; gradual smooth boundary.

B2t—12 to 21 inches; yellowish brown (10YR 5/6) shaly silt loam; moderate medium subangular blocky structure; friable; discontinuous clay films on ped faces and in pores; 20 percent coarse fragments; very strongly acid; gradual smooth boundary.

B3—21 to 26 inches; yellowish brown (10YR 5/4) shaly silt loam; weak medium subangular blocky structure; friable; 30 percent coarse fragments; very strongly acid; abrupt smooth boundary.

R—26 inches; siltstone and shale bedrock.

The solum thickness ranges from 18 to 36 inches. Rippable bedrock is at a depth of 20 to 40 inches. The content of coarse fragments, mainly shale, ranges from 15 to 35 percent in the surface layer and 10 to 50 percent in the subsoil. Some pedons have a C horizon that is 30 to 50 percent coarse fragments. Reaction is very strongly acid or strongly acid throughout the soil.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 2 to 4. It is silt loam or loam or their shaly analogs.

The B horizon has hue of 7.5YR to 2.5Y, value of 5, and chroma of 4 to 8. It is silt loam, loam, or silty clay loam or their shaly or very shaly analogs. Structure is weak or moderate, fine or medium subangular blocky.

Some pedons have a C horizon with hue of 7.5YR to 2.5Y, value of 5, and chroma of 4 to 8. It is silt loam or silty clay loam or their shaly or very shaly analogs. Consistence is friable or firm. The material is massive or has platy structure.

Halsey Series

The Halsey series consists of deep, very poorly drained soils that formed in glacial outwash deposits containing shale and sandstone gravel. The Halsey soils are in depressions and along seepage areas of glacial outwash plains and valley terraces. Slopes range from 0 to 3 percent.

Halsey soils are in a drainage sequence with somewhat poorly drained Red Hook soils and are associated with Chenango, Castile, Farnham, Blasdell, and Wayland soils. The Halsey soils are wetter and have a lower coarse-fragment content than the Chenango or Castile soils, are wetter than and do not have the high shale content of the Farnham or Blasdell soils, and do not have the high silt content of the Wayland soils.

Typical pedon of Halsey silt loam, in the town of Concord, 1/2 mile east of the intersection of NY Route 240 and Foot Road, east of the main entrance to Sprague Brook Park and north of Foot Road:

A1—0 to 8 inches; black (10YR 2/1) silt loam, gray (10YR 5/1) dry; moderate fine granular structure; very friable; slightly sticky; many fine roots; 5 percent coarse fragments; slightly acid; clear wavy boundary.

IIB2g—8 to 20 inches; grayish brown (2.5Y 5/2) gravelly silt loam; common medium distinct gray (5Y 5/1) and light olive brown (2.5Y 5/4) mottles; weak medium and coarse subangular blocky structure; friable; nonsticky; few fine roots; 20 percent coarse fragments; medium acid; clear smooth boundary.

IIIB3g—20 to 25 inches; gray (10YR 5/1) very gravelly sandy loam; common medium distinct light olive brown (2.5Y 5/4) mottles; weak medium subangular blocky structure; friable; 35 percent coarse fragments; slightly acid; abrupt wavy boundary.

IIIC—25 to 60 inches; gray (10YR 5/1) stratified gravel and sand; single grain; loose, nonsticky; 60 percent coarse fragments; neutral.

The solum is 20 to 34 inches thick, and the depth to carbonates ranges from 36 to 60 inches. The depth to

bedrock is more than 5 feet. The content of coarse fragments, by volume, ranges from 5 to 35 percent in the A and B horizons and from 10 to 60 percent in the C horizon.

The A1 or Ap horizon has hue of 10YR or 2.5Y, value of 2 or 3, and chroma of 0 to 2. The fine-earth fraction is mainly silt loam but includes loam or sandy loam. Structure is weak or moderate fine granular or very weak fine subangular blocky. Reaction ranges from medium acid to neutral. An A2 horizon is in some pedons.

The B horizon has hue of 10YR to 5Y, value of 5 or 6, and chroma of 1 or 2. It has medium or coarse, distinct or prominent mottles. The horizon is mainly loam, silt loam, or fine sandy loam or their gravelly analogs. The B3 horizon commonly ranges to sandy loam in the fine-earth fraction. Structure is moderate or weak medium platy or weak subangular blocky, and consistence is friable or firm. Reaction is medium acid to neutral.

The C horizon has hue of 10YR to 5Y, value of 5 or 6, and chroma of 0 to 2. Distinct mottles are in some pedons. The horizon consists of stratified gravel and sand or stratified sand and sandy loam. It is loose to firm. Reaction is slightly acid to moderately alkaline.

Haplaquolls

Haplaquolls consist of deep, very poorly drained mineral soils that have a dark surface layer that is high in organic matter content. These soils are ponded throughout much of the year and are commonly called freshwater marsh. Haplaquolls formed in lacustrine, outwash, glacial till, or alluvial deposits. The soils are in low areas or depressions, commonly adjacent to natural or manmade lakes, ponds, and other bodies of water. Slopes range from 0 to 1 percent.

In some areas Haplaquolls are adjacent to Palms muck, which formed in moderately deep deposits of organic material overlying loamy mineral soil deposits. Haplaquolls are commonly near Lyons, Canandaigua, Wayland, Lamson, and Halsey soils, all of which occupy slightly higher areas where ponding sometimes occurs for brief periods in early spring.

Because of the variability of Haplaquolls, a typical pedon is not given.

Haplaquolls have a solum that ranges mainly from 5 to 25 inches thick, and bedrock is at a depth of more than 5 feet. The coarse fragment content ranges from 0 to 50 percent, by volume. The soils are medium acid to neutral in the solum and commonly range to mildly alkaline in the lower part of the substratum.

The surface layer in places is well decomposed or moderately well decomposed organic deposits mixed with some mineral soil material. It has hue of 10YR to 5Y or is neutral and has value of 2 or 3 and chroma of 0 to 2. It is 1 to 16 inches thick.

The surface layer in other areas has hue of 10YR to 5Y or is neutral and has value of 2 to 4 and chroma of 0 to 2. It ranges from mucky silt loam to loamy sand or their gravelly analogs. It is 1 to 25 inches thick.

The subsoil and substratum are neutral in color or have hue of 10YR to 5Y, value of 3 to 6, and chroma of 0 to 3. Mottles are common. The texture ranges from silty clay loam to loamy sand or their gravelly or very gravelly analogs. The subsoil is 1 to 10 inches thick. Some pedons do not have a subsoil.

Hudson Series

The Hudson series consists of deep, moderately well drained soils that formed in glacial lake sediments that have a high content of clay and silt. The Hudson soils are on lake plains and side slopes of dissected ridges and on valley sides. Slopes range from 3 to 8 percent and from 25 to 40 percent.

Hudson soils formed in the same kind of parent material as did Rhinebeck soils but are better drained than the Rhinebeck soils. Hudson soils are associated with Collamer and Chenango soils. The Hudson soils have more clay in the subsoil than the Collamer soils and do not have the high gravel content typical of the Chenango soils.

Pedon of Hudson silt loam, 8 to 15 percent slopes, in the town of Lancaster, 1 mile southwest of the village of Townline (representative of the Hudson series in this survey area):

Ap—0 to 8 inches; brown (10YR 5/3) silt loam; strong medium and coarse granular structure; friable; slightly acid; clear smooth boundary.

A2—8 to 14 inches; pale brown (10YR 6/3) silt loam; grayish brown (10YR 5/2) ped interiors with many threadlike pale brown (10YR 6/3) mottles; weak medium subangular blocky structure parting to very weak thin platy; friable; slightly acid; clear wavy boundary.

B&A—14 to 23 inches; dark grayish brown (10YR 4/2) silty clay; strong medium and coarse subangular blocky structure; firm, very plastic; pale brown (10YR 6/3) silt coats on ped faces in upper 4 inches and brown (10YR 5/3) clay films on ped faces in lower 5 inches; neutral; gradual wavy boundary.

B21t—23 to 29 inches; dark grayish brown (10YR 4/2) silty clay; few fine faint yellowish brown (10YR 5/4) mottles; moderate coarse and very coarse prismatic structure parting to strong coarse blocky; firm, very plastic; peds have thick brown (10YR 5/3) clay films; neutral; gradual wavy boundary.

C—29 to 60 inches; dark grayish brown (10YR 4/2) varved clay; few lenses of fine silt; firm; calcareous; moderately alkaline.

The thickness of the solum ranges from 24 to 40 inches, and the depth to carbonates is 24 to 50 inches. The content of coarse fragments ranges from 0 to 25

percent in the A horizon and from 0 to 10 percent in the B and C horizons. Bedrock is at a depth of more than 60 inches.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. It ranges from loam to silty clay loam. In some areas the surface is gravelly. The A2 horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 2 or 3. Its texture is similar to that of the Ap horizon, and some profiles have faint mottles. Some profiles do not have an A2 horizon. The A horizon ranges from strongly acid to neutral.

The Bt horizon has hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 2 to 4. It is silty clay loam or silty clay. The clay content in the upper 20 inches of the Bt horizon ranges from 35 to 55 percent. The horizon has medium to very coarse subangular blocky or blocky structure or coarse or very coarse prisms. Reaction ranges from medium acid to mildly alkaline.

The C horizon is similar in color to the B horizon, but the hue ranges from 5YR to 2.5Y. The C horizon ranges from silty clay or clay to silt loam. It is commonly stratified or varved with silt, giving the appearance of platy structure. Thin very fine sand varves are in some pedons. Reaction ranges from neutral to moderately alkaline.

Lamson Series

The Lamson series consists of deep, poorly drained and very poorly drained soils that formed in lake-laid deposits dominated by sand. Lamson soils are in depressions on glacial lake plains. Slopes range from 0 to 3 percent.

Lamson soils are associated with Arkport, Galen, Minoa, Colonie, Elnora, and Canandaigua soils. The Lamson soils are more poorly drained than the Arkport, Galen, or Minoa soils. The Lamson soils are not so well drained as the Colonie or Elnora soils, and they have a higher silt and clay content. They are more sandy than the Canandaigua soils.

Typical pedon of Lamson very fine sandy loam, in the town of Amherst, near Hopkins Road and 0.6 mile north of NY Route 263:

Ap—0 to 9 inches; very dark gray (10YR 3/1) very fine sandy loam, gray (10YR 5/1) dry; weak fine granular structure; very friable; many fine roots; slightly acid; abrupt smooth boundary.

A2g—9 to 14 inches; light gray (10YR 6/1) loamy very fine sand; few fine distinct brown (7.5YR 4/4) mottles; single grain; loose; common fine roots; neutral; clear wavy boundary.

B21g—14 to 24 inches; brown (7.5YR 4/2) fine sandy loam; many fine and medium distinct yellowish brown (10YR 5/6) and faint brown (7.5YR 4/4) mottles; weak coarse subangular blocky structure; friable; very few fine roots; neutral; clear wavy boundary.

B22g—24 to 40 inches; grayish brown (10YR 5/2) fine sandy loam; common medium distinct strong brown (7.5YR 5/6) mottles; varves of light gray (10YR 7/2) loamy fine sand and very fine sandy loam with few medium faint yellowish brown (10YR 5/4) mottles; weak medium and thick platy structure; friable; mildly alkaline; gradual smooth boundary.

C—40 to 60 inches; light brownish gray (10YR 6/2) loamy very fine sand; few fine faint brown (10YR 5/3) mottles; massive; very friable, compact in place; calcareous; moderately alkaline.

The thickness of the solum and depth to carbonates range from 30 to 50 inches. The depth to bedrock or to contrasting material is more than 60 inches. From the base of the Ap horizon to a depth of 40 inches, the average clay content is less than 18 percent. The gravel content ranges from 0 to 10 percent throughout.

The Ap horizon has hue of 10YR to 7.5YR, value mainly of 2 or 3, and chroma of 1 or 2. The dry value is 5 or less. The horizon is mainly very fine sandy loam or mucky very fine sandy loam, but some pedons have fine sandy loam or silt loam in the surface layer. Reaction ranges from medium acid to mildly alkaline.

The A2g horizon has hue of 2.5Y or 10YR, value of 5 or 6, and chroma of 1 or 2. It has few to common mottles. Structure ranges from weak coarse subangular blocky to weak medium granular to single grain. Consistence is loose, very friable, or friable. Some pedons do not have an A2g horizon.

The B2g horizon has hue of 2.5Y to 7.5YR, value of 4 to 6, and chroma mainly of 1 or 2. The chroma in places is more than 3 at a depth of more than 30 inches. The horizon is mainly fine sandy loam or very fine sandy loam. Consistence is friable or very friable. Reaction ranges from slightly acid to moderately alkaline. A B3 horizon is in some profiles.

The C horizon has hue of 5Y to 5YR, value of 4 to 6, and chroma of 2 or 3. It is not mottled in some profiles. The C horizon ranges mainly from fine sand to loamy very fine sand but has strata of silt loam in some profiles. The material is massive or single grain. Reaction ranges from slightly acid to moderately alkaline.

Lordstown Series

The Lordstown series consists of moderately deep, well drained soils that formed in glacial till deposits derived from siltstone and sandstone. Bedrock is at a depth of 20 to 40 inches. The Lordstown soils are in the Oil Springs Reservation on hillcrests and steep, uniformly sloping valley sides. Slopes range from 8 to 15 percent and from 35 to 65 percent.

Lordstown soils are near Schuyler, Mardin, and Fremont soils. The Lordstown soils are better drained and have less clay in the subsoil than the Schuyler or

Fremont soils and are better drained than and are not so deep to bedrock as the Mardin soils.

Typical pedon of Lordstown channery silt loam, 8 to 15 percent slopes, in the town of Cuba, southeast of Cuba Lake, 1/2 mile southeast of the junction of County Routes 50 and 59, on an old logging road:

A1—0 to 4 inches; dark grayish brown (10YR 4/2) channery silt loam; weak medium granular structure; very friable; common roots; 30 percent coarse fragments; strongly acid; abrupt smooth boundary.
B21—4 to 14 inches; yellowish brown (10YR 5/4) channery silt loam; weak medium subangular blocky structure; friable; 20 percent coarse fragments; common roots; strongly acid; gradual smooth boundary.
B22—14 to 29 inches; brown (10YR 5/3) channery silt loam; weak medium subangular blocky structure; friable; few roots; 25 percent coarse fragments; strongly acid; clear smooth boundary.
C—29 to 36 inches; brown (10YR 5/3) very channery silt loam; massive; friable; few roots; 45 percent coarse fragments; strongly acid; abrupt smooth boundary.
R—36 inches; siltstone bedrock.

The thickness of the solum ranges from 20 to 40 inches. Bedrock is at a depth of 20 to 40 inches. The coarse fragments are mainly flat angular fragments and flagstones. They make up 20 to 35 percent of the volume of the solum and up to 60 percent of the C horizon.

The A1 horizon has hue of 7.5YR to 2.5Y, value of 3 to 5, and chroma of 2 to 4. It is channery loam or channery silt loam. Reaction ranges from very strongly acid to slightly acid.

The B horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 6. It is loam, very fine sandy loam, or silt loam in the fine-earth fraction. Consistence is very friable or friable. Reaction is medium acid to very strongly acid.

The C horizon has hue of 7.5YR to 2.5Y, value of 3 to 6, and chroma of 2 to 4. It ranges from fine sandy loam to silt loam in the fine-earth fraction. This horizon is massive, or it has weak platy structure. Consistence is friable or firm.

The R horizon consists of massive, thick to thin beds of siltstone or sandstone interbedded with shale.

Lyons Series

The Lyons series consists of deep, poorly drained and very poorly drained soils that formed in glacial till deposits derived from limestone, calcareous shale, and sandstone. In places, local colluvium mantles the till deposits. The Lyons soils are on flats or in depressions on uplands. Slopes range from 0 to 3 percent.

Lyons soils are associated with Volusia, Derb, Halsey, and Canandaigua soils. The Lyons soils do not have the fragipan that is typical of the Volusia soils, are not so well drained or so acid as the Derb soils, are not so gravelly as the Halsey soils, and are not so silty as the Canandaigua soils.

Typical pedon of Lyons silt loam, in the town of Alden, 0.4 mile west of the Genesee County line and 40 feet south of NY Route 33:

Ap—0 to 9 inches; very dark brown (10YR 2/2) silt loam, gray (10YR 5/1) dry; moderate medium granular structure; very friable; slightly sticky; many fine and very fine roots; neutral; abrupt smooth boundary.
B21—9 to 15 inches; brown to dark brown (7.5YR 4/2) silt loam; common medium faint brown (7.5YR 5/4) and distinct strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; firm, slightly sticky; few very fine roots; common fine pores; brown (7.5YR 5/2) ped faces; neutral; gradual wavy boundary.
B3g—15 to 32 inches; grayish brown (10YR 5/2) silt loam; common medium distinct light gray to gray (2.5Y 6/0) mottles and few to common medium distinct yellowish brown (10YR 5/4) mottles; moderate coarse subangular blocky structure; very firm, slightly sticky; few very fine roots and pores; grayish brown (2.5Y 5/2) ped faces; 5 percent coarse fragments; mildly alkaline; gradual wavy boundary.
C1—32 to 45 inches; brown (7.5YR 5/2) silt loam; common medium prominent strong brown (7.5YR 5/6) and gray (5Y 5/1) mottles; massive; very firm, slightly sticky; 10 percent coarse fragments; strongly effervescent; moderately alkaline; abrupt wavy boundary.
IIC2—45 to 65 inches; dark grayish brown (10YR 4/2) silty clay loam; massive; very firm, sticky; 10 percent coarse fragments; strongly effervescent; moderately alkaline.

The thickness of the solum ranges from 20 to 40 inches. The depth to carbonates ranges from 23 to 40 inches. The content of coarse fragments, by volume, ranges from 0 to 15 percent in the A horizon, from 5 to 30 percent in the B horizon, and from 5 to 60 percent in the C horizon. The clay content at a depth of 10 to 40 inches is between 18 and 28 percent. Bedrock is at a depth of more than 5 feet.

The Ap horizon mainly has value of 2 or 3 and chroma of 0 to 2. Dry value is 5 or less. The horizon is mainly silt loam but ranges from loam to silty clay loam. Consistence is friable or very friable. Reaction ranges from medium acid to neutral.

The Bg horizon has hue of 5YR to 2.5Y, value of 4 to 6, and chroma of 1 or 2. It is loam to silty clay loam or their gravelly analogs. The Bg horizon has angular blocky or prismatic structure and friable or firm

consistence. Reaction ranges from slightly acid to mildly alkaline.

The C horizon has hue, value, and chroma similar to that of the B horizon. The C horizon ranges from fine sandy loam to silty clay loam or their gravelly or very gravelly analogs. Consistence is firm or very firm. Reaction is mildly alkaline or moderately alkaline.

Manlius Series

The Manlius series consists of moderately deep, excessively drained to well drained soils that formed in glacial till derived mainly from acid shale bedrock. Bedrock is at a depth of 20 to 40 inches. The Manlius soils are on till plains where the topography is influenced by the underlying bedrock. Slopes range from 0 to 8 percent and from 15 to 50 percent.

Manlius soils are near Orpark, Derb, Schuyler, and Marilla soils. The Manlius soils are better drained and have less clay than the Orpark, Derb, or Schuyler soils. They are shallower to bedrock than the Marilla soils, and unlike the Marilla soils, they do not have a fragipan.

Typical pedon of Manlius shaly silt loam, 3 to 8 percent slopes, in the town of Orchard Park, at the intersection of NY Route 277 and Gartman Road, near Chestnut Ridge Park:

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) shaly silt loam; weak fine granular structure; very friable; many roots; 30 percent coarse fragments; slightly acid (limed); abrupt smooth boundary.

B2—8 to 21 inches; yellowish brown (10YR 5/4) very shaly silt loam; very weak fine subangular blocky structure; friable; common fine roots; common fine pores; 40 percent coarse fragments; strongly acid; clear wavy boundary.

C—21 to 31 inches; brown (10YR 4/3) very shaly silt loam; very weak medium platy structure; friable; very few roots; common pores; 60 percent coarse fragments; strongly acid; abrupt wavy boundary.

R—31 inches; very dark grayish brown (2.5Y 3/2) to very dark gray (10YR 3/1) shale bedrock; brittle; strongly acid.

The thickness of the solum ranges from 20 to 30 inches. Bedrock is at a depth of 20 to 40 inches. The content of coarse fragments, mainly shale, ranges from 15 to 40 percent in the Ap horizon and increases with depth to as much as 60 percent in the C horizon. Some profiles do not have a C horizon, and the solum rests directly on bedrock.

The Ap horizon has hue of 10YR, value of 3 or 4, and chroma of 2 or 3. It is silt loam or loam or their shaly or very shaly analogs. Unless limed, the soil ranges from extremely acid to strongly acid.

The B horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 3 to 6. Some profiles have few to common faint mottles below a depth of 20 inches. The B horizon is very shaly silt loam or very shaly loam. It ranges from extremely acid to strongly acid.

The C horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 to 4. The texture of the C horizon is similar to that of the B horizon. This horizon is massive, or it has platy structure, and consistence is very friable to firm. Reaction ranges from very strongly acid to slightly acid.

The R horizon in some areas has thin layers of nonbrittle, clayey shale.

Mardin Series

The Mardin series consists of deep, moderately well drained soils that formed in glacial till deposits derived mainly from acid shale and sandstone. These soils are on the upland plateau. Slopes range from 3 to 25 percent.

Mardin soils and somewhat poorly drained Volusia soils and poorly drained Chippewa soils formed in the same kind of parent material. Mardin soils are associated with Valois and Schuyler soils. The Mardin soils have a fragipan, which is not typical of the Valois soils, and are not so well drained as the Valois soils. The Mardin soils are deeper to bedrock and have a slightly lower clay content than the Schuyler soils.

Typical pedon of Mardin channery silt loam, 3 to 8 percent slopes, in the town of Concord, off the Brown Hill Road, and 1 mile northeast of Wyandale Road:

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) channery silt loam; weak medium granular structure; very friable; many fine roots; 20 percent coarse fragments; medium acid; abrupt smooth boundary.

B2—8 to 13 inches; yellowish brown (10YR 5/6) channery silt loam; weak fine subangular blocky structure; friable; common fine roots and pores; 15 percent coarse fragments; strongly acid; clear wavy boundary.

A'2—13 to 16 inches; pale brown (10YR 6/3) channery silt loam; common medium faint yellowish brown (10YR 5/6) mottles; very weak medium platy structure; firm; common fine roots; common fine pores; 20 percent coarse fragments; strongly acid; abrupt irregular boundary.

Bx1—16 to 29 inches; light olive brown (2.5Y 5/4) channery loam; common medium faint light brownish gray (10YR 6/2) mottles and common medium distinct yellowish brown (10YR 5/8) mottles; strong very coarse prisms separated by thin streaks of pale brown (10YR 6/3) silt; distinct coarse yellowish brown (10YR 5/8) mottles at the sides of the silt streaks; very firm and brittle; few fine roots along prism faces; few fine pores, some with clay film linings; 25 percent coarse fragments; strongly acid; gradual wavy boundary.

Bx2—29 to 50 inches; olive brown (2.5Y 4/4) very channery loam; common medium faint dark grayish brown (10YR 4/2) and distinct yellowish brown (10YR 5/8) mottles; strong very coarse prisms separated by thin streaks of pale brown (10YR 6/3) silt; distinct coarse yellowish brown (10YR 5/8) mottles at the sides of the silt streaks; very firm and brittle; few fine pores, some with clay film linings; 35 percent coarse fragments; medium acid; gradual wavy boundary.

C—50 to 60 inches; olive brown (2.5Y 4/4) very channery loam; common fine faint dark grayish brown (10YR 4/2) and yellowish brown (10YR 5/6) mottles; massive; very firm; 40 percent coarse fragments; slightly acid.

The solum thickness ranges from 40 to 70 inches. The depth to the fragipan ranges from 14 to 26 inches, and the depth to bedrock is 5 feet or more. The average clay content of the fine-earth fraction above the fragipan is less than 18 percent. Coarse fragments, dominantly sandstone and siltstone, make up from 5 to 35 percent of the horizons above the fragipan and from 20 to 60 percent of the Bx and C horizons.

The Ap horizon has hue of 2.5Y or 10YR, value of 3 or 4, and chroma of 2 to 4. It is loam or silt loam or their channery or flaggy analogs. It has weak or moderate, fine or medium granular structure and has friable or very friable consistence. Reaction ranges from extremely acid to slightly acid.

The B2 horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6. It is loam or silt loam or their channery or gravelly analogs. Structure is very weak through moderate, very fine through medium subangular blocky or granular. Mottling is faint in some pedons. Reaction ranges from extremely acid to slightly acid.

The A'2 horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 2 or 3. It is loam or silt loam or their channery or gravelly analogs. Structure ranges from weak or very weak platy to subangular blocky, or the horizon is massive. It has friable or firm consistence. Reaction ranges from extremely acid to slightly acid.

The B'x horizon has hue of 10YR to 5Y, value of 3 to 5, and chroma of 2 to 4. It is channery or very channery loam or silt loam. It has firm or very firm consistence, and the material is brittle. Reaction ranges from very strongly acid to neutral.

The C horizon has hue of 10YR to 5Y, value of 3 to 5, and chroma of 2 to 4. It is massive, or it has weak platy structure. Consistence is firm or very firm. The C horizon generally contains more coarse fragments than the B'x horizon. Reaction ranges from strongly acid to moderately alkaline.

Marilla Series

The Marilla series consists of deep, moderately well drained soils that formed in shaly glacial till deposits. These soils are on the upland plateau. Slopes range from 3 to 15 percent.

Marilla soils are associated with Derb, Manlius, Schuyler, and Volusia soils. The Marilla soils have a fragipan that is not typical of the Schuyler or Derb soils, are better drained than the Volusia or Derb soils, and are deeper to bedrock than the Manlius soils.

Typical pedon of Marilla shaly silt loam, 3 to 8 percent slopes, in the town of Orchard Park, near Scherff Road, and 1.5 miles south of NY Route 250:

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) shaly silt loam; weak medium granular structure; very friable; many roots; 20 percent coarse fragments; strongly acid; abrupt smooth boundary.

B2—8 to 18 inches; yellowish brown (10YR 5/4) shaly silt loam; few fine faint light olive brown (2.5Y 5/6) mottles in lower part; weak fine subangular blocky structure; friable; many fine roots; many fine pores; 20 percent coarse fragments; strongly acid; clear wavy boundary.

Bx—18 to 42 inches; olive brown (2.5Y 4/4) shaly silt loam; distinct prisms 10 to 16 inches in diameter; streaks of light gray (10YR 6/1) bordered by thin distinct strong brown (7.5YR 5/6) along prism faces; common medium distinct light olive brown (2.5Y 5/8) mottles within prisms; firm, brittle; few roots in upper part; few fine pores with thin clay lining; 25 percent coarse fragments; strongly acid; gradual smooth boundary.

C—42 to 60 inches; olive gray to dark olive gray (5Y 4/2) very shaly silt loam; many medium distinct light olive brown (2.5Y 5/4) and grayish brown (10YR 5/2) mottles; massive; firm; very few pores; 40 percent coarse fragments; strongly acid.

The solum thickness ranges from 40 to 60 inches. The depth to the fragipan ranges from 15 to 25 inches. Coarse fragments, consisting mostly of thin brittle shale fragments, make up from 20 to 35 percent of the horizons above the fragipan and from 20 to 50 percent of the fragipan and the substratum. Bedrock is at a depth of more than 5 feet.

The Ap horizon has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 2 to 4. It is shaly silt loam or shaly loam. Structure is weak to moderate, very fine to medium granular. Consistence is friable or very friable. Reaction in unlimed areas is strongly acid or very strongly acid.

The B2 horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 3 to 6. It has distinct or prominent high-chroma mottles at a depth of 12 to 18 inches. It is shaly loam or shaly silt loam. Structure ranges from very weak fine granular through weak fine subangular blocky in the upper part, and from weak fine subangular blocky through weak thick or medium platy in the lower part. Reaction is strongly acid or very strongly acid.

The Bx horizon has hue of 10YR to 5Y, value of 4 or 5, and chroma of 2 or 3. It is shaly or very shaly loam or silt loam. Consistence is firm or very firm. Reaction is strongly acid to slightly acid.

The C horizon has hue of 10YR to 5Y and value of 4 or 5. It is very shaly or shaly loam or silt loam. Structure is platy, or the material is massive. Consistence is firm or very firm. Reaction is slightly acid through strongly acid.

Middlebury Series

The Middlebury series consists of deep, moderately well drained and somewhat poorly drained soils that formed in alluvial deposits derived from upland soils that have a high content of shale and sandstone. Middlebury soils are on flood plains and alluvial fans. Slopes range from 0 to 3 percent.

Middlebury soils and Tioga soils formed in the same kind of parent material. Middlebury soils are associated with Unadilla, Scio, Wayland, and Chenango soils. The Middlebury soils have a higher content of fine sand than the Unadilla or Scio soils and are better drained than the Wayland soils. They have less sand and gravel than the Chenango soils and are not so well drained.

Typical pedon of Middlebury silt loam, in the town of Aurora, 0.6 mile southeast of Blakely Road, west of NY Route 16:

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) silt loam; moderate medium granular structure; very friable; common roots; medium acid; clear smooth boundary.

B21—9 to 14 inches; dark brown (10YR 4/3) silt loam; moderate medium subangular blocky structure; friable; common roots; medium acid; gradual smooth boundary.

B22—14 to 28 inches; dark brown (10YR 4/3) silt loam; many medium distinct yellowish brown (10YR 5/6) mottles and common coarse distinct grayish brown (2.5Y 5/2) mottles; moderate medium subangular blocky structure; friable; common roots; medium acid; clear wavy boundary.

B23—28 to 36 inches; dark brown (10YR 4/3) very fine sandy loam; few medium distinct grayish brown (2.5Y 5/2) mottles and few medium distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable; few roots; 5 percent coarse fragments; slightly acid; abrupt smooth boundary.

IIC1—37 to 47 inches; dark brown (10YR 3/3) stratified medium and fine sand and coarse silt; few medium distinct grayish brown (2.5Y 5/2) mottles and few medium distinct yellowish brown (10YR 5/6) mottles; massive; friable; few roots; slightly acid; clear smooth boundary.

IIIC2—47 to 60 inches; dark brown (10YR 3/3) stratified fine sand and gravel; common coarse distinct gray (10YR 5/1) mottles fringed with strong brown (7.5YR 5/6); massive; friable; 10 percent coarse fragments; slightly acid.

The solum thickness ranges from 15 to 45 inches. The depth to bedrock is more than 5 feet. The content of coarse fragments ranges from 0 to 10 percent in the A horizon, from 0 to 20 percent in the B horizon, and from 0 to 40 percent in the C horizon.

The A horizon has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 2 or 3. It is dominantly silt loam, but in some pedons it is loam or fine sandy loam. It has weak or moderate fine to coarse granular structure, and it is friable or very friable. Reaction is strongly acid to slightly acid.

The B horizon has hue of 10YR to 5Y, value of 4 or 5, and chroma of 3 or 4. High-chroma mottles are in all subhorizons of some pedons. There are common to many mottles of low and high chroma in the lower part of the B horizon at a depth of 24 inches. The B horizon ranges from gravelly fine sandy loam to silt loam. It has weak or moderate, medium or coarse subangular blocky or prismatic structure, and it is friable or very friable. Reaction is medium acid to neutral.

The C horizon has hue of 10YR to 5Y, value of 4 or 5, and chroma of 2 to 4. There are few to many high-chroma and low-chroma mottles. The horizon ranges from fine sandy loam to silt loam in the fine-earth fraction above a depth of 40 inches, but it is dominantly stratified sand and gravel below a depth of 40 inches. The C horizon is friable or firm. Reaction is medium acid to neutral.

Minoa Series

The Minoa series consists of deep, somewhat poorly drained soils that formed in lake-laid deposits that have a high content of very fine sand and fine sand. The soils are on remnant deltas and beaches on the lowland lake plain and are in association with steeper, sandy soils that formed in glacial outwash deposits. Slopes range from 0 to 3 percent.

Minoa soils formed in the same kind of parent material as did well drained Arkport soils, moderately well drained Galen soils, and poorly drained and very poorly drained Lamson soils. Minoa soils are near Cosad, Chenango, and Blasdell soils. The Minoa soils do not have the clayey substratum that is typical of the Cosad soils and are not so gravelly or so well drained as the Chenango or Blasdell soils.

Typical pedon of Minoa very fine sandy loam, in the town of Amherst, near French Road and west of Got Creek:

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) very fine sandy loam, light brownish gray (10YR 6/2) dry and crushed; moderate fine granular structure; very friable; many fine roots; slightly acid.

B21—9 to 14 inches; light yellowish brown (10YR 6/4) very fine sandy loam; common fine faint strong brown (7.5YR 5/6) and light brownish gray (10YR 6/1) mottles; very weak fine subangular blocky structure; very friable; common fine roots; common pores; medium acid; clear wavy boundary.
B22—14 to 24 inches; pale brown (10YR 6/3) loamy very fine sand; common medium distinct strong brown (7.5YR 5/6) mottles; very weak very fine granular structure; very friable; few fine roots; common fine pores; slightly acid; clear wavy boundary.
B3—24 to 40 inches; grayish brown (10YR 5/2) loamy very fine sand; many medium distinct yellowish brown (10YR 5/4) and strong brown (7.5YR 5/6) mottles; massive; very friable; few fine pores; neutral; clear wavy boundary.
C—40 to 60 inches; light brownish gray (10YR 6/2) loamy very fine sand; common medium distinct dark yellowish brown (10YR 4/4) and strong brown (7.5YR 5/6) mottles; massive; friable; few fine pores; mildly alkaline.

The thickness of the solum ranges from 20 to 40 inches. The soils typically are free of stones and gravel, but some subhorizons are up to 5 percent coarse fragments. Bedrock is at a depth of more than 5 feet.

The Ap horizon has hue of 2.5Y to 7.5YR, value of 3 or 4, and chroma of 2 or 3. It is very fine sandy loam, silt loam, or loamy very fine sand. Reaction is strongly acid to neutral.

The B2 horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 2 to 4. The B2 horizon ranges from silt loam to loamy very fine sand and fine sandy loam. It has very weak or weak granular or subangular blocky structure, or it is massive. Consistence is very friable to firm. Reaction is strongly acid to neutral.

The B3 horizon has hue of 5YR to 2.5Y, value of 4 or 5, and chroma of 2 to 4. It ranges from silt loam to loamy very fine sand. Structure ranges from very weak or weak granular to subangular blocky, or the material is massive. Consistence is loose or friable. Reaction ranges from medium acid to neutral.

The C horizon has hue of 2.5Y to 5YR, value of 4 to 6, and chroma of 2 to 4. It ranges from silt loam to loamy fine sand and has thin varves of silty clay or fine sand in some pedons. Reaction ranges from medium acid to neutral to a depth of 40 inches and from slightly acid to moderately alkaline at a depth of more than 40 inches.

Niagara Series

The Niagara series consists of deep, somewhat poorly drained soils that formed in silty lacustrine sediments. These soils are mainly on the lowland lake plain. Some areas are on alluvial fans along valley bottoms, and some areas have a glacial till substratum. Slopes range from 0 to 8 percent.

Niagara soils and moderately well drained Collamer soils and poorly drained and very poorly drained Canandaigua soils formed in the same kind of parent material. Some Niagara soils are near Churchville soils that have a high clay content. Niagara soils are associated with Cosad, Raynham, and Rhinebeck soils. Niagara soils do not have the sandy mantle typical of the Cosad soils, have a higher clay content in the subsoil than the Raynham soils, and have a lower clay content than the Rhinebeck soils.

Typical pedon of Niagara silt loam, 0 to 3 percent slopes, in the town of Lancaster, 0.2 mile west of the intersection of Ransom Road and Erie Street, and 240 feet south of telephone pole no. 128-425-NYT-605:

Ap—0 to 11 inches; dark brown (10YR 3/3) silt loam, pale brown (10YR 6/3) dry; moderate fine granular structure; friable; many fine roots and pores; slightly acid; abrupt smooth boundary.
B1—11 to 16 inches; yellowish brown (10YR 5/4) silt loam; common medium distinct strong brown (7.5YR 5/6) mottles and few fine faint pale brown (10YR 6/3) mottles; moderate medium subangular blocky structure; firm; many very fine roots and pores; common worm channels filled with dark brown material; slightly acid; abrupt wavy boundary.
B21t—16 to 21 inches; dark brown (7.5YR 4/2) silty clay loam; many medium distinct strong brown (7.5YR 5/6) mottles and few fine distinct grayish brown (2.5Y 5/2) mottles; moderate coarse and medium subangular blocky structure; firm; few fine roots; few very fine pores; many moderately thick brown (10YR 4/3) clay films on ped faces and in pores; mildly alkaline; clear wavy boundary.
B22t—21 to 27 inches; dark brown (7.5YR 4/4) silt loam; common medium distinct strong brown (7.5YR 5/6) mottles, few fine distinct grayish brown (2.5Y 5/2) mottles, and few medium faint dark brown (7.5Y 4/2) mottles; moderate coarse and medium subangular blocky structure; firm; few very fine and fine roots and pores; common moderately thick brown (10YR 4/3) clay films on ped faces and in pores; mildly alkaline; gradual wavy boundary.
C1—27 to 60 inches; dark brown (10YR 4/3) silt loam; few medium distinct strong brown (7.5YR 5/6) mottles and common fine distinct gray (5Y 6/1) mottles; moderate very coarse prismatic structure parting to moderate medium platy; firm; very few very fine roots along prism faces; few very fine pores; continuous thick olive gray (5Y 5/2) silt coats on prism faces, bordered by oxidized yellowish brown (10YR 5/6) bands 3 to 5 millimeters wide; lime concretions 2 to 20 millimeters thick; calcareous; moderately alkaline; clear wavy boundary.

IIC—60 to 72 inches; olive brown (2.5Y 4/4) coarse silt and very fine sand; massive; strong effervescence; strongly calcareous; moderately alkaline.

The thickness of the solum ranges from 20 to 40 inches. The depth to carbonates is 20 to 50 inches. The solum is typically free of gravel, but some subhorizons contain as much as 3 percent coarse fragments, by volume. Bedrock is at a depth of more than 5 feet.

The Ap horizon has hue of 10YR or 2.5Y, value mainly of 3 or 4, and chroma of 2 or 3. Dry value is more than 5.5. The horizon is silt loam, very fine sandy loam, or loam. Reaction is strongly acid to neutral.

The B1 horizon has hue of 7.5YR to 2.5Y, value of 5 or 6, and chroma of 3 or 4. It is very fine sandy loam to silt loam. This horizon has weak or moderate subangular blocky structure. Some pedons have an A2 horizon instead of a B1 horizon. The A2 horizon differs from the B1 horizon by having chroma ranging to 2, structure that is weak subangular blocky or platy, and consistence that is friable. Reaction of the B1 horizon is medium acid to mildly alkaline.

The B2t horizon has hue of 5YR to 2.5Y and value of 4 or 5. Chroma of 2 or less dominates on the ped faces. The horizon is silt loam, very fine sandy loam, or silty clay loam. The content of clay is between 18 and 35 percent. Reaction ranges from medium acid to mildly alkaline.

The C horizon has hue of 2.5Y to 5YR, value of 3 to 5, and chroma of 2 to 4. It is very fine sandy loam, silt loam, or silty clay loam and commonly is stratified with fine sand, silt, or clay. Glacial till or gravelly layers are at a depth of 40 to 60 inches in some pedons. Reaction ranges from neutral to moderately alkaline.

Orpark Series

The Orpark series consists of moderately deep, somewhat poorly drained soils that formed in a thin mantle of glacial till overlying weathered soft shale bedrock. The Orpark soils are on plateau crests and summits on the uplands. Slopes range from 0 to 15 percent.

Orpark soils are associated with Derb and Angola soils but are shallower to bedrock than the Derb soils and do not have the clay accumulation in the subsoil typical of the Angola soils. Orpark soils are also associated with Chippewa, Blasdell, and Farnham soils. The Orpark soils are better drained and shallower to bedrock than the Chippewa soils, and they have a lower content of shale fragments than the Blasdell or Farnham soils and are not so well drained.

Typical pedon of Orpark silty clay loam, 0 to 3 percent slopes, in the town of Eden, in a field on the north side of Eckhardt Road, 0.3 mile east of Eden Road:

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) silty clay loam; moderate fine granular structure; friable; many fine roots; 5 percent coarse fragments; very strongly acid; abrupt smooth boundary.

B21—9 to 13 inches; light olive brown (2.5Y 5/4) silty clay loam; few medium faint yellowish brown (10YR 5/6) mottles; weak fine subangular blocky structure; friable; common fine roots; 5 percent coarse fragments; very strongly acid; clear wavy boundary.

B22—13 to 22 inches; olive brown (2.5Y 4/4) silty clay loam; common medium faint light olive brown (2.5Y 5/6) mottles and few medium distinct gray (5Y 5/1) mottles; weak medium subangular blocky structure; friable; few fine roots; grayish brown (2.5Y 5/2) faces of peds; 10 percent coarse fragments; very strongly acid; clear wavy boundary.

C—22 to 27 inches; pale olive (5Y 6/3) silty clay loam; many medium prominent yellowish brown (10YR 5/8) mottles; weak thin subangular blocky structure; firm; few fine roots; light olive gray (5Y 6/2) silt coatings on ped faces; 10 percent coarse fragments; very strongly acid; abrupt smooth boundary.

IIR—27 inches; olive (5Y 5/3) soft shale bedrock interbedded with thin dark gray somewhat harder strata; very strongly acid.

The solum thickness ranges from 20 to 32 inches. The depth to bedrock ranges from 20 to 40 inches. The content of coarse fragments, dominantly soft shale, ranges mainly from 0 to 10 percent of the soil; some thin subhorizons in the C horizon contain as much as 20 percent.

The Ap horizon has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 1 to 3. It is loam, silt loam, or silty clay loam. Structure is weak or moderate, fine or medium granular, and consistence is very friable or friable. Undisturbed pedons have a black or very dark grayish brown A1 horizon 2 to 5 inches thick. Reaction is very strongly acid or strongly acid.

The B horizon has hue of 10YR to 5Y, value of 4 to 6, and chroma of 2 to 4. The texture is silt loam or silty clay loam. Structure is weak or moderate, fine to coarse subangular blocky or prismatic parting to subangular blocky. Consistence is friable or firm. Reaction is very strongly acid or strongly acid.

The C or Cr horizon is 1 to 6 inches thick and has hue, value, and chroma similar to those of the B horizon. The C horizon is silt loam or silty clay loam in the fine-earth fraction. Platy structure is inherited from the weathered bedrock. Reaction is strongly acid or very strongly acid.

Palms Series

The Palms series consists of deep, very poorly drained soils that formed in decomposed organic deposits that overlie loamy mineral soil material. The organic mantle is 16 to 50 inches thick. These soils are in depressional

areas on lake plains and till plains. Slopes range from 0 to 3 percent but are dominantly less than 1 percent.

Palms soils are associated with Chenango, Scio, Raynham, and Lamson soils. The Palms soils have a higher organic matter content than the Chenango soils and are not so well drained. The Palms soils have a thicker organic mantle than the Lamson soils, which formed in sandy deposits, and do not have the high silt content typical of the Scio and Raynham soils.

Typical pedon of Palms muck, in the town of Concord, 30 yards west of Snyder Road and 0.4 mile north of the intersection of Snyder Road and Sharp Street:

Oa1—0 to 12 inches; black (10YR 2/1) broken face and rubbed muck (sapric material); 5 to 8 percent fiber unrubbed and less than 5 percent rubbed; fibers are mainly herbaceous with few woody fragments; weak fine and medium granular structure; very friable; slightly sticky; many roots; less than 10 percent mineral silt particles; medium acid; clear smooth boundary.

Oa2—12 to 23 inches; black to very dark brown (10YR 2/1 to 2/2) broken face and rubbed muck (sapric material); about 25 percent fiber unrubbed and less than 8 percent rubbed; fibers are about 15 percent herbaceous and 10 percent woody; moderate coarse granular structure; friable (slightly sticky when wet); few fine roots; less than 10 percent mineral silt particles; medium acid; clear smooth boundary.

Oa3—23 to 30 inches; very dark grayish brown (10YR 3/2) broken face and rubbed muck (sapric material); 30 percent fiber unrubbed and less than 15 percent rubbed; fibers are mainly herbaceous with very few woody fragments; massive; friable; slightly sticky; less than 5 percent mineral content; clear smooth boundary; slightly acid.

Oa4—30 to 38 inches; dark grayish brown (10YR 4/2) broken face and rubbed muck (sapric material); 25 percent fiber unrubbed and less than 10 percent rubbed; fibers are herbaceous; massive; friable; slightly sticky; less than 5 percent mineral content; slightly acid; abrupt smooth boundary.

IICg—38 to 60 inches; dark gray to gray (10YR 4/1 to 5/1) loam; massive; friable; 5 percent coarse fragments; slightly acid.

The substratum is at a depth of 16 to 50 inches. The depth to bedrock is more than 5 feet.

The surface layer, or Oa1 horizon, has hue of 10YR. The organic material in the subsurface and bottom layers has hue of 5YR to 10YR. In all the organic layers, value is 2 to 4 and chroma is 0 to 2. The organic layers have platy, blocky, or granular structure, or they are massive. Consistence is very friable to firm. Reaction ranges from strongly acid to mildly alkaline.

The IICg horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 or 2. It ranges from fine sandy loam to silty clay loam. The coarse fragment content is 0 to 15 percent. The horizon is slightly acid to moderately alkaline.

Patchin Series

The Patchin series consists of moderately deep, poorly drained and very poorly drained soils that formed in glacial till deposits underlain by shale bedrock. The soils are in slightly concave areas of bedrock-controlled till plains that receive surface runoff from adjacent soils. Bedrock is at a depth of 20 to 40 inches. Slopes range from 0 to 3 percent.

Patchin soils are associated with Derb, Orpark, Angola, and Lyons soils. The Patchin soils are shallower to bedrock than the Derb soils and are not so well drained as the Derb and Orpark soils. The Patchin soils are more acid than the Angola soils and are shallower to bedrock than the Lyons soils.

Typical pedon of Patchin silt loam, in the town of Aurora, 30 feet south of Bailey Road and 0.3 mile west of Lewis Road:

Ap—0 to 10 inches; dark grayish brown (10YR 4/2) silt loam; common fine distinct reddish brown (5YR 4/3) mottles; moderate medium granular structure; very friable; many medium to very fine roots; many very fine pores; few fine distinct black (5Y 2/1) concretions; strongly acid; abrupt smooth boundary.

A2g—10 to 14 inches; light brownish gray (2.5Y 6/2) silt loam; medium distinct strong brown (7.5YR 5/6) mottles; moderate thick platy structure; friable; few fine and very fine roots; few fine pores; 5 percent coarse fragments; strongly acid; clear wavy boundary.

B2g—14 to 20 inches; dark grayish brown (10YR 4/2); silty clay loam; many (45 percent) medium distinct strong brown (7.5YR 5/6) mottles and common coarse distinct light brownish gray (2.5Y 6/2) mottles; moderate coarse subangular blocky structure; firm; few fine and very fine roots; few fine pores; light brownish gray (2.5Y 6/2) silt coats on vertical faces of peds; 10 percent coarse fragments; strongly acid; clear wavy boundary.

B3g—20 to 23 inches; grayish brown (2.5Y 5/2) shaly silt loam; many medium distinct strong brown (7.5YR 5/6) mottles and many medium faint light brownish gray (2.5Y 6/2) mottles; weak coarse subangular blocky structure parting to moderate medium platy; firm; few fine pores; light brownish gray (2.5Y 6/2) silt coats on vertical faces of peds; 20 percent soft shale fragments; strongly acid; abrupt smooth boundary.

R—23 inches; grayish brown (2.5Y 5/2) soft shale bedrock.

The thickness of the solum ranges from 20 to 36 inches. The depth to bedrock is 20 to 40 inches. The content of coarse fragments, dominantly shale, ranges from 0 to 10 percent throughout the soil and is up to 5 percent fragments greater than 3 inches in diameter in the lower part of the subsoil or in the substratum. Some thin subhorizons contain up to 25 percent shale fragments just above the bedrock. Reaction throughout the soil in unlimed areas is very strongly acid or strongly acid.

The Ap horizon has hue of 10YR or 2.5Y, value of 2 to 4, and chroma of 2 or 3. It is silt loam or silty clay loam. It has weak or moderate, fine or medium granular or subangular blocky structure, and very friable or friable consistence.

The A2g horizon has hue of 2.5Y or 5Y, value of 6 or 7, and chroma of 0 to 2. It is silt loam or silty clay loam. It has weak or moderate, thick to thin platy structure.

The Bg horizon has hue of 10YR to 5Y, value of 4 to 6, and chroma of 0 to 2. Mottles with chroma of more than 2 make up 40 to 60 percent of the matrix above a depth of 30 inches. The horizon is silt loam or silty clay loam. It mainly has weak or moderate, fine to coarse subangular blocky or prismatic structure parting to blocky. Some pedons have platy structure in the lower part, which is inherited from the weathered bedrock.

A C or Cr horizon up to 6 inches thick is in some pedons. It has the same hue, value, and chroma as the B horizon. It is shaly silt loam to silty clay loam and has platy structure inherited from the weathered bedrock.

Phelps Series

The Phelps series consists of deep, moderately well drained soils that formed in glacial outwash deposits with a high content of gravel and sand. The gravel is dominated by limestone and various amounts of sandstone, siltstone, shale, and igneous erratics. Phelps soils are on glacial outwash plains and terraces. Slopes range from 0 to 3 percent.

Phelps soils are associated with Chenango, Alton, and Red Hook soils. The Phelps soils do not have the high gravel content typical of the Chenango and Alton soils, are not so acid as the Chenango soils, and are better drained than the Red Hook soils.

Typical pedon of Phelps gravelly loam, 0 to 3 percent slopes, in the town of Newstead, 3,900 feet west of Millgrove Road and 1,300 feet south of an abandoned barn on Hiller Road:

Ap—0 to 10 inches; very dark grayish brown (10YR 3/2) gravelly loam, light brownish gray (10YR 6/2) dry; weak coarse subangular blocky structure parting to moderate fine granular; very friable; common fine and medium roots; 20 percent coarse fragments; neutral; abrupt smooth boundary.

B&A—10 to 15 inches; brown (10YR 4/3) gravelly loam; weak medium subangular blocky structure; friable; common fine and medium roots; many medium pores; 20 percent coarse fragments; pale brown (10YR 6/3) and very pale brown (10YR 7/3) skeletans on ped faces about 1 millimeter thick; clay linings in some pores; neutral; clear wavy boundary

B2t—15 to 28 inches; brown (10YR 4/3) gravelly loam; common fine distinct yellowish brown (10YR 5/6) mottles and common medium distinct light gray (10YR 7/2) mottles; moderate coarse subangular blocky structure; friable; few medium roots; common fine pores; thin dark brown (10YR 3/3) patchy clay films in pores and on ped faces; 20 percent coarse fragments; neutral; abrupt wavy boundary.

IIB3—28 to 32 inches; yellowish brown (10YR 5/4) gravelly sandy loam; common fine distinct dark yellowish brown (10YR 4/4) mottles; weak medium subangular blocky structure; very friable; few fine roots; many medium pores; 30 percent coarse fragments; neutral; clear wavy boundary.

IIC—32 to 60 inches; brown (10YR 5/3) and grayish brown (10YR 5/2) very gravelly loamy sand stratified with sand layers 2 to 3 inches thick; few to common fine faint yellowish brown (10YR 5/4) mottles; single grain; loose; 45 percent coarse fragments; strongly calcareous; moderately alkaline.

The solum thickness ranges from 24 to 36 inches. Carbonates are at a depth of 18 to 40 inches, and bedrock is at a depth of more than 5 feet. The content of gravel fragments is as much as 35 percent, by volume, in the A and B horizons and as much as 70 percent in the C horizon.

The Ap horizon has value of 2 to 4 and chroma of 2 or 3. It ranges from gravelly sandy loam to gravelly silt loam but commonly is gravelly loam. Reaction ranges from medium acid to neutral. In some pedons a thin A2 horizon of gravelly loam or sandy loam underlies the Ap horizon. The A2 horizon has hue of 7.5YR to 2.5Y, value of 5 or 6, and chroma of 2 or 3.

The B&A horizon is loam, silt loam, or clay loam or their gravelly analogs. Interfingering of the A2 horizon into the B horizon occurs as thin films of clean sand grains on ped faces.

The B2t horizon has hue of 7.5YR to 2.5Y, value of 3 to 5, and chroma of 3 or 4. Mottles are mostly of higher chroma than the matrix, but some mottles have chroma of 2 or less. The horizon is loam, silt loam, or clay loam or their gravelly analogs. The horizon has weak to moderate fine to coarse subangular blocky structure. Reaction ranges from medium acid to neutral. A thin B3 horizon is in many pedons and ranges to sandy loam.

The IIC horizon has hue of 5YR to 10YR, value of 3 to 5, and chroma of 2 to 4. It ranges from very gravelly loamy sand to stratified sand and gravel. Reaction ranges from mildly alkaline to moderately alkaline.

Rayne Series

The Rayne series consists of deep, well drained soils that formed in weathered residuum of interbedded shale, siltstone, and some fine-grained sandstone. Rayne soils are on ridgetops and hillsides in the Allegheny River Valley. Slopes range from 3 to 65 percent.

Rayne soils are associated with Gilpin, Wharton, and Ernest Variant soils. The Rayne soils are deeper to bedrock than the Gilpin soils and are better drained than the Wharton or Ernest Variant soils.

Typical pedon of Rayne channery silt loam, 35 to 65 percent slopes, in the town of Cold Springs, 1 mile south of Southern Tier Expressway and 100 feet east of NY Route 280:

A1—0 to 1 inch; dark brown (10YR 4/3) channery silt loam; weak fine subangular blocky structure; friable; many fine roots; 20 percent coarse fragments; strongly acid; abrupt wavy boundary.

B1—1 inch to 7 inches; brown (10YR 5/3) channery silt loam; weak fine subangular blocky structure; friable; common roots; thin patchy clay flows in pores; 30 percent coarse fragments; strongly acid; clear wavy boundary.

B2t—7 to 20 inches; yellowish brown (10YR 5/4) channery silt loam; moderate fine subangular blocky structure; friable; common roots; patchy clay flows in pores; 30 percent coarse fragments; strongly acid; clear wavy boundary.

B3—20 to 42 inches; brown (10YR 5/3) channery silt loam; weak fine subangular blocky structure; firm; 30 percent coarse fragments; strongly acid; clear wavy boundary.

C—42 to 60 inches; brown (10YR 5/3) channery silt loam; massive; firm; 30 percent coarse fragments; strongly acid.

The solum thickness ranges from 40 to 60 inches. Bedrock is at a depth of 40 inches or more. The content of coarse fragments, by volume, ranges from 15 to 35 percent in the A horizon, 10 to 35 percent in the B2 horizon, and 15 to 60 percent in the B3 and C horizons. Reaction throughout the soil is strongly acid or very strongly acid.

The A horizon has hue of 10YR, value of 3 or 4, chroma of 2 to 4. It is silt loam or loam in the fine-earth fraction.

The B horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6. It is loam, silt loam, clay loam, or silty clay loam in the fine-earth fraction. Structure is weak or moderate, fine or medium subangular blocky. Consistence is friable or firm.

The C horizon has hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 3 to 6. It ranges from sandy loam to silty clay loam in the fine-earth fraction.

Raynham Series

The Raynham series consists of deep, somewhat poorly drained soils that formed in lake-laid deposits with a high content of silt and very fine sand. These soils are on low-lying flats and in basins on the lowland lake plain and in a few isolated depressions on the upland plateau. Slopes range from 0 to 8 percent.

Raynham soils are associated with Collamer, Scio, Cosad, Lamson, and Canandaigua soils. The Raynham soils are coarser textured than the Collamer soils, are not so well drained as the Collamer or Scio soils, and do not have the sandy mantle typical of the Cosad soils. The Raynham soils are better drained than the Lamson or Canandaigua soils, are not so sandy as the Lamson soils, and have a lower clay content than the Canandaigua soils.

Typical pedon of Raynham silt loam, 0 to 3 percent slopes, in the town of Amherst, 1 mile west of Cambell Blvd. and 1,000 feet south of Tonawanda Creek:

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam; moderate medium granular structure; friable; many roots; slightly acid; abrupt smooth boundary.

B2—8 to 26 inches; yellowish brown (10YR 5/4) silt loam; common medium distinct light brownish gray (10YR 6/2) mottles and common fine distinct dark yellowish brown (10YR 4/6) mottles; moderate coarse subangular blocky structure parting to moderate medium platy; friable; common roots; grayish brown (10YR 5/2) ped faces; slightly acid; clear wavy boundary.

C1—26 to 42 inches; yellowish brown (10YR 5/4) silt loam; many coarse distinct light gray (N 7/0) mottles and many coarse distinct brownish yellow (10YR 6/8) mottles; massive; friable; many small shells; thin stratified layers of fine sand; mildly alkaline; clear wavy boundary.

IIC2—42 to 60 inches; grayish brown (10YR 5/2) fine sand; common coarse distinct strong brown (7.5YR 5/6) mottles; single grain; loose; thin stratified silty layers; strongly effervescent; moderately alkaline.

The thickness of the solum ranges from 16 to 37 inches. The depth to carbonates ranges from 20 inches to more than 60 inches. The content of coarse fragments is less than 2 percent, by volume, throughout the soil. Bedrock is at a depth of more than 5 feet.

The Ap horizon has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 2 or 3. It is silt loam or very fine sandy loam. This horizon has fine or medium granular structure and is very friable or friable. Reaction ranges from strongly acid to neutral.

The B horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 2 to 4. Where the B2 horizon has a matrix chroma greater than 2, ped faces with chroma of 2 are present. The horizon is silt loam, silt, or very fine

sandy loam. Consistence is friable or firm. Structure is weak to moderate, fine to coarse subangular blocky, or it is medium to thick platy. Reaction ranges from strongly acid to neutral.

The C horizon has hue of 7.5YR to 5Y, value of 4 to 6, and chroma of 1 to 4. It ranges from fine sand to silt loam. The material in the C horizon is massive, or it is varved. Reaction is medium acid to moderately alkaline.

Raynham soils in this survey area are a taxadjunct to the Raynham series because of the shallow depth to free carbonates and the presence of fine sand in the substratum. These differences do not significantly affect use and management of the soils.

Red Hook Series

The Red Hook series consists of deep, somewhat poorly drained soils that formed in outwash and stream deposits. These soils are on glacial outwash plains and stream terraces throughout the area. Slopes range from 0 to 3 percent.

Red Hook soils formed in parent material similar to that of Alton, Castile, Chenango, and Farnham soils, but all of these soils are better drained than the Red Hook soils. Red Hook soils are associated with Rhinebeck, Halsey, and Middlebury soils. The Red Hook soils are coarser textured than the Rhinebeck soils, are not so poorly drained as the Halsey soils, and are not subject to common flooding as are the Middlebury soils.

Typical pedon of Red Hook silt loam, in the town of Hamburg, near Lakeview Road, opposite utility pole 13, 210 feet from east edge of woods, and 590 feet north of the road:

Ap—0 to 10 inches; very dark grayish brown (10YR 3/2) silt loam, light brownish gray (10YR 6/2) dry; moderate medium granular structure; friable; many fine roots; less than 5 percent coarse fragments; slightly acid; abrupt smooth boundary.

B21—10 to 17 inches; yellowish brown (10YR 5/4) loam; common coarse faint yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable; few fine roots; grayish brown (2.5Y 5/2) ped faces; 5 percent coarse fragments; neutral; clear wavy boundary.

B22—17 to 23 inches; brown (10YR 5/3) loam; few fine distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; few fine roots; grayish brown (2.5Y 5/2) ped faces; 10 percent coarse fragments; mildly alkaline; abrupt wavy boundary.

IIC1—23 to 45 inches; dark gray (5Y 4/1) shaly loam; common fine distinct dark yellowish brown (10YR 4/4) mottles, increasing in abundance with depth; massive; firm; 30 percent coarse fragments; weakly calcareous; mildly alkaline; clear wavy boundary.

IIIC2—45 to 60 inches; gray (10YR 5/1) stratified shaly sandy loam; firm; 20 percent coarse fragments; calcareous; moderately alkaline.

The solum thickness ranges from 20 to 40 inches. Bedrock is at a depth of 5 feet or more. The clay content between depths of 10 and 40 inches commonly is less than 18 percent, but some horizons within these depths are as much as 30 percent clay. The coarse fragment content, by volume, is 3 to 15 percent in the A horizon and 10 to 60 percent in the subsoil and substratum, but it averages less than 35 percent to a depth of 40 inches.

The Ap horizon has hue of 10YR or 2.5Y, value of 2 to 4, and chroma of 1 to 3. It ranges from fine sandy loam to silt loam, but silt loam is common. It has weak or moderate, fine to coarse granular or subangular blocky structure and very friable or friable consistence. Reaction ranges from strongly acid to slightly acid.

The B2 horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 1 to 4. Chroma is 1 or 2 in the matrix or on ped faces in at least some subhorizon within 20 inches of the surface. The B2 horizon is sandy loam, loam, or silt loam or their gravelly or very gravelly analogs. It has very weak to moderate subangular blocky or platy structure and has very friable to firm consistence. Reaction ranges from medium acid to mildly alkaline.

The C horizon has hue of 7.5YR to 5Y, value of 3 to 5, and chroma of 1 to 3. It ranges from sandy loam to silt loam in the fine-earth fraction. This horizon is massive or single grain. Reaction ranges from slightly acid to moderately alkaline.

The Red Hook soils in this survey area are a taxadjunct to the Red Hook series because of the shallower depth to carbonates and slightly higher reaction throughout. These differences, however, do not significantly affect use and management of the soils.

Rhinebeck Series

The Rhinebeck series consists of deep, somewhat poorly drained soils that formed in lake-laid sediments dominated by silt and clay. In some areas these soils are thinly mantled with gravelly outwash deposits. Rhinebeck soils are on the lowland lake plain and in some valleys. Slopes range from 0 to 3 percent.

Rhinebeck soils and poorly drained Canadice soils and moderately well drained Hudson soils formed in the same kind of parent material. Rhinebeck soils are associated with Niagara and Churchville soils. The Rhinebeck soils have a higher clay content than the Niagara soils and are not underlain by glacial till deposits as are the Churchville soils.

Pedon of Rhinebeck silt loam, 3 to 8 percent slopes, in the town of Concord, 138 feet south of the access road to Tony Smith's pond, and 250 feet south of the

intersection of NY Route 219 and Sharp Road (representative of the Rhinebeck series in this survey area):

Ap—0 to 9 inches; dark grayish brown (2.5Y 4/2) silt loam; moderate medium granular structure; friable; many fine and few medium roots; pale olive (5Y 6/3) ped faces; slightly acid; abrupt smooth boundary.
B1—9 to 16 inches; light yellowish brown (2.5Y 6/4) silty clay; many common distinct brownish yellow (10YR 6/8) mottles; strong coarse subangular blocky structure; firm; common fine roots; light gray (5Y 7/2) ped faces; strongly acid; clear wavy boundary.
B2t—16 to 37 inches; brown (10YR 5/3) silty clay; common fine distinct yellowish brown (10YR 5/6) mottles and common fine faint gray (10YR 5/1) mottles; strong coarse prismatic structure parting to strong coarse angular blocky; very firm; common fine roots along prism faces; slightly sticky and plastic; gray (5Y 6/1) ped faces with silt coats and discontinuous clay films; clay linings in pores; neutral; gradual wavy boundary.
C1—37 to 64 inches; dark grayish brown (2.5Y 4/2) silty clay; few fine faint light olive brown (2.5Y 5/6) mottles; moderate very coarse prismatic structure; very firm; gray (5Y 5/1) ped faces; few very fine and fine roots along ped faces; slightly sticky and plastic; varving in interior of peds; carbonate concretions; 5 percent coarse fragments; mildly alkaline; gradual wavy boundary.
C2—64 to 70 inches; dark grayish brown (2.5Y 4/2) varved silty clay; massive; very firm; plastic and slightly sticky; 5 percent coarse fragments; calcareous; moderately alkaline.

The solum thickness ranges from 20 to 48 inches and commonly corresponds to the depth to carbonates. Coarse fragments make up 0 to 25 percent of the A horizon and 0 to 10 percent of the B and C horizons. Bedrock is at a depth of more than 6 feet.

The Ap horizon has hue of 10YR to 2.5Y and chroma of 3 to 6. Value is 2 to 4 when moist and more than 5.5 when dry. The Ap horizon is silt loam, silty clay loam, or gravelly loam. Structure is granular or subangular blocky, and consistence is very friable or friable. Reaction ranges from strongly acid to neutral.

The B1 horizon has hue of 7.5YR to 5Y, value of 5 or 6, and chroma of 3 to 6 and is mottled. It ranges from silty clay loam to silty clay. Structure is moderate or strong subangular blocky. Consistence is friable or firm. Reaction ranges from strongly acid to mildly alkaline. In some profiles an A2 horizon replaces or overlies the B1 horizon. The A2 horizon is similar to the B1 horizon in hue and value, but chroma is 2 or 3.

The B2t horizon has hue of 7.5YR to 5Y, value of 3 to 5, and chroma of 2 to 4 and is mottled. Chroma of the ped faces is 1 or 2. The B2t horizon is silty clay loam or silty clay. Structure ranges from weak to strong, prismatic to subangular or angular blocky. Consistence is firm or very firm. Reaction ranges from strongly acid to mildly alkaline.

A B3 or IIB3 horizon underlies the B2t horizon in some profiles. It has hue, value, and chroma similar to that of the B2t horizon, but structure is generally of weaker grade or it is platy and inherited from the varved lake sediments. Consistence is firm or very firm.

The C horizon has hue of 7.5YR to 5Y, value from 3 to 5, and chroma of 1 to 3. It is silty clay loam, clay, or silty clay and in places contains thin strata of fine sand. It is massive, has platy structure inherited from the varved sediment, or is prismatic. Reaction ranges from slightly acid to moderately alkaline.

Schuyler Series

The Schuyler series consists of deep, moderately well drained soils that formed in shaly glacial till deposits that are underlain by shale bedrock at a depth of 40 to 60 inches. These soils are on the sides of valleys and on side slopes on the upland plateau. Slopes range from 3 to 8 percent and from 15 to 25 percent.

Schuyler soils and somewhat poorly drained Derb soils formed in the same kind of parent material. Schuyler soils are associated with Orpark and Marilla soils. The Schuyler soils are better drained and deeper to bedrock than the Orpark soils and do not have the fragipan that is typical of the Marilla soils.

Typical pedon of Schuyler silt loam, 15 to 25 percent slopes, in the town of Aurora, 54 feet west of Park Road, and 0.3 mile northeast of the entrance to Emery Park:

Ap—0 to 6 inches; very dark grayish brown (10YR 3/2) silt loam, light brownish gray (10YR 6/2) dry; moderate fine granular structure; very friable; many fine medium roots; 5 percent coarse fragments; very strongly acid; abrupt wavy boundary.
B21—6 to 15 inches; dark yellowish brown (10YR 4/4) silt loam; weak medium subangular blocky structure; friable; common coarse to many fine and medium roots; 10 percent coarse fragments; very strongly acid; clear wavy boundary.
B22—15 to 22 inches; yellowish brown (10YR 5/4) silt loam; moderate medium subangular blocky structure; friable; many fine to very fine and common medium roots; 10 percent coarse fragments; very strongly acid; clear wavy boundary.
B23—22 to 32 inches; light olive brown (2.5Y 5/4) shaly silt loam; few fine faint light brownish gray (2.5Y 6/2) mottles and common fine distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; pale olive (5Y 6/3) ped faces; common fine roots; 20 percent coarse fragments; very strongly acid; clear wavy boundary.
B3—32 to 42 inches; olive (5Y 4/3) shaly silt loam; common fine distinct light olive gray (5Y 6/2) and

yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; firm; light olive gray (5Y 6/2) ped faces; few very fine roots; 40 percent coarse fragments; very strongly acid; abrupt wavy boundary.

Cr—42 to 48 inches; olive (5Y 4/3) very shaly silt loam interbedded with layers of light olive gray (5Y 6/2) and strong brown (7.5YR 5/6) shale; massive; very firm; very strongly acid; clear smooth boundary.

R—48 inches; olive (5Y 4/3) soft shale bedrock.

The solum thickness ranges from 20 to 45 inches. The depth to bedrock is 40 to 60 inches. Coarse fragments, mainly shale, make up 5 to 15 percent of the A horizon, 5 to 45 percent of the B horizon, and 20 to 70 percent of the C horizon. The content of flagstones ranges from 0 to 10 percent throughout.

The Ap or A1 horizon has hue of 10YR or 2.5Y, value of 2 to 4, and chroma of 2 or 3. The A horizon is silt loam, loam, or fine sandy loam. Structure is weak to moderate, fine or medium, granular or subangular blocky, and consistence is very friable or friable. Reaction in unlimed areas ranges from extremely acid to medium acid.

The B2 horizon has hue of 7.5YR to 5Y, value of 4 to 6, and chroma of 3 to 5. Mottles of low and high chroma are at a depth of less than 24 inches. The fine-earth fraction of the horizon is loam, silt loam, or silty clay loam. Structure is weak to moderate, fine to coarse, subangular blocky or granular. Consistence ranges from very friable to firm. Reaction ranges from medium acid to extremely acid.

The B3 horizon differs from the B2 horizon by having weaker structure, chroma as low as 2, and more coarse fragments.

The C or Cr horizon has hue of 10YR to 5Y, value of 4 or 5, and chroma of 1 to 3. It is silt loam, loam, or silty clay loam or their shaly or very shaly analogs. Reaction ranges from extremely acid to medium acid.

The R horizon is mainly shale bedrock, but some areas have siltstone.

Scio Series

The Scio series consists of deep, moderately well drained soils that formed in wind- or water-deposited silt and very fine sand. The Scio soils are on terraces and old alluvial fans. Slopes range from 0 to 3 percent.

Scio soils are associated with Allard, Unadilla, Raynham, Collamer, and Arkport soils. The Scio soils are not so well drained as the Allard or Unadilla soils, are better drained than the Raynham soils, and do not have the high clay content typical of the Collamer soils. Scio soils are not so well drained as the Arkport soils and have a lower sand content.

Typical pedon of Scio silt loam, in the town of Evans, 1,000 feet north of Caine Road, near Big Sister Creek:

Ap—0 to 10 inches; dark brown (10YR 3/3) silt loam; moderate medium granular structure; friable; many fine roots; slightly acid; abrupt smooth boundary.

B21—10 to 20 inches; yellowish brown (10YR 5/4) silt loam; moderate medium subangular blocky structure; very friable; common fine roots; common medium and fine pores; strongly acid; gradual wavy boundary.

B22—20 to 25 inches; dark yellowish brown (10YR 4/4) silt loam; few medium faint light brownish gray (10YR 6/2) mottles and fine medium distinct strong brown (7.5YR 5/8) mottles; moderate coarse subangular blocky structure; friable; few fine roots; common medium and fine pores; medium acid; clear wavy boundary.

B23—25 to 34 inches; brown (10YR 5/3) silt loam; common medium distinct strong brown (7.5YR 5/6) mottles, common fine prominent strong brown (7.5YR 5/8) mottles, and many coarse distinct light brownish gray (2.5Y 6/2) mottles; moderate medium subangular blocky structure; friable; few fine roots; common medium and fine pores; strongly acid; abrupt smooth boundary.

C1—34 to 42 inches; brown (10YR 5/3) silt loam; common medium distinct dark brown (7.5YR 4/4) mottles, few fine prominent strong brown (7.5YR 5/8) mottles, and common medium distinct light gray (2.5Y 7/2) mottles; weak thick platy structure; friable; common medium and fine pores; strongly acid; abrupt smooth boundary.

IIC2—42 to 48 inches; brown (10YR 5/3) gravelly sandy loam; common medium distinct strong brown (7.5YR 5/6) mottles, common fine prominent strong brown (7.5YR 5/8) mottles, and common medium distinct grayish brown (2.5Y 5/2) mottles; massive; loose; 40 percent coarse fragments; medium acid; abrupt smooth boundary.

IIIC3—48 to 60 inches; dark brown (10YR 4/3) gravelly loamy sand; common fine distinct yellowish brown (10YR 5/6) mottles; single grain; loose; 40 percent coarse fragments; massive; strongly acid.

The thickness of the solum ranges from 24 to 36 inches. Contrasting texture is at a depth of 40 to 60 inches. Bedrock is at a depth of 5 feet or more. The content of coarse fragments ranges from 0 to 5 percent above a depth of 40 inches and up to 60 percent below a depth of 40 inches.

The Ap horizon has hue of 10YR, value of 3 to 5, and chroma of 2 or 3. It is silt loam or very fine sandy loam. Reaction ranges from very strongly acid to medium acid.

The B horizon has hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 3 to 6. It is silt loam or very fine sandy loam. Reaction ranges from very strongly acid to medium acid.

The C horizon has hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 2 to 4. It ranges from silt loam to

stratified gravel and sand. This horizon has weak platy structure or is massive or single grain. Consistence ranges from loose to firm. Reaction ranges from strongly acid to mildly alkaline.

Tioga Series

The Tioga series consists of deep, well drained soils that formed in alluvium derived mainly from parent material containing sandstone, siltstone, and shale. These soils are on flood plains along the Cattaraugus and Clear Creeks. Slopes range from 0 to 3 percent.

Tioga soils are in a drainage sequence with moderately well drained to somewhat poorly drained Middlebury soils and formed in similar parent material. Tioga soils are associated with well drained Unadilla soils but have a higher sand content. Tioga soils are also associated with Chenango soils on nearby terraces but do not have the high gravel content typical of the Chenango soils.

Typical pedon of Tioga silt loam, in the town of Boston, about 100 feet north of the intersection of Zimmerman Road and Back Creek Road:

Ap—0 to 10 inches; very dark grayish brown (10YR 3/2) silt loam; moderate medium granular structure; friable; many very fine and fine roots; few medium and coarse tubular pores (mainly worm channels); medium acid; abrupt smooth boundary.

B21—10 to 35 inches; dark yellowish brown (10YR 4/4) silt loam; brown (10YR 4/3) ped faces; very dark grayish brown worm casts; common fine distinct strong brown (7.5YR 5/6) mottles in the lower part; moderate medium subangular blocky structure; friable; very few very fine roots; medium fine and coarse tubular pores; medium acid; gradual wavy boundary.

B22—35 to 43 inches; dark yellowish brown (10YR 4/4) silt loam; brown to dark brown (10YR 4/3) ped faces; very dark grayish brown (10YR 3/2) worm casts; common fine distinct strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; friable; very few very fine roots; few medium and coarse tubular pores; medium acid; clear wavy boundary.

IIB3—43 to 51 inches; dark yellowish brown (10YR 4/4) sandy loam; brown to dark brown (10YR 4/3) ped faces; dark brown (10YR 3/3) worm casts; few fine distinct yellowish red (5YR 5/6) mottles and few fine faint very dark gray (10YR 3/1) mottles; weak medium subangular blocky structure; friable; very few very fine roots; few medium and coarse tubular pores; 3 percent fine gravel; medium acid; gradual wavy boundary.

IIC—51 to 60 inches; dark yellowish brown (10YR 4/4) sandy loam; dark brown (10YR 3/3) worm casts; few fine distinct yellowish red (5YR 5/6) mottles, few fine distinct strong brown (7.5YR 5/6) mottles, and few fine faint dark grayish brown (10YR 4/2) mottles; massive in individual strata that are 2 to 6 inches thick; strata range from sandy loam to loamy sand; friable; few coarse tubular pores; 5 percent fine gravel; medium acid.

The solum ranges from 18 to 55 inches in thickness. The depth to bedrock is more than 5 feet. There generally are no coarse fragments in the A horizon. Coarse fragments, mainly gravel, make up 0 to 35 percent of the B horizon and as much as 60 percent of the C horizon.

The Ap horizon has hue of 10YR to 2.5Y, value mainly of 3 to 5, and chroma of 2 or 3. Dry value is 6 or higher. The horizon is mainly silt loam but includes fine sandy loam or loam. Reaction ranges from strongly acid to neutral.

The B horizon has hue of 2.5Y to 7.5YR, value of 4 or 5, and chroma of 2 to 4. The horizon has no mottles to a depth of 24 inches. The horizon mainly is silt loam, fine sandy loam, or loam and in a few areas is gravelly. Structure is subangular blocky or granular. Consistence is very friable or friable. Reaction is strongly acid to neutral. A IIB3 horizon is in some profiles.

The IIC horizon ranges from silt loam to loamy sand or their gravelly or very gravelly analogs. It commonly is stratified below a depth of 40 inches. Consistence is loose to friable. Reaction ranges from medium acid to mildly alkaline.

The Tioga soils in this survey area are a taxadjunct to the Tioga series. They have a thicker solum and more acid reaction in the lower part of the subsoil than is typical for Tioga soils. These differences do not affect use and management of the soils.

Udifluvents

Udifluvents consist of deep, moderately well drained and well drained soils that formed in recent alluvial deposits. The soils are adjacent to streams and are subject to frequent flooding. Slopes range from 0 to 5 percent.

Udifluvents are mapped only in an undifferentiated group with Fluvaquents. Udifluvents commonly are near Tioga, Middlebury, and Wayland soils. Udifluvents are in that part of the flood plain where the adjacent stream, through scouring, cutting, and lateral erosion, commonly shifts the soil deposits from place to place.

Because of the variability of Udifluvents, a typical pedon is not provided. These soils have little or no profile development. The solum consists of a surface layer 1 to 9 inches thick. The depth to bedrock mainly is more than 4 feet. The content of coarse fragments, consisting of gravel, shale, cobblestones, and flagstones, ranges from 0 to 80 percent, by volume. These soils are very strongly acid to mildly alkaline. Organic matter content decreases with depth.

The surface layer has hue of 5YR to 2.5Y, value of 3 to 5, and chroma of 2 or 3. The texture is variable, ranging from fine sand to silty clay loam or their shaly, gravelly, cobbly, or very gravelly analogs.

The substratum has hue of 5YR to 2.5Y, value of 3 to 7, and chroma of 3 to 6 and generally has no mottles. It ranges from coarse sandy loam to silty clay loam or their gravelly, flaggy, cobbly, or very gravelly analogs. Some pedons contain strata of sandy material. Consistence is friable or loose.

Unadilla Series

The Unadilla series consists of deep, well drained soils that formed in water-laid deposits of silt and very fine sand. These soils are in the Cattaraugus Indian Reservation on terraces in the valleys along the Cattaraugus and Clear Creeks. Slopes range from 0 to 3 percent.

Unadilla soils are in a drainage sequence with moderately well drained Scio soils and somewhat poorly drained Raynham soils. Unadilla soils are near Tioga, Middlebury, and Chenango soils. The Unadilla soils are better drained than the Middlebury soils, contain more silt than the Tioga soils, and do not have the gravelly fragments typical of the Chenango soils.

Typical pedon of Unadilla silt loam, in the Cattaraugus Indian Reservation, 0.6 mile east of Brant Hill Reservation Road, and 50 feet north of NY Route 438, in a cultivated field:

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) silt loam; moderate fine and medium granular structure; friable; many fine roots; slightly acid (limed); abrupt smooth boundary.

B21—9 to 18 inches; yellowish brown (10YR 5/4) silt loam; weak medium subangular blocky structure; friable; common fine roots; medium acid; clear wavy boundary.

B22—18 to 38 inches; dark yellowish brown (10YR 4/4) very fine sandy loam; moderate fine and medium subangular blocky structure; friable; few roots; medium acid; clear wavy boundary.

C1—38 to 44 inches; brown (10YR 4/3) very fine sandy loam; weak thin platy structure; firm; medium acid; clear wavy boundary.

C2—44 to 60 inches; brown (10YR 4/3) fine sandy loam; massive; friable; medium acid.

The solum thickness ranges from 20 to 45 inches. The depth to bedrock is more than 60 inches. The content of coarse fragments is 0 to less than 5 percent throughout the solum and 0 to 55 percent below a depth of 40 inches.

The Ap horizon has hue of 10YR, value of 3 or 4, and chroma of 2 to 4. It is silt loam or very fine sandy loam. Reaction in unlimed areas ranges from very strongly acid to medium acid.

The B horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 6. It is silt loam or very fine sandy loam. Structure is weak or moderate, fine or medium subangular blocky. Consistence is very friable to firm. Reaction ranges from very strongly acid to medium acid.

The C horizon has hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 2 to 4. It is silt loam to very gravelly sand. It is massive or has weak or moderate platy structure. Consistence is loose to firm. Reaction ranges from strongly acid to mildly alkaline.

Valois Series

The Valois series consists of deep, well drained soils that formed in glacial till deposits dominated by material derived from sandstone, siltstone, and shale. The Valois soils commonly are on recessional or lateral moraines. Slopes range from 3 to 8 percent.

Valois soils are associated with Mardin, Alton, Chenango, and Arkport soils. The Valois soils do not have the fragipan typical of the Mardin soils and have more gravel in the subsoil. The Valois soils have less gravel in the subsoil than the Alton or Chenango soils and have a lower sand content than the Arkport soils.

Typical pedon of Valois gravelly silt loam, 3 to 8 percent slopes, in the town of Sardinia, on the west side of Pratham Road and 500 feet north of Allen Road:

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) gravelly silt loam; moderate medium granular structure; very friable; many fine roots; 25 percent coarse fragments; strongly acid; abrupt smooth boundary.

B21—8 to 16 inches; yellowish brown (10YR 5/6) gravelly silt loam; weak fine subangular blocky structure; very friable; many fine roots; 20 percent coarse fragments; many fine and medium pores; strongly acid; clear wavy boundary.

B22—16 to 31 inches; yellowish brown (10YR 5/4) gravelly loam; weak medium subangular blocky structure; friable; common fine roots; many fine pores; 25 percent coarse fragments; strongly acid; clear wavy boundary.

B23—31 to 52 inches; brown (10YR 5/3) gravelly sandy loam; weak medium platy structure; friable; few fine roots in upper part; many fine and medium pores; 30 percent coarse fragments; strongly acid; clear wavy boundary.

IIC—52 to 65 inches; grayish brown (10YR 5/2) very gravelly sandy loam; weak medium granular structure with some stratification; very friable; porous; 50 percent coarse fragments; medium acid.

The solum is 30 to 70 inches thick. Bedrock is at a depth of 5 feet or more. The content of coarse fragments, by volume, ranges from 15 to 35 percent in

the A horizon, from 5 to 35 percent in the upper part of the B horizon, from 20 to 35 percent in the lower part of the B horizon, and from 35 to 70 percent in the C horizon.

The Ap horizon has value of 3 or 4 and chroma of 2 or 3. It is gravelly silt loam, gravelly loam, or gravelly fine sandy loam. Reaction ranges from very strongly acid to medium acid.

The B2 horizon has hue of 7.5YR to 2.5Y and value of 4 or 5. It is loam, silt loam, or sandy loam or their gravelly analogs. It has very fine to medium, subangular blocky structure but is platy in the lower part of some profiles. Consistence is very friable to firm and is friable when the soil is removed. Reaction ranges from very strongly acid to medium acid.

The C horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 or 3. It ranges from very gravelly loam to very gravelly sandy loam. Reaction ranges from medium acid to neutral.

Volusia Series

The Volusia series consists of deep, somewhat poorly drained soils that formed in firm basal till dominated by material derived from siltstone, sandstone, and shale. Volusia soils are on broad divides of the dissected, glaciated upland plateau. These soils have a firm, dense fragipan in the subsoil. Slopes range from 0 to 15 percent.

Volusia soils and poorly drained Chippewa soils and moderately well drained Mardin soils formed in similar kinds of parent material. Volusia soils are associated with somewhat poorly drained Derb soils and moderately well drained Schuyler soils, but neither of the associated soils has a fragipan.

Typical pedon of Volusia channery silt loam, 3 to 8 percent slopes, in the town of Concord, near Brown Hill Road and 1.3 miles northeast of Wyandale Road:

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) channery silt loam; weak medium granular structure; very friable; many fine roots; 20 percent coarse fragments; medium acid; abrupt smooth boundary.

A2—9 to 15 inches; light brownish gray (10YR 6/2) channery silt loam; many medium distinct yellowish brown (10YR 5/6) mottles; very weak medium platy structure; friable; common fine roots; common fine pores; 20 percent coarse fragments; medium acid; clear irregular boundary.

Bx—15 to 50 inches; olive brown (2.5Y 4/4) channery loam; common medium distinct gray (10YR 5/1) and yellowish brown (10YR 5/6) mottles; strong very coarse prisms separated by thin streaks of light brownish gray silt; distinct coarse yellowish brown mottles at the edge of the silt streaks; very firm and brittle; few roots in upper part between prism faces; few fine pores with some clay linings; 30 percent coarse fragments; medium acid; gradual wavy boundary.

C—50 to 60 inches; dark grayish brown (10YR 4/2) very channery loam; many faint dark yellowish brown (10YR 4/4) mottles; massive; very firm; 35 percent coarse fragments; slightly acid.

The solum thickness ranges from 40 to 70 inches. The depth to the fragipan ranges from 10 to 20 inches. The content of coarse fragments ranges from 10 to 30 percent in the A and B horizons and from 10 to 50 percent in the C horizon.

The Ap horizon has hue of 10YR or 2.5Y, value of 3 to 5, and chroma of 2 or 3. It is silt loam or loam or their channery analogs. Reaction ranges from very strongly acid to slightly acid.

The A2 horizon has hue of 10YR to 5Y, value of 4 to 6, and chroma of 2 or 3. It has common or many, distinct or prominent mottles with higher chroma than in the matrix. The A2 horizon is loam or silt loam or their channery analogs. It has very weak or weak platy or blocky structure, or it is massive. Consistence is friable or firm. Some pedons do not have an A2 horizon but have a B2 horizon. Reaction ranges from very strongly acid to slightly acid.

The Bx or B'x horizon has hue of 10YR to 5Y, value of 3 to 5, and chroma of 2 to 4. The horizon has few or common, faint to distinct mottles. It is dominantly loam or silt loam but ranges to include silty clay loam and, commonly, the channery analogs. Consistence is firm to extremely firm. Reaction ranges from strongly acid to neutral.

The C horizon has hue of 10YR to 5Y, value of 3 to 5, and chroma of 2 to 4. It is loam or silt loam or their channery or very channery analogs. It is massive or has lenticular platy structure and is firm or very firm. Reaction ranges from medium acid to moderately alkaline.

Wallington Series

The Wallington series consists of deep, somewhat poorly drained soils that formed in silty deposits. The soils are on remnant stream terraces. Slopes range from 0 to 3 percent.

Wallington soils are associated with Raynham, Scio, and Brinkerton Variant soils. None of the associated soils has a fragipan.

A typical pedon of Wallington silt loam, in the town of Carrollton, 2 miles west of Vandalia, 1.4 miles north of NY Route 17, and 100 feet east of Ten Mile Road:

A1—0 to 2 inches; dark grayish brown (10YR 4/2) silt loam; moderate fine granular structure; friable; many roots; less than 2 percent coarse fragments; very strongly acid; abrupt smooth boundary.

B21—2 to 7 inches; dark yellowish brown (10YR 4/4) silt loam; few fine faint grayish brown (10YR 5/2)

mottles; weak faint subangular blocky structure; friable; common roots; less than 2 percent coarse fragments; strongly acid; clear wavy boundary.

B22—7 to 12 inches; yellowish brown (10YR 5/4) silt loam; grayish brown (10YR 5/2) faces of peds; few medium distinct brown (7.5YR 5/4) mottles; weak fine subangular blocky structure; friable; few roots; less than 2 percent coarse fragments; strongly acid; clear wavy boundary.

Bx1—12 to 20 inches; grayish brown (10YR 5/2) and brown (7.5YR 5/4) silt loam; moderate very coarse prismatic structure parting to weak coarse subangular blocky; firm; light brownish gray (10YR 6/2) prism faces with brown (7.5YR 4/2) streaks; thin patchy clay flows in pores; few roots on prism faces; less than 2 percent coarse fragments; strongly acid; clear wavy boundary.

Bx2—20 to 30 inches; brown (7.5YR 4/4) fine sandy loam; very coarse prismatic structure; firm; light brownish gray (10YR 6/2) prism faces with yellowish brown (10YR 5/8) streaks; thin patchy clay flows in pores; less than 2 percent coarse fragments; strongly acid; clear wavy boundary.

B3—30 to 60 inches; gray (10YR 6/1), strong brown (7.5YR 5/8), and yellowish red (5YR 5/8) loam; very coarse prismatic structure; firm; less than 2 percent coarse fragments; strongly acid.

The thickness of the solum ranges from 30 to 60 inches. Bedrock is at a depth of 60 inches or more. The content of coarse fragments is less than 3 percent throughout the soil.

The A horizon has hue of 10YR, value of 3 or 4, and chroma of 2 or 3. It is silt loam or very fine sandy loam. It has weak or moderate, fine or medium granular structure. Reaction ranges from very strongly acid to medium acid.

The B2 horizon has hue of 7.5YR to 2.5Y, value of 3 to 5, chroma of 3 or 4. It is silt loam or very fine sandy loam. It has weak or moderate, fine or medium subangular blocky structure. Consistence is friable or firm. Reaction ranges from very strongly acid to medium acid.

The Bx horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, chroma of 2 to 4. It is silt loam or very fine sandy loam in the upper part and ranges to fine sandy loam in the lower part. It mainly has weak or moderate, very coarse prismatic structure parting to thick platy or coarse subangular blocky. The material in places is massive within prisms. Reaction is strongly acid to slightly acid.

The B3 horizon has hue of 7.5YR to 2.5Y, value of 3 to 6, chroma of 1 to 8. It is silt loam, loam, or fine sandy loam. Structure is very coarse prismatic or platy, or the material is massive within prisms. Consistence is friable to firm. Reaction is strongly acid to slightly acid.

The C horizon has hue of 7.5YR to 2.5Y, value of 3 to 6, chroma of 2 to 4. It ranges from loamy very fine sand to silt loam. Consistence is friable or firm, and the material is massive. Reaction ranges from strongly acid to slightly acid.

The Wallington soils in this survey area are a taxadjunct to the Wallington series because of the fine sandy loam in the Bx horizon and the loam in the B3 horizon. These differences do not significantly affect the use and management of the soils.

Wayland Series

The Wayland series consists of deep, poorly drained and very poorly drained soils that formed in recent alluvial deposits on flood plains. The Wayland soils are in the lowest parts of the flood plains, commonly in slackwater areas farthest from the stream. Slopes range from 0 to 3 percent.

Wayland soils are associated with Tioga, Middlebury, and Chenango soils. The Wayland soils are more poorly drained than the Tioga or Middlebury soils. They do not have the high gravel content of the Chenango soils and are not so well drained.

Typical pedon of Wayland silt loam, in the town of Newstead, 0.3 mile north of Tonawanda Creek Road and 0.4 mile west of NY Route 93:

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) silt loam, dark gray (10YR 4/1) crushed and smoothed; moderate medium subangular blocky structure; firm; many fine and very fine roots; neutral; clear smooth boundary.

Bg—9 to 28 inches; dark gray (10YR 4/1) silt loam; common medium distinct dark brown (7.5YR 4/4) mottles; weak coarse subangular blocky structure; firm; common fine and very fine roots; neutral; gradual wavy boundary.

Cg—28 to 45 inches; dark gray (10YR 4/1) silt loam; common medium distinct brown (10YR 4/3) mottles; weak thick platy structure; firm; common very fine roots; neutral; abrupt wavy boundary.

IIC2—45 to 60 inches; dark gray to dark grayish brown (2.5Y 4/1) stratified silt loam and very fine sand; massive; firm; calcareous; moderately alkaline.

The thickness of the silty deposits over contrasting coarser textured material ranges from 36 inches to more than 60 inches. Bedrock is at a depth of more than 60 inches. There generally are no coarse fragments, but the content in some profiles is as much as 5 percent above a depth of 36 inches.

The A1 or Ap horizon has hue of 10YR or 2.5Y, value of 2 or 3, and chroma of 1 or 2. The A horizon is silt loam or silty clay loam. Reaction ranges from strongly acid to mildly alkaline.

The Bg horizon has hue of 7.5YR to 5Y, value of 3 to 6, and chroma of 1 or 2. It is silt loam or silty clay loam. Structure ranges from weak or moderate, fine to coarse

subangular blocky to weak or moderate prismatic. Consistence is friable or firm. Reaction ranges from strongly acid to moderately alkaline. Some pedons do not have a Bg horizon.

The hue, value, chroma, and texture of the Cg horizon are similar to those of the Bg horizon. The Cg horizon has platy structure or is massive. Some pedons have a IIC horizon that has color similar to that of the Cg horizon but that ranges from stratified silt loam and very fine sand to gravelly fine sandy loam. Reaction ranges from medium acid to moderately alkaline.

Wharton Series

The Wharton series consists of deep, moderately well drained soils that formed in residual material derived from weathered interbedded shale and siltstone. These soils are on hillsides in the Allegheny River Valley. Slopes range from 8 to 25 percent.

Wharton soils and Gilpin, Rayne, and Ernest Variant soils formed in similar kinds of parent material. The Wharton soils are not so well drained as the Rayne or Gilpin soils and are deeper than the Gilpin soils. The Ernest Variant soils are in lower positions than the Wharton soils and formed in a distinct colluvial silt mantle.

Typical pedon of Wharton silt loam, 15 to 25 percent slopes, in the town of Great Valley, 0.3 mile east of NY Route 219, near Thorpe Hollow Road:

A1—0 to 4 inches; very dark grayish brown (10YR 3/2) silt loam; moderate medium granular structure; friable; many roots; 10 percent coarse fragments; strongly acid; abrupt smooth boundary.

B21t—4 to 22 inches; yellowish brown (10YR 5/4) channery silt loam; weak medium to fine subangular blocky structure; friable; thin discontinuous clay films on ped faces and in pores; many roots; 20 percent coarse fragments; strongly acid; clear smooth boundary.

B22t—22 to 34 inches; brown (10YR 4/3) channery silty clay loam; common medium distinct yellowish brown (7.5YR 5/8) and grayish brown (10YR 5/2) mottles; grayish brown (10YR 5/2) ped faces; numerous clay films in pores and on ped faces; moderate medium subangular blocky structure; firm; few roots; 20 percent coarse fragments; strongly acid; clear smooth boundary.

B3t—34 to 42 inches; olive brown (2.5Y 4/4) silt loam; common medium distinct strong brown (7.5YR 5/8) mottles; weak medium subangular structure; firm; thin patchy clay films on ped faces and in pores; 30 percent coarse fragments; strongly acid; clear smooth boundary.

C—42 to 60 inches; brown (10YR 4/3) silt loam; massive; firm; 40 percent coarse fragments; strongly acid.

The solum thickness ranges from 30 to 60 inches or more. The depth to bedrock is at least 40 inches. Reaction is extremely acid to strongly acid throughout. The content of coarse fragments, by volume, ranges from 0 to 15 percent in the A horizon, 0 to 20 percent in the B2 horizon, and up to 50 percent in the B3 horizon. The C horizon is 20 to 60 percent coarse fragments.

The A horizon has value of 2 or 3 and chroma of 0 to 3. It is silt loam or silty clay loam. Structure is weak or moderate, fine or medium granular.

The B horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 2 to 8. In the fine-earth fraction it is silt loam, silty clay loam, or clay loam. Consistence is friable or firm.

The C horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 2 to 6. In the fine-earth fraction it is mostly silt loam to clay loam but ranges to clay.

Williamson Series

The Williamson series consists of deep, moderately well drained soils that formed in silty lacustrine deposits. The soils are on lake plains and remnant stream terraces. Slopes range from 3 to 8 percent.

Williamson soils are associated with Rhinebeck soils on lake plains but do not have the clayey texture of the Rhinebeck soils and are better drained. They are also associated with Wallington and Scio soils but are better drained than the Wallington soils, and the Scio soils do not have a fragipan.

Typical pedon of Williamson silt loam, 3 to 8 percent slopes, in the town of Colden, 500 feet east of Bleistern Road and 600 feet north of Partridge Road:

Ap—0 to 7 inches; dark brown (10YR 3/3) silt loam; weak fine subangular blocky structure parting to moderate medium granular; friable; many fine roots; many fine pores; strongly acid; abrupt smooth boundary.

B2—7 to 15 inches; dark yellowish brown (10YR 4/4) silt loam; moderate medium subangular blocky structure; friable; few fine roots; few fine pores; few very dark grayish brown (10YR 3/2) worm channels 5 to 10 millimeters in diameter; 2 percent coarse fragments; strongly acid; clear wavy boundary.

A'2—15 to 18 inches; pale brown (10YR 6/3) silt loam; few medium distinct yellowish brown (10YR 5/6) mottles; moderate medium platy structure; friable; few fine roots; few medium pores; strongly acid; abrupt irregular boundary.

B'x1—18 to 30 inches; brown (10YR 5/3) very fine sandy loam; prisms 10 to 15 inches across separated by 1/4 to 1/2 inch borders of very pale brown (10YR 7/3) surrounded by strong brown (7.5YR 5/6) mottles or streaks; prisms parting to moderate medium platy structure; very firm, brittle;

many medium pores; strongly acid; gradual wavy boundary.

B'x2—30 to 45 inches; yellowish brown (10YR 5/4) very fine sandy loam; prisms 8 to 10 inches across are separated by 1/8 to 1/4 inch of light brownish gray (2.5Y 6/2) very fine sand; coarse moderate distinct strong brown (7.5YR 5/6) and pale brown (10YR 6/3) mottles; firm, brittle; common medium pores; 2 percent coarse fragments; strongly acid; gradual wavy boundary.

IIC—45 to 55 inches; yellowish brown (10YR 5/4) silt loam; common medium distinct light brownish gray (2.5Y 6/2) and strong brown (7.5YR 5/6) mottles; weak thin platy structure; friable; strongly acid; abrupt smooth boundary.

IIIC—55 to 60 inches; brown (10YR 5/3) loamy very fine sand; single grain; very friable; strongly acid.

The thickness of the solum ranges from 35 to 60 inches. The silt or very fine sand deposits are at a depth of 40 inches and extend to at least 60 inches. Bedrock is at a depth of 5 feet or more. The content of coarse fragments is less than 2 percent throughoout the soil.

The Ap horizon has hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 2 or 3. It is silt loam, very fine sandy loam, or fine sandy loam. Reaction ranges from very strongly acid to medium acid.

The B2 horizon has hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 3 to 6. In places, this horizon has common faint mottles. It is silt loam or very fine sandy loam. Structure is very weak or weak granular or subangular blocky. Reaction ranges from very strongly acid to medium acid.

The A'2 horizon has hue of 7.5YR to 2.5Y, value of 5 to 7, and chroma of 3 or 4. This horizon has common to many, distinct to prominent mottles that have chroma of 3 to 6. The horizon is silt loam or very fine sandy loam. Structure is weak platy, or the horizon is massive. Reaction ranges from very strongly acid to medium acid.

The B'x horizon has hue of 2.5YR to 2.5Y, value of 4 or 5, and chroma of 3 or 4. Mottles are few to common, medium to coarse, and faint to distinct. This horizon is silt loam or very fine sandy loam. It is massive or has platy structure within weak to moderate very coarse prisms. Reaction ranges from very strongly acid to medium acid.

The C horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 to 4. This horizon typically is silt loam or stratified silt loam and very fine sandy loam. Thin layers of loamy very fine sand are common. This horizon has platy structure or is massive. Reaction ranges from strongly acid to neutral.

Formation of the Soils

The first part of this section describes the factors of soil formation and relates them to the soils in the survey area. The second part defines the processes of soil horizon development as they relate to soil formation.

Factors of Soil Formation

Soils are natural three-dimensional bodies at the earth's surface. They are products of weathering and other processes that act on parent material. The properties of the soil at any point depend on the combination of the following factors at that point: physical and chemical composition of the parent material, climate, plant and animal life, relief, and time. The relative influence of each of these major factors of soil formation differs from place to place, and each modifies the effects of the other four. For example, the effects of climate and of plant and animal life are influenced by relief and by the nature of the parent material. In some places the influence of one factor is dominant.

In the following pages the five major factors of soil formation are described in relation to their effects on the soils in the Seneca Nation of Indians.

Parent Material

Parent material is the unconsolidated mass in which soils formed or are forming. It determines the mineralogical composition of the soil and contributes largely to the chemical composition. It also influences to a great extent the rate at which soil-forming processes take place and the soil color. In the Allegany Reservation, most of the soils on uplands formed in material weathered from interbedded shale, siltstone, and sandstone bedrock (fig. 6). In most places the residual material is deep over bedrock. Rayne and Wharton soils, for example, formed in these areas. Gilpin soils formed in places where the residual material is moderately deep over bedrock. In colluvial areas—areas in which the soil material has moved by creep, slide, or local wash and has been deposited at the base of steep slopes—Brinkerton Variant and Ernest Variant soils have formed.

Most of the soils in the Cattaraugus Indian Reservation and Oil Springs Reservation formed in different types of deposits that resulted from glaciation. Glacial till and glaciofluvial (outwash) deposits are the most extensive source of parent material, and the material in a few areas derived from glaciolacustrine (lake-laid) sediments. Some soils are forming in recent deposits of stream alluvium and in accumulations of organic matter.

Soils that formed in glacial till deposits, which have a heterogeneous mixture of rock and soil particles, have a wide range of characteristics. A firm fragipan and substratum are commonly characteristic of the deeper soils, such as the Mardin, Marilla, and Volusia soils. The Lordstown, Manlius, and Orpark soils formed in places where the till mantle is moderately deep over bedrock.

In the Cattaraugus and Oil Springs Reservations, the underlying bedrock formation is dominantly shale and some siltstone and sandstone. The till deposits have a high component of fragments from local underlying bedrock.

As the glacial ice melted, enormous quantities of meltwater carried and sorted soil and rock debris, called outwash. This material was redeposited in layers of sand and gravel on outwash plains and in valleys as terraces, kames, eskers, and deltas. Examples of soils that formed in this material are Chenango and Alton soils. These soils commonly are medium textured to coarse textured.

The Cattaraugus and Allegheny valleys at one time contained a glacial lake where glacial meltwater was trapped. Most of the stone-free sediment deposited in the quiet lake waters was clay and silt. Rhinebeck, Unadilla, Collamer, Scio, and Raynham soils are examples of soils that formed in these fine textured to medium textured deposits.

In more recent times, overflowing streams have deposited fresh, dark alluvial material on flood plains. Soils forming in this medium textured or moderately coarse textured material have weak soil profile development. Tioga and Middlebury soils are examples of soils forming in these deposits. Soils that formed from organic deposits in low bogs and swamps are called muck. Palms soils are typically in these areas.

Topography

The shape of the land surface, commonly called the lay of the land, and the slope and the position of the land surface in relation to the underlying water table have had great influence on the formation of soils in the survey area. Soils that formed in convex, sloping areas

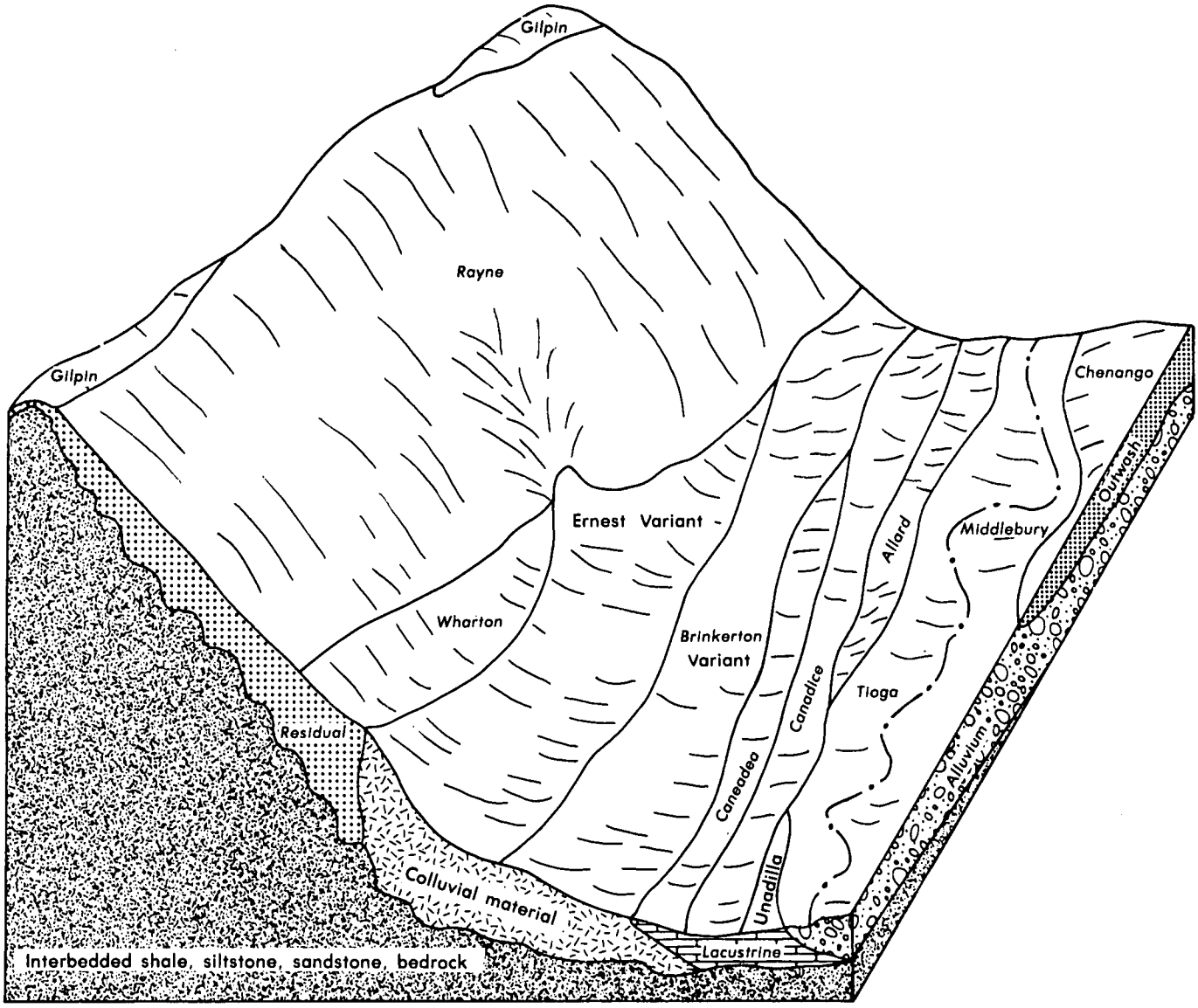


Figure 6.—Typical relationship of soils to parent material in the Allegheny River Valley.

that accumulate little runoff, or where runoff is moderate or rapid, generally are well drained and have a bright-colored, unmottled subsoil. These soils are usually leached to greater depths than are low-lying wetter soils in the same general area. In more gently sloping areas, where runoff is slower, the soils generally exhibit some evidence of wetness, such as mottling in the subsoil. In level areas or slight depressions where the water table is at or near the surface for long periods, the soils show evidence of wetness to a marked degree. They have a dark-colored, thick surface layer and a strongly mottled or grayish subsoil. Some soils are wet because of a high water table or because they occupy a position on the landscape where water accumulates and is perched on an impervious layer in the soil. Permeability of the soil material, as well as the length, steepness, and configuration of slopes, influences the kind of soil that is formed from place to place. Local differences in soils are largely the result of differences in parent material and topography.

Table 18 shows the relationship between soil series and landscape position, parent material, and drainage.

Climate

Climate, particularly temperature and precipitation, is one of the most influential of the soil-forming factors. It determines to a large degree the kind of weathering processes that occur. It also affects the growth and kind of vegetation and the leaching and translocation of weathered materials.

The Cattaraugus, Allegany, and Oil Springs Reservations have a humid, temperate climate which tends to promote the development of moderately weathered, leached soils. Although there is a slightly higher average temperature near Lake Erie, in lowland areas, and on south-facing slopes, variability of the climate is not great enough to cause major differences among the soils in the survey area. For more detailed information on climate, see the section "General Nature of the Survey Area."

Plant and Animal Life

All living organisms, including plants, animals, bacteria, and fungi, influence soil formation. Vegetation is generally responsible for the amount of organic matter and nutrients in the soil and for the color and structure of the surface layer. Earthworms and burrowing animals help to keep the soil porous and more permeable by air and water. Their waste products cause aggregations of soil particles and improve soil structure. Bacteria and fungi decompose vegetation, which results in the release of nutrients.

This survey area was originally in native forest consisting of northern hardwoods and pines. The loss of nutrients through leaching is slow under hardwoods because they take up large quantities of bases (nutrients) and return much of them to the soil surface each year as leaf litter. Conifers, such as pines, do not use large amounts of nutrients; therefore, leaching is more rapid than it is under hardwoods.

Because the rooting depth is shallow in many of the upland soils, trees are susceptible to windthrow, which has caused much mixing of the soil material.

Man, through clearing of trees and cultivation of the land, has also influenced changes that occur in soils. He has added nutrients by fertilizing, has mixed some soil horizons by plowing, and has accelerated erosion in many areas.

Time

The degree of profile development not only reflects the age of a soil, but it also reflects the influence of other factors. In geological terms, the deposits in which soils formed in the survey area are relatively young. Most of the material, other than that in the unglaciated part of the Allegany Reservation, was left after the last glacier retreated 10,000 to 15,000 years ago. The soils have not reached the same stage of profile development, however, because other soil-forming factors also influence the rate and kind of profile development. Collamer and Galen soils, for example, appear to be younger than Mardin and Chenango soils, but the difference in appearance is caused by a difference in parent material.

An immature soil is one that has not had enough time to develop distinct horizons. The Tioga and Wayland soils are such soils and are forming in alluvial sediments on flood plains. They are immature because of the periodic deposition of fresh alluvium.

Processes of Soil Horizon Development

This section contains a brief explanation of soil horizon nomenclature and a discussion of the processes involved in soil horizon development as they relate to soil formation.

The soil-forming factors cause the formation of different layers, or soil horizons. These soil horizons can be viewed in a vertical cut of soil, known as a soil profile. The soil profile extends from the surface downward into material that is little altered by the soil-forming processes. Most soils contain three major horizons, called A, B, and C horizons.

Several processes cause the formation of soil horizons. They include the accumulation of organic matter, the leaching of soluble salts and minerals, the translocation of clay minerals, the reduction and transfer of iron, and the formation of dense and compact layers in the subsoil.

The accumulation of organic matter takes place as plant residue decomposes. This process darkens the surface layer and helps to form the A1 horizon. It takes a long time to replace this organic matter once it has been lost. The organic matter content of the surface layer of soils in the survey area averages about 4 percent.

For soils to develop a distinct subsoil, some of the lime and other soluble salts must be leached before other soil processes such as translocation of clay minerals can take place. Factors that affect leaching include the kinds of salts originally present, the rate and depth of percolation, and the texture of the soil.

One of the more important processes of soil horizon development in some of the soils is the translocation of silicate clay minerals. The amount of clay minerals in a soil is inherent in the parent material, but clay content varies from one soil horizon to another. Clay particles are transported (eluviation) downward from the A horizon and redeposited (illuviation) in the B horizon as clay films on ped faces, as linings along pores and root channels, and as coatings on some coarse fragments. In some soils an A2 horizon has formed by considerable eluviation of clay minerals to the B horizon. The Collamer soil is an example of a soil where the clay content is higher in the B horizon than in the A horizon because of translocation.

The reduction and transfer of iron compounds occur mainly in the wetter, more poorly drained soils. This process is known as gleying. In poorly drained and very poorly drained soils, such as Halsey and Canandaigua soils, the grayish subsoil indicates the reduction of iron. In moderately well drained and somewhat poorly drained soils, such as Elnora and Minoa soils, yellowish brown and reddish brown mottles indicate the segregation of iron compounds. A bright-colored, unmottled subsoil indicates a well drained soil where no reduction and transfer of iron have taken place; Arkport soils are an example.

Some of the soils in the survey area have developed a distinct fragipan in the subsoil. The fragipan is very firm and brittle when moist and very hard when dry. Studies indicate that swelling and shrinking take place in alternating wet and dry periods, which may account for the dense packing of soil particles, the low pore space, and the gross polygonal pattern of vertical cracks in most fragipans (*3*). Clay, silica, and oxides of aluminum are the most likely cementing agents causing brittleness and hardness. Volusia, Mardin, and Chippewa soils are examples of soils that have a well expressed fragipan.

Several well drained and moderately well drained soils in the survey area—for example, Chenango and Valois soils—have a strong brown, yellowish brown, or reddish brown subsoil. These colors are mainly caused by thin coatings of iron oxides on sand and silt particles. The subsoil in these soils normally contains little or no clay translocated from the overlying surface horizon.

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 287-69. *In* 1974 Annual Book of ASTM Standards, Part 19, 464 pp., illus.

(3) Grossman, R.B., and F.J. Carlisle, 1969. Fragipan soils of the eastern United States. Advances in Agronomy. Ser. 21, pp. 237-279.

(4) Muller, Ernest H., 1963. Geology of Chautauqua County, New York, part II, Pleistocene geology. N.Y. St. Museum and Science Serv. Bull. No. 392, 60 pp., illus.

(5) Tesmer, Irving H., 1963. Geology of Chautauqua County, New York. Buffalo Soc. Natu. Sciences, 65 pp., illus.

(6) Tesmer, Irving H., 1975. Geology of Cattaraugus County, New York. Buffalo Soc. Natu. Sciences, 105 pp., illus.

(7) United States Department of Agriculture, 1951. Soil survey manual. U.S. Dep. of Agric. Handb. 18, 503 pp., illus. (Supplements replacing pp. 173-188 issued May 1962.)

(8) 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.

(9) United States Department of the Interior, 1960. Topographic map of Silver Creek Quadrangle, New York. Geol. Surv.

(10) United States Department of the Interior, 1961. Topographic map of Cuba Quadrangle, New York. Geol. Surv.

(11) United States Department of the Interior, 1961. Topographic map of Salamanca Quadrangle, New York. Geol. Surv.

Glossary

ABC soil. A soil having an A, a B, and a C horizon.

AC soil. A soil having only an A and a C horizon. Commonly such soil formed in recent alluvium or on steep rocky slopes.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

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.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 40-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 2.4
Low	2.4 to 3.2
Moderate	3.2 to 5.2
High	>5.2

Basal till. Compact glacial till deposited beneath the ice.

Base saturation. The degree to which material having cation exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation exchange capacity.

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.

Channery soil. A soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a fragment.

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. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15 to 38 centimeters (6 to 15 inches) long.

Coarse textured soil. Sand or loamy sand.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.5 to 25 centimeters) in diameter.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or 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.

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of

the soil profile between depths of 10 inches and 40 or 80 inches.

Conservation tillage system. A form of noninversion tillage that retains protective amounts of residue mulch on the surface throughout the year. It includes no-tillage, strip tillage, stubble mulching, and other types of noniversion tillage.

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.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Deferred grazing. Postponing grazing or resting grazingland for a prescribed period.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

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 drainage 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 they are wet 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.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

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.

Esker (geology). A narrow, winding ridge of stratified gravelly and sandy drift deposited by a stream flowing in a tunnel beneath a glacier.

Excess fines (in tables). Excess silt and clay in the soil. The soil is not a source of gravel or sand for construction purposes.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fine textured soil. Sandy clay, silty clay, and clay.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist, 6 to 15 inches (15 to 37.5 centimeters) long.

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.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Glaciofluvial deposits (geology). Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur as kames, eskers, deltas, and outwash plains.

Glaciolacustrine deposits. Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial melt water. Many deposits are interbedded or laminated.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors 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.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

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.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an O, A, or E horizon. The B horizon is in part a layer of transition from the overlying horizon 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 Arabic numeral 2 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.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—

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.

Kame (geology). An irregular, short ridge or hill of stratified glacial drift.

Kettle (geology). A depression in the soil surface formed by the melting of an ice block buried in glacial drift.

Lacustrine deposit (geology). Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Lake plain (geology). An area dominated by low-lying relief that formed at the bottom of a glacial lake during glacial periods.

Large stones (in tables). Rock fragments 3 inches (7.5 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Sandy loam and fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, and silty clay loam.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. 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).

Munsell notation. A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

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.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan.*

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affecting the specified use.

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

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

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

Poor outlets (in tables). Refers to areas where surface or subsurface drainage outlets are difficult or expensive to install.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

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

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.

Rippable. Bedrock or hardpan can be excavated using a single-tooth ripping attachment mounted on a tractor with a 200-300 draw bar horsepower rating.

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 ground-water 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.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

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.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

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.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slippage (in tables). Soil mass susceptible to movement downslope when loaded, excavated, or wet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope (in tables). Slope is great enough that special practices are required to insure satisfactory performance of the soil for a specific use.

Sloughed till. Water-saturated till that has flowed slowly downhill from its original place of deposit by glacial ice. It may rest on other till, on glacial outwash, or on a glaciolacustrine deposit.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.5 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

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

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

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

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A 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).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terminal moraine. A belt of thick glacial drift that generally marks the termination of important glacial advances.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

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.

Unstable fill (in tables). Risk of caving or sloughing on banks of fill material.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands 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.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Varve. A sedimentary layer or a lamina or sequence of laminae deposited in a body of still water within a year. Specifically, a thin pair of graded glaciolacustrine layers seasonally deposited, usually by melt water streams, in a glacial lake or other body of still water in front of a glacier.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

[Recorded in the period 1951-79 at Allegany, New York]

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January	31.3	13.2	22.3	56	-15	10	2.83	1.80	3.76	9	17.5
February	33.7	13.4	23.6	59	-19	11	2.64	1.58	3.58	8	17.5
March	42.8	21.8	32.3	73	-5	39	3.16	1.90	4.28	9	15.7
April	56.6	31.8	44.2	84	10	174	3.58	2.40	4.65	10	2.2
May	68.1	40.5	54.3	87	23	449	4.03	2.72	5.21	10	.0
June	76.1	49.9	63.0	90	31	690	4.21	2.53	5.71	9	.0
July	79.6	53.4	66.5	92	37	822	4.22	2.45	5.78	9	.0
August	77.9	52.3	65.1	91	35	778	3.97	2.29	5.45	8	.0
September	71.3	46.3	58.8	89	28	564	4.35	2.47	6.01	8	.0
October	60.9	36.8	48.9	81	18	293	3.47	1.51	5.13	8	.6
November	47.0	29.3	38.2	72	7	73	4.09	2.76	5.30	10	11.7
December	35.3	19.2	27.3	62	-12	18	3.56	2.36	4.65	12	23.0
Yearly:											
Average	56.7	34.0	45.4	---	---	---	---	---	---	---	---
Extreme	---	---	---	93	-21	---	---	---	---	---	---
Total	---	---	---	---	---	3,921	44.11	38.05	49.92	110	88.2

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40° F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

[Recorded in the period 1951-79 at Allegany, New York]

Probability	Temperature		
	24° F or lower	28° F or lower	32° F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	May 7	May 31	June 13
2 years in 10 later than--	May 10	May 26	June 7
5 years in 10 later than--	April 28	May 15	May 28
First freezing temperature in fall:			
1 year in 10 earlier than--	September 26	September 7	August 19
2 years in 10 earlier than--	October 4	September 18	August 29
5 years in 10 earlier than--	October 19	October 8	September 18

TABLE 3.--GROWING SEASON

[Recorded in the period 1951-79 at Allegany, New York]

Probability	Length of growing season if daily minimum temperature is--		
	Higher than 24° F	Higher than 28° F	Higher than 32° F
	Days	Days	Days
9 years in 10	143	109	81
8 years in 10	153	121	92
5 years in 10	173	145	112
2 years in 10	193	169	133
1 year in 10	203	181	144

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
AkA	Allard silt loam, 0 to 3 percent slopes	2,636	6.2
AkB	Allard silt loam, 3 to 8 percent slopes	293	0.7
AlA	Allard Variant silt loam, 0 to 3 percent slopes	70	0.2
AlB	Allard Variant silt loam, 3 to 8 percent slopes	28	0.1
AlC	Allard Variant silt loam, 8 to 15 percent slopes	122	0.3
AmA	Alton fine gravelly loam, 0 to 3 percent slopes	518	1.2
AmB	Alton fine gravelly loam, 3 to 8 percent slopes	196	0.5
AmC	Alton fine gravelly loam, 8 to 15 percent slopes	198	0.5
AoA	Angola silt loam, 0 to 3 percent slopes	43	0.1
ArC	Arkport very fine sandy loam, 8 to 15 percent slopes	53	0.1
ArE	Arkport very fine sandy loam, 25 to 40 percent slopes	246	0.6
Be	Beaches	14	*
BlB	Blasdell shaly silt loam, 3 to 8 percent slopes	38	0.1
BrB	Brinkerton Variant silt loam, 3 to 8 percent slopes	1,058	2.5
BrC	Brinkerton Variant silt loam, 8 to 15 percent slopes	841	2.0
BrD	Brinkerton Variant silt loam, 15 to 25 percent slopes	91	0.2
Ca	Canadice silt loam	132	0.3
Cb	Canadice silty clay loam	414	1.0
Cc	Canandaigua silt loam	521	1.2
Cd	Canandaigua mucky silt loam	158	0.4
Ce	Canandaigua silt loam, acid substratum	355	0.8
CfA	Caneadea silty clay loam, 0 to 3 percent slopes	399	0.9
CfB	Caneadea silty clay loam, 3 to 8 percent slopes	98	0.2
CgA	Castile gravelly loam, 0 to 3 percent slopes	308	0.7
Ch	Chenango sandy loam	123	0.3
CkA	Chenango gravelly loam, 0 to 3 percent slopes	3,127	7.3
CkB	Chenango gravelly loam, 3 to 8 percent slopes	1,502	3.5
CkC	Chenango gravelly loam, 8 to 15 percent slopes	650	1.5
CkD	Chenango gravelly loam, 15 to 25 percent slopes	362	0.8
CkE	Chenango gravelly loam, 25 to 40 percent slopes	804	1.9
ClA	Chenango channery silt loam, fan, 0 to 3 percent slopes	288	0.7
ClB	Chenango channery silt loam, fan, 3 to 8 percent slopes	137	0.3
Cn	Chippewa silt loam	20	*
CoA	Churchville silt loam, 0 to 3 percent slopes	80	0.2
CoB	Churchville silt loam, 3 to 8 percent slopes	188	0.4
CsB	Collamer silt loam, 3 to 8 percent slopes	155	0.4
CsC	Collamer silt loam, 8 to 15 percent slopes	21	*
CtB	Collamer silt loam, till substratum, 3 to 8 percent slopes	61	0.1
CuB	Colonie loamy fine sand, 3 to 8 percent slopes	131	0.3
CuC	Colonie loamy fine sand, 8 to 15 percent slopes	353	0.8
Cv	Cosad loamy fine sand	45	0.1
DdA	Derb silt loam, 0 to 3 percent slopes	539	1.3
DdB	Derb silt loam, 3 to 8 percent slopes	759	1.8
DdC	Derb silt loam, 8 to 15 percent slopes	90	0.2
ElA	Elnora loamy fine sand, 0 to 3 percent slopes	49	0.1
ElB	Elnora loamy fine sand, 3 to 8 percent slopes	165	0.4
ErB	Ernest Variant silt loam, 3 to 8 percent slopes	92	0.2
ErC	Ernest Variant silt loam, 8 to 15 percent slopes	206	0.5
ErD	Ernest Variant silt loam, 15 to 25 percent slopes	367	0.9
FbB	Farnham shaly silt loam, 3 to 8 percent slopes	28	0.1
Fu	Fluvaquents and Udifluvents, frequently flooded	708	1.7
FxB	Fremont silt loam, 3 to 8 percent slopes	35	0.1
GaA	Galen very fine sandy loam, 0 to 3 percent slopes	75	0.2
GaB	Galen very fine sandy loam, 3 to 8 percent slopes	91	0.2
GlB	Gilpin shaly silt loam, 3 to 8 percent slopes	111	0.3
GlC	Gilpin shaly silt loam, 8 to 15 percent slopes	62	0.1
GlD	Gilpin shaly silt loam, 15 to 25 percent slopes	83	0.2
GlE	Gilpin shaly silt loam, 25 to 35 percent slopes	57	0.1
GlF	Gilpin shaly silt loam, 35 to 65 percent slopes	461	1.1
Ha	Halsey silt loam	298	0.7
Hn	Haplaquolls, ponded	18	*
HuB	Hudson silt loam, 3 to 8 percent slopes	9	*
HvE	Hudson silty clay loam, 25 to 40 percent slopes	19	*
Lc	Lamson very fine sandy loam	298	0.7
Ld	Lamson mucky very fine sandy loam	26	0.1
LoC	Lordstown channery silt loam, 8 to 15 percent slopes	49	0.1
LoF	Lordstown channery silt loam, 35 to 65 percent slopes	132	0.3
Ly	Lyons silt loam	69	0.2
MaA	Manlius shaly silt loam, 0 to 3 percent slopes	32	0.1
MaB	Manlius shaly silt loam, 3 to 8 percent slopes	47	0.1

See footnote at end of table.

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Acres	Percent
MaD	Manlius shaly silt loam, 15 to 25 percent slopes	102	0.2
MbE	Manlius very shaly silt loam, 25 to 35 percent slopes	20	*
MbF	Manlius very shaly silt loam, 35 to 50 percent slopes	139	0.3
MdB	Mardin channery silt loam, 3 to 8 percent slopes	10	*
MdC	Mardin channery silt loam, 8 to 15 percent slopes	13	*
MdD	Mardin channery silt loam, 15 to 25 percent slopes	64	0.1
MfB	Marilla shaly silt loam, 3 to 8 percent slopes	33	0.1
MfC	Marilla shaly silt loam, 8 to 15 percent slopes	56	0.1
Mg	Middlebury silt loam	3,288	7.7
Mh	Minoa very fine sandy loam	477	1.1
NfA	Niagara silt loam, 0 to 3 percent slopes	552	1.3
NfB	Niagara silt loam, 3 to 8 percent slopes	543	1.3
Nh	Niagara silt loam, till substratum	225	0.5
OrA	Orpark silty clay loam, 0 to 3 percent slopes	196	0.5
OrB	Orpark silty clay loam, 3 to 8 percent slopes	378	0.9
OrC	Orpark silty clay loam, 8 to 15 percent slopes	91	0.2
Pa	Palms muck	130	0.3
Pc	Patchin silt loam	44	0.1
PhA	Phelps gravelly loam, 0 to 3 percent slopes	96	0.2
Pt	Pits, borrow	21	0.1
Pu	Pits, gravel	273	0.6
RaB	Rayne channery silt loam, 3 to 8 percent slopes	58	0.1
RaC	Rayne channery silt loam, 8 to 15 percent slopes	180	0.4
RaD	Rayne channery silt loam, 15 to 25 percent slopes	1,023	2.4
RaE	Rayne channery silt loam, 25 to 35 percent slopes	2,194	5.1
RaF	Rayne channery silt loam, 35 to 65 percent slopes	1,382	3.2
RbC	Rayne extremely bouldery silt loam, 8 to 15 percent slopes	13	*
RbD	Rayne extremely bouldery silt loam, 15 to 25 percent slopes	104	0.2
RbE	Rayne extremely bouldery silt loam, 25 to 35 percent slopes	123	0.3
RbF	Rayne extremely bouldery silt loam, 35 to 65 percent slopes	123	0.3
RcA	Raynham silt loam, 0 to 3 percent slopes	533	1.2
RcB	Raynham silt loam, 3 to 8 percent slopes	219	0.5
Re	Red Hook silt loam	371	0.9
RgA	Rhinebeck silt loam, 0 to 3 percent slopes	204	0.5
RkA	Rhinebeck gravelly loam, 0 to 3 percent slopes	50	0.1
ScB	Schuyler silt loam, 3 to 8 percent slopes	62	0.1
ScD	Schuyler silt loam, 15 to 25 percent slopes	29	0.1
Sd	Scio silt loam	968	2.3
To	Tioga silt loam	2,786	6.5
Ua	Unadilla silt loam	1,073	2.5
VaB	Valois gravelly silt loam, 3 to 8 percent slopes	23	0.1
VpA	Volusia channery silt loam, 0 to 3 percent slopes	269	0.6
VpB	Volusia channery silt loam, 3 to 8 percent slopes	123	0.3
VpC	Volusia channery silt loam, 8 to 15 percent slopes	113	0.3
Wa	Wallington silt loam	33	0.1
Wd	Wayland silt loam	714	1.7
WhC	Wharton silt loam, 8 to 15 percent slopes	22	0.1
WhD	Wharton silt loam, 15 to 25 percent slopes	183	0.4
WmB	Williamson silt loam, 3 to 8 percent slopes	109	0.3
W	Water	1,102	2.6
	Total	42,789	100.0

* Less than 0.1 percent.

TABLE 5.--PRIME FARMLAND

[Urban or built-up areas of the soils listed are not considered prime farmland. If a soil is prime farmland only if certain limitations have been overcome, the corrective measures are specified in parentheses after the soil name]

Map symbol	Soil name
AkA	Allard silt loam, 0 to 3 percent slopes
AkB	Allard silt loam, 3 to 8 percent slopes
AlA	Allard Variant silt loam, 0 to 3 percent slopes
AlB	Allard Variant silt loam, 3 to 8 percent slopes
AmA	Alton fine gravelly loam, 0 to 3 percent slopes
AmB	Alton fine gravelly loam, 3 to 8 percent slopes
BlB	Blasdell shaly silt loam, 3 to 8 percent slopes
CgA	Castile gravelly loam, 0 to 3 percent slopes
Ch	Chenango sandy loam
CkA	Chenango gravelly loam, 0 to 3 percent slopes
CkB	Chenango gravelly loam, 3 to 8 percent slopes
ClA	Chenango channery silt loam, fan, 0 to 3 percent slopes
ClB	Chenango channery silt loam, fan, 3 to 8 percent slopes
CoA	Churchville silt loam, 0 to 3 percent slopes (where drained)
CoB	Churchville silt loam, 3 to 8 percent slopes (where drained)
CsB	Collamer silt loam, 3 to 8 percent slopes
CtB	Collamer silt loam, till substratum,3 to 8 percent (where drained)
Cv	Cosad loamy fine sand (where drained)
ErB	Ernest Variant silt loam, 3 to 8 percent slopes
FbB	Farnham shaly silt loam, 3 to 8 percent slopes
GaA	Galen very fine sandy loam, 0 to 3 percent slopes
GaB	Galen very fine sandy loam, 3 to 8 percent slopes
HuB	Hudson silt loam, 3 to 8 percent slopes
Mg	Middlebury silt loam
Mh	Minoa very fine sandy loam (where drained)
NfA	Niagara silt loam, 0 to 3 percent slopes (where drained)
NfB	Niagara silt loam, 3 to 8 percent slopes (where drained)
Nh	Niagara silt loam, till substratum (where drained)
PhA	Phelps gravelly loam, 0 to 3 percent slopes
RaB	Rayne channery silt loam, 3 to 8 percent slopes
RcA	Raynham silt loam, 0 to 3 percent slopes (where drained)
RcB	Raynham silt loam, 3 to 8 percent slopes (where drained)
Re	Red Hook silt loam (where drained)
RgA	Rhinebeck silt loam, 0 to 3 percent slopes (where drained)
RkA	Rhinebeck gravelly loam, 0 to 3 percent slopes (where drained)
ScB	Schuyler silt loam, 3 to 8 percent slopes
Sd	Scio silt loam
To	Tioga silt loam
Ua	Unadilla silt loam
VaB	Valois gravelly silt loam, 3 to 8 percent slopes
Wa	Wallington silt loam (where drained)
WmB	Williamson silt loam, 3 to 8 percent slopes

TABLE 6.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS

[Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil]

Soil name and map symbol	Land capability	Sweet corn	Tomatoes	Snap beans	Strawberries	Corn silage	Wheat	Alfalfa hay
		Ton	Ton	Ton	Quarts	Ton	Bu	Ton
AkA---------- Allard	I	6	25	5.0	8,000	25	65	6.0
AkB---------- Allard	IIe	6	25	5.0	8,000	24	65	6.0
AlA---------- Allard Variant	IIw	5.5	23	4.8	7,000	23	60	5.0
AlB---------- Allard Variant	IIe	5.5	23	4.8	7,000	23	60	5.0
AlC---------- Allard Variant	IIIe	4.0	18	---	---	21	50	5.0
AmA---------- Alton	IIs	5.5	23	4.8	7,000	22	55	5.5
AmB---------- Alton	IIs	5.5	23	4.8	7,000	21	55	5.5
AmC---------- Alton	IIIe	5.0	18	---	---	18	45	5.0
AoA---------- Angola	IIIw	3.0	---	---	---	16	55	---
ArC---------- Arkport	IIIe	3.5	18	---	---	18	45	5.0
ArE---------- Arkport	VIe	---	---	---	---	---	---	---
Be*. Beaches								
BlB---------- Blasdell	IIs	5.5	23	4.5	7,000	21	50	5.5
BrB---------- Brinkerton Variant	IIIw	3.0	---	---	---	17	50	3.5
BrC---------- Brinkerton Variant	IIIe	2.0	---	---	---	16	40	---
BrD---------- Brinkerton Variant	IVe	---	---	---	---	---	---	---
Ca, Cb---------- Canadice	IVw	---	---	---	---	15	---	---
Cc---------- Canandaigua	IIIw	4.0	16	3.3	---	17	40	---
Cd---------- Canandaigua	Vw	---	---	---	---	---	---	---
Ce---------- Canandaigua	Vw	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 6.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS--Continued

Soil name and map symbol	Land capability	Sweet corn	Tomatoes	Snap beans	Strawberries	Corn silage	Wheat	Alfalfa hay
		Ton	Ton	Ton	Quarts	Ton	Bu	Ton
CfA---------- Caneadea	IIIw	3.5	16	2.5	---	17	40	---
CfB---------- Caneadea	IIIw	4.0	16	2.8	---	18	45	---
CgA---------- Castile	IIw	5.5	23	4.8	7,000	23	60	5.0
Ch, CkA------ Chenango	IIs	5.5	23	4.8	7,000	22	50	5.5
CkB---------- Chenango	IIs	5.5	23	4.5	7,000	21	50	5.5
CkC---------- Chenango	IIIe	5.0	18	---	---	18	40	5.5
CkD---------- Chenango	IVe	---	---	---	---	15	35	5.0
CkE---------- Chenango	VIe	---	---	---	---	---	---	---
ClA---------- Chenango	IIs	5.5	23	4.8	7,000	22	50	5.5
ClB---------- Chenango	IIs	5.5	23	4.5	7,000	21	50	5.5
Cn---------- Chippewa	IVw	---	---	---	---	---	---	---
CoA, CoB----- Churchville	IIIw	3.0	15	3.0	---	18	45	---
CsB---------- Collamer	IIe	5.5	23	5.0	7,000	23	60	5.5
CsC---------- Collamer	IIIe	4.5	18	---	---	21	50	5.0
CtB---------- Collamer	IIe	5.5	23	5.0	7,000	23	60	5.5
CuB---------- Colonie	IIIs	4.0	18	3.3	4,000	16	---	4.0
CuC---------- Colonie	IVs	3.5	15	---	---	14	25	3.5
Cv---------- Cosad	IIIw	3.0	---	3.0	---	17	40	---
DdA---------- Derb	IIIw	3.0	---	---	---	16	45	---
DdB---------- Derb	IIIw	3.0	---	---	---	17	50	---
DdC---------- Derb	IIIw	2.0	---	---	---	16	40	---
ElA---------- Elnora	IIIw	4.0	18	3.3	5,000	17	40	3.5
ElB---------- Elnora	IIIw	4.0	18	3.3	5,000	17	40	3.5

TABLE 6.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS--Continued

Soil name and map symbol	Land capability	Sweet corn	Tomatoes	Snap beans	Straw-berries	Corn silage	Wheat	Alfalfa hay
		Ton	Ton	Ton	Quarts	Ton	Bu	Ton
ErB--- Ernest Variant	IIe	---	---	---	---	20	40	4.0
ErC--- Ernest Variant	IIIe	---	---	---	---	19	40	4.0
ErD--- Ernest Variant	IVe	---	---	---	---	18	35	3.5
FbB--- Farnham	IIw	5.0	20	4.5	7,000	20	55	5.0
Fu--- Fluvaquents and Udifluvents	Vw	---	---	---	---	---	---	---
FxB--- Fremont	IIIw	---	---	---	---	14	35	3.0
GaA--- Galen	IIw	5.0	20	4.0	7,000	21	55	4.5
GaB--- Galen	IIw	5.0	20	4.5	7,000	21	55	5.0
GlB--- Gilpin	IIe	---	---	---	---	---	40	3.5
GlC--- Gilpin	IIIe	---	---	---	---	---	35	3.5
GlD--- Gilpin	IVe	---	---	---	---	---	30	3.0
GlE--- Gilpin	VIe	---	---	---	---	---	---	---
GlF--- Gilpin	VIIe	---	---	---	---	---	---	---
Ha--- Halsey	Vw	---	---	---	---	17	35	---
Hn--- Haplaquolls	VIIIw							
HuB--- Hudson	IIe	---	---	---	---	24	50	5.0
HvE--- Hudson	VIe	---	---	---	---	---	---	---
Lc--- Lamson	IIIw	4.0	18	3.3	---	18	40	---
Ld--- Lamson	Vw	---	---	---	---	---	---	---
LoC--- Lordstown	IIIe	---	---	---	---	17	---	3.5
LoF--- Lordstown	VIIe	---	---	---	---	---	---	---
Ly--- Lyons	IVw	---	---	---	---	16	---	---

TABLE 6.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS--Continued

Soil name and map symbol	Land capability	Sweet corn	Tomatoes	Snap beans	Strawberries	Corn silage	Wheat	Alfalfa hay
		Ton	Ton	Ton	Quarts	Ton	Bu	Ton
MaA--- Manlius	IIs	---	---	---	---	17	45	4.0
MaB--- Manlius	IIe	---	---	---	---	16	40	3.5
MaD--- Manlius	IVe	---	---	---	---	12	30	3.0
MbE--- Manlius	VIe	---	---	---	---	---	---	---
MbF--- Manlius	VIIe	---	---	---	---	---	---	---
MdB--- Mardin	IIw	---	---	---	---	19	50	4.0
MdC--- Mardin	IIIe	---	---	---	---	---	---	4.0
MdD--- Mardin	IVe	---	---	---	---	---	---	---
MfB--- Marilla	IIw	---	---	---	---	20	50	4.5
MfC--- Marilla	IIIe	---	---	---	---	18	40	4.0
Mg--- Middlebury	IIw	5.5	23	4.8	7,000	23	45	5.0
Mh--- Minoa	IIIw	4.0	18	3.5	---	19	45	---
NfA--- Niagara	IIIw	4.0	20	3.5	---	19	50	---
NfB--- Niagara	IIIw	4.5	20	3.8	---	20	55	---
Nh--- Niagara	IIIw	4.0	20	3.5	---	19	50	---
OrA--- Orpark	IIIw	---	---	---	---	16	40	---
OrB--- Orpark	IIIw	---	---	---	---	17	45	---
OrC--- Orpark	IIIe	---	---	---	---	16	35	---
Pa--- Palms	Vw	---	---	---	---	---	---	---
Pc--- Patchin	IVw	---	---	---	---	10	---	---
PhA--- Phelps	IIw	5.5	23	4.8	7,000	23	60	5.0
Pt*, Pu*. Pits								
RaB--- Rayne	IIe	---	---	---	---	22	45	4.5

See footnote at end of table.

TABLE 6.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS--Continued

Soil name and map symbol	Land capability	Sweet corn	Tomatoes	Snap beans	Straw-berries	Corn silage	Wheat	Alfalfa hay
		Ton	Ton	Ton	Quarts	Ton	Bu	Ton
RaC--Rayne	IIIe	---	---	---	---	20	40	4.5
RaD--Rayne	IVe	---	---	---	---	19	40	4.0
RaE--Rayne	VIe	---	---	---	---	---	---	---
RaF--Rayne	VIIe	---	---	---	---	---	---	---
RbC, RbD, RbE--Rayne	VIIs	---	---	---	---	---	---	---
RbF--Rayne	VIIe	---	---	---	---	---	---	---
RcA, RcB--Raynham	IIIw	4.0	20	3.5	---	19	50	---
Re--Red Hook	IIIw	4.0	20	3.5	---	19	50	---
RgA, RkA--Rhinebeck	IIIw	3.5	16	2.5	---	17	40	---
ScB--Schuyler	IIe	---	---	---	---	18	40	---
ScD--Schuyler	IVe	---	---	---	---	16	35	4.0
Sd--Scio	IIw	5.5	23	4.8	7,000	23	60	5.0
To--Tioga	I	6.0	25	5.0	8,000	25	55	6.0
Ua--Unadilla	I	6.0	25	5.0	8,000	25	55	6.0
VaB--Valois	IIe	5.5	25	4.8	7,000	23	60	5.5
VpA--Volusia	IIIw	---	---	---	---	15	30	---
VpB--Volusia	IIIw	---	---	---	---	16	35	---
VpC--Volusia	IIIe	---	---	---	---	14	---	3.0
Wa--Wallington	IIIw	---	---	---	---	---	35	3.5
Wd--Wayland	Vw	4.0	---	3.0	---	17	---	---
WhC--Wharton	IIIe	---	---	---	---	16	35	3.5
WhD--Wharton	IVe	---	---	---	---	14	30	3.0
WmB--Williamson	IIe	---	---	---	---	20	45	4.5

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that 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	
AkA, AkB---------- Allard	2o	Slight	Slight	Slight	Slight	Sugar maple--------- White ash---------- Northern red oak---- Black cherry-------- American beech------ Eastern white pine-- Eastern hemlock-----	63 76 70 70 --- 75 ---	Eastern white pine, Norway spruce, European larch, red pine.
AlA, AlB---------- Allard Variant	2o	Slight	Slight	Slight	Slight	Northern red oak---- White ash---------- Sugar maple--------- Black cherry--------	75 85 70 80	European larch, Norway spruce, white spruce, eastern white pine.
AlC---------- Allard Variant	2r	Moderate	Slight	Slight	Slight	Northern red oak---- White ash---------- Sugar maple--------- Black cherry--------	75 85 70 80	European larch, Norway spruce, white spruce, eastern white pine.
AmA, AmB, AmC------ Alton	3o	Slight	Slight	Slight	Slight	Sugar maple--------- Northern red oak----	60 70	Eastern white pine, red pine, European larch.
AoA---------- Angola	3w	Slight	Moderate	Moderate	Slight	Northern red oak---- Sugar maple--------- White ash----------	70 60 70	Eastern white pine, Norway spruce, white spruce, European larch.
ArC---------- Arkport	2o	Slight	Slight	Slight	Slight	Sugar maple--------- Red pine---------- Eastern white pine--	70 85 85	Norway spruce, red pine, eastern white pine.
ArE---------- Arkport	2r	Slight	Moderate	Slight	Slight	Sugar maple--------- Eastern white pine-- Red pine---------- Northern red oak----	70 85 85 75	Norway spruce, eastern white pine.
BlB---------- Blasdell	2o	Slight	Slight	Slight	Slight	Sugar maple--------- Northern red oak----	70 80	Eastern white pine, red pine, European larch.
BrB---------- Brinkerton Variant	3w	Slight	Slight	Moderate	Moderate	Sugar maple--------- Northern red oak---- White ash---------- Black cherry--------	65 65 --- ---	Norway spruce, white spruce, European larch, white ash, sugar maple.
BrC---------- Brinkerton Variant	3w	Slight	Moderate	Moderate	Moderate	Sugar maple--------- Northern red oak---- White ash---------- Black cherry--------	65 65 --- ---	Norway spruce, white spruce, European larch, white ash, sugar maple.
BrD---------- Brinkerton Variant	3r	Moderate	Moderate	Moderate	Moderate	Sugar maple--------- Northern red oak---- White ash---------- Black cherry--------	65 65 --- ---	Norway spruce, white spruce, European larch, white ash, sugar maple.
Ca, Cb---------- Canadice	5w	Slight	Severe	Severe	Moderate	Red maple---------- Eastern white pine--	50 55	Eastern white pine, white spruce.
Cc, Cd, Ce--------- Canandaigua	4w	Slight	Severe	Severe	Severe	Red maple---------- Eastern white pine--	65 65	Eastern white pine, white spruce.

TABLE 7.--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	
CfA, CfB---------- Caneadea	3c	Slight	Slight	Severe	Severe	Northern red oak----	70	Austrian pine, yellow-poplar, red maple, eastern white pine, white spruce.
						Sugar maple---------	65	
						White ash----------	---	
						Black cherry--------	---	
						Red maple----------	---	
						White oak----------	---	
CgA---------- Castile	3o	Slight	Slight	Slight	Slight	Sugar maple---------	63	Eastern white pine, Norway spruce, white spruce.
						Northern red oak----	70	
						Black cherry--------	70	
Ch, CkA, CkB, CkC-- Chenango	2o	Slight	Slight	Slight	Slight	Sugar maple---------	70	Eastern white pine, red pine, European larch, Norway spruce.
						Northern red oak----	80	
CkD, CkE---------- Chenango	2r	Slight	Moderate	Slight	Slight	Sugar maple---------	70	Eastern white pine, red pine, European larch, Norway spruce.
						Northern red oak----	80	
ClA, ClB---------- Chenango	2o	Slight	Slight	Slight	Slight	Sugar maple---------	70	Eastern white pine, Norway spruce.
						Northern red oak----	80	
Cn---------- Chippewa	5w	Slight	Severe	Severe	Severe	Red maple----------	50	White spruce, northern white-cedar.
						Northern white-cedar	---	
CoA, CoB---------- Churchville	3w	Slight	Moderate	Slight	Moderate	Sugar maple---------	60	Eastern white pine, Norway spruce.
						Eastern white pine--	75	
						Northern red oak----	70	
CsB---------- Collamer	2o	Slight	Slight	Slight	Slight	Sugar maple---------	70	Eastern white pine, Norway spruce, white spruce, European larch.
						Black cherry--------	80	
						White ash----------	85	
						Northern red oak----	80	
						American basswood---	75	
CsC---------- Collamer	2r	Moderate	Slight	Slight	Slight	Sugar maple---------	70	Eastern white pine, Norway spruce, white spruce, European larch.
						Black cherry--------	80	
						White ash----------	85	
						Northern red oak----	80	
						American basswood---	75	
CtB---------- Collamer	2o	Slight	Slight	Slight	Slight	Sugar maple---------	70	Eastern white pine, Norway spruce, white spruce, European larch.
						Black cherry--------	80	
						White ash----------	85	
						Northern red oak----	80	
						American basswood---	75	
CuB, CuC---------- Colonie	4s	Slight	Slight	Severe	Slight	Eastern white pine--	65	Eastern white pine, European larch, red pine.
						Northern red oak----	60	
						Sugar maple---------	55	
						White oak----------	60	
						Red pine-----------	65	
Cv---------- Cosad	4w	Slight	Moderate	Moderate	Moderate	Red maple----------	70	Norway spruce, white spruce, eastern white pine, northern white-cedar.
						Eastern white pine--	70	
DdA, DdB, DdC------ Derb	3w	Slight	Moderate	Moderate	Moderate	Sugar maple---------	65	Eastern white pine, Norway spruce, white spruce, European larch, Scotch pine, Douglas-fir.
						Northern red oak----	70	
						White ash----------	75	
ElA, ElB---------- Elnora	4s	Slight	Slight	Severe	Slight	Northern red oak----	60	Eastern white pine, Norway spruce.
						Eastern white pine--	65	
						Sugar maple---------	55	

TABLE 7.--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	
ErB---------- Ernest Variant	2o	Slight	Slight	Slight	Slight	Sugar maple--------- Northern red oak---- White ash---------- Black cherry--------	70 80 --- ---	Sugar maple, white ash, eastern white pine, white spruce, Norway spruce.
ErC---------- Ernest Variant	2r	Moderate	Slight	Slight	Slight	Sugar maple--------- Northern red oak---- White ash---------- Black cherry--------	70 80 --- ---	Sugar maple, white ash, eastern white pine, white spruce, Norway spruce.
ErD---------- Ernest Variant	2r	Severe	Moderate	Slight	Slight	Sugar maple--------- Northern red oak---- White ash---------- Black cherry--------	70 80 --- ---	Sugar maple, white ash, eastern white pine, white spruce, Norway spruce.
FbB---------- Farnham	3o	Slight	Slight	Slight	Slight	Sugar maple--------- Northern red oak---- Black cherry--------	65 70 70	Eastern white pine, Norway spruce, European larch, white spruce.
FxB---------- Fremont	3w	Slight	Moderate	Moderate	Moderate	Sugar maple--------- Northern red oak---- American basswood--- White ash---------- Red maple----------	65 65 --- 75 70	Eastern white pine, European larch, Norway spruce, white spruce.
GaA, GaB---------- Galen	2o	Slight	Slight	Slight	Slight	Sugar maple--------- White ash---------- Eastern white pine--	70 84 85	Eastern white pine, red pine, Norway spruce, European larch.
GlB, GlC---------- Gilpin	2o	Slight	Slight	Slight	Slight	Northern red oak---- Yellow-poplar-------	80 95	Japanese larch, eastern white pine, black cherry, yellow-poplar.
GlD, GlE---------- Gilpin	2r	Moderate	Moderate	Slight	Slight	Northern red oak---- Yellow-poplar-------	80 95	Japanese larch, eastern white pine, black cherry, yellow-poplar.
GlF---------- Gilpin	2r	Severe	Severe	Slight	Slight	Northern red oak---- Yellow-poplar-------	80 95	Japanese larch, eastern white pine, black cherry, yellow-poplar.
Ha---------- Halsey	5w	Slight	Severe	Severe	Severe	Red maple---------- White oak---------- American beech------	55 --- ---	Eastern white pine, white spruce.
HuB---------- Hudson	2o	Slight	Slight	Slight	Slight	Northern red oak---- Sugar maple--------- Eastern white pine-- White ash----------	80 70 85 85	Eastern white pine, yellow-poplar, black cherry, black walnut.
HvE---------- Hudson	2r	Severe	Moderate	Slight	Slight	Northern red oak---- Sugar maple--------- Eastern white pine-- White ash----------	80 70 85 85	Eastern white pine, yellow-poplar, black cherry, black walnut.
Lc, Ld---------- Lamson	4w	Slight	Severe	Severe	Severe	Eastern white pine-- Red maple----------	65 65	Northern white-cedar, eastern white pine.
LoC---------- Lordstown	3o	Slight	Slight	Slight	Slight	Northern red oak---- Sugar maple--------- White ash----------	70 73 75	Eastern white pine, European larch, red pine, Norway spruce.

TABLE 7.--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	
LoF---- Lordstown	3r	Moderate	Severe	Slight	Slight	Northern red oak---- Sugar maple---------- White ash----------	70 73 75	Eastern white pine, European larch, red pine, Norway spruce.
Ly---- Lyons	5w	Slight	Severe	Severe	Severe	Red maple----------	50	Northern white-cedar.
MaA, MaB---- Manlius	3o	Slight	Slight	Slight	Slight	Northern red oak---- Black cherry-------- Sugar maple---------	70 70 70	Eastern white pine, red pine, black cherry, Norway spruce, European larch.
MaD, MbE---- Manlius	3r	Slight	Moderate	Slight	Slight	Northern red oak---- Black cherry-------- Sugar maple---------	70 70 70	Eastern white pine, red pine, black cherry, Norway spruce, European larch.
MbF---- Manlius	3r	Moderate	Severe	Slight	Slight	Northern red oak---- Black cherry-------- Sugar maple---------	70 70 70	Eastern white pine, red pine, black cherry, Norway spruce, European larch.
MdB, MdC---- Mardin	3o	Slight	Slight	Slight	Slight	Sugar maple--------- Northern red oak---- Black cherry-------- White ash----------	60 63 70 70	Red pine, European larch, Norway spruce, eastern white pine, white spruce.
MdD---- Mardin	3r	Slight	Moderate	Slight	Slight	Sugar maple--------- Northern red oak---- Black cherry-------- White ash----------	60 63 70 70	Red pine, European larch, Norway spruce, eastern white pine, white spruce.
MfB, MfC---- Marilla	3o	Slight	Slight	Slight	Slight	Sugar maple--------- Northern red oak---- Black cherry--------	60 63 75	Red pine, European larch, Norway spruce, eastern white pine.
Mg---- Middlebury	2o	Slight	Slight	Slight	Slight	Northern red oak---- Sugar maple--------- Yellow-poplar-------	80 70 85	Eastern white pine, yellow-poplar, Norway spruce, European larch, black walnut, black cherry.
Mh---- Minoa	3w	Slight	Moderate	Moderate	Moderate	Sugar maple--------- White ash---------- Northern red oak---- Eastern hemlock-----	60 69 70 65	Eastern white pine, Norway spruce, European larch, white spruce.
NfA, NfB, Nh---- Niagara	3w	Slight	Moderate	Moderate	Moderate	Sugar maple--------- Northern red oak---- White ash---------- Black cherry--------	65 70 75 70	Eastern white pine, white spruce, Norway spruce.
OrA, OrB, OrC---- Orpark	3w	Slight	Moderate	Moderate	Slight	Northern red oak---- Sugar maple---------	70 60	Eastern white pine, Norway spruce, white spruce, European larch.
Pa---- Palms	4w	Slight	Severe	Severe	Severe	White ash---------- Red maple----------	51 51	
Pc---- Patchin	5w	Slight	Severe	Severe	Severe	Red maple---------- Eastern hemlock----- Northern white-cedar	60 --- ---	White spruce.

TABLE 7.--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	
PhA---------- Phelps	2o	Slight	Slight	Slight	Slight	Sugar maple--------- White ash---------- Eastern white pine--	70 84 85	Eastern white pine, red pine, Norway spruce, European larch, white spruce.
RaB, RaC---------- Rayne	2o	Slight	Slight	Slight	Slight	Northern red oak---- Yellow-poplar------- Eastern white pine-- Sugar maple---------	80 90 90 ---	Eastern white pine, yellow-poplar, black cherry, Norway spruce.
RaD, RaE---------- Rayne	2r	Slight	Moderate	Slight	Slight	Northern red oak---- Yellow-poplar------- Eastern white pine-- Sugar maple---------	80 90 90 ---	Eastern white pine, yellow-poplar, black cherry, Norway spruce.
RaF---------- Rayne	2r	Moderate	Severe	Slight	Slight	Northern red oak---- Yellow-poplar------- Eastern white pine-- Sugar maple---------	80 90 90 ---	Eastern white pine, yellow-poplar, black cherry, Norway spruce.
RbC, RbD, RbE------ Rayne	2x	Slight	Moderate	Slight	Slight	Northern red oak---- Yellow-poplar------- Eastern white pine-- Sugar maple---------	80 90 90 ---	Eastern white pine, yellow-poplar, black cherry, Norway spruce.
RbF---------- Rayne	2x	Moderate	Severe	Slight	Slight	Northern red oak---- Yellow-poplar------- Eastern white pine-- Virginia pine------- Shortleaf pine------ Sugar maple---------	80 90 90 75 75 ---	Eastern white pine, yellow-poplar, black cherry, Virginia pine, Norway spruce.
RcA, RcB---------- Raynham	4w	Slight	Severe	Severe	Severe	Eastern white pine-- White spruce-------- Red spruce---------- Red maple----------	65 55 45 ---	Eastern white pine, white spruce, northern white-cedar.
Re---------- Red Hook	3w	Slight	Moderate	Moderate	Moderate	Red maple---------- Eastern white pine--	70 70	Eastern white pine, Norway spruce.
RgA, RkA---------- Rhinebeck	3w	Slight	Moderate	Slight	Slight	Sugar maple--------- Northern red oak---- Eastern white pine-- Red maple----------	65 70 75 70	Eastern white pine, Norway spruce, European larch, white spruce.
ScB---------- Schuyler	3o	Slight	Slight	Slight	Slight	Sugar maple--------- Northern red oak---- Black cherry--------	63 70 70	Eastern white pine, Norway spruce, European larch.
ScD---------- Schuyler	3r	Moderate	Moderate	Slight	Slight	Sugar maple--------- Northern red oak---- Black cherry--------	63 70 70	Eastern white pine, Norway spruce, European larch.
Sd---------- Scio	2o	Slight	Slight	Slight	Slight	Northern red oak---- White ash---------- Sugar maple--------- Black cherry-------- Eastern hemlock----- Eastern white pine--	75 85 70 80 70 85	European larch, eastern white pine, red pine, Norway spruce, white spruce.
To---------- Tioga	2o	Slight	Slight	Slight	Slight	Northern red oak---- Yellow-poplar------- Sugar maple---------	75 85 67	Eastern white pine, yellow-poplar, Norway spruce, black walnut, European larch.

TABLE 7.--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	
Ua---------- Unadilla	2o	Slight	Slight	Slight	Slight	Sugar maple----------	70	Eastern white pine, Norway spruce, black cherry, European larch, red pine, white spruce.
						Eastern white pine--	85	
						Northern red oak----	80	
						Black cherry--------	80	
						White ash-----------	95	
VaB---------- Valois	3o	Slight	Slight	Slight	Slight	Sugar maple----------	61	Eastern white pine, white spruce, Norway spruce, red pine, European larch.
						Northern red oak----	70	
						White ash-----------	70	
						American basswood---	70	
VpA, VpB, VpC------ Volusia	3w	Slight	Moderate	Moderate	Moderate	Northern red oak----	70	Eastern white pine, Norway spruce, European larch, white spruce, black cherry.
						Sugar maple----------	64	
						White ash-----------	75	
Wa---------- Wallington	3w	Slight	Moderate	Moderate	Moderate	Northern red oak----	65	Eastern white pine, white spruce, Norway spruce.
						Sugar maple----------	65	
						White ash-----------	75	
Wd---------- Wayland	4w	Slight	Severe	Severe	Severe	Red maple-----------	65	White spruce, northern white-cedar.
WhC---------- Wharton	2r	Moderate	Slight	Slight	Slight	Northern red oak----	76	Eastern white pine, yellow-poplar.
						Yellow-poplar-------	90	
WhD---------- Wharton	2r	Moderate	Moderate	Slight	Slight	Northern red oak----	76	Eastern white pine, yellow-poplar.
						Yellow-poplar-------	90	
WmB---------- Williamson	3o	Slight	Slight	Slight	Slight	Eastern white pine--	75	Eastern white pine, red pine, European larch, Norway spruce, white spruce, black locust.
						Sugar maple----------	65	

TABLE 8.--RECREATIONAL DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
AkA---- Allard	Slight	Slight	Slight	Slight	Slight.
AkB---- Allard	Slight	Slight	Moderate: slope.	Slight	Slight.
AlA---- Allard Variant	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Slight	Slight.
AlB---- Allard Variant	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Slight	Slight.
AlC---- Allard Variant	Moderate: slope, wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Slight	Moderate: slope.
AmA, AmB---- Alton	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight	Moderate: small stones.
AmC---- Alton	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight	Moderate: slope, small stones.
AoA---- Angola	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, erodes easily.	Severe: wetness.
ArC---- Arkport	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: droughty, slope.
ArE---- Arkport	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Be*. Beaches					
BlB---- Blasdell	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight	Moderate: small stones.
BrB---- Brinkerton Variant	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
BrC---- Brinkerton Variant	Severe: wetness.	Severe: wetness.	Severe: slope, wetness.	Severe: wetness.	Severe: wetness.
BrD---- Brinkerton Variant	Severe: slope, wetness.	Severe: slope, wetness.	Severe: slope, wetness.	Severe: wetness.	Severe: slope, wetness.
Ca, Cb---- Canadice	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.
Cc---- Canandaigua	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Cd---- Canandaigua	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: ponding.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Ce Canandaigua	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
CfA, CfB Caneadea	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Severe: erodes easily.	Moderate: wetness.
CgA Castile	Moderate: small stones, wetness.	Moderate: small stones, wetness.	Severe: small stones.	Moderate: wetness.	Moderate: small stones, wetness.
Ch Chenango	Slight	Slight	Moderate: small stones.	Slight	Slight.
CkA, CkB Chenango	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight	Moderate: small stones.
CkC Chenango	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope; small stones.	Slight	Moderate: small stones, slope.
CkD Chenango	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
CkE Chenango	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
ClA, ClB Chenango	Severe: flooding.	Moderate: small stones.	Severe: small stones.	Slight	Moderate: small stones, large stones, droughty.
Cn Chippewa	Severe: wetness, percs slowly, excess humus.	Severe: wetness, percs slowly, excess humus.	Severe: wetness, percs slowly, excess humus.	Severe: wetness, excess humus.	Severe: wetness.
CoA, CoB Churchville	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.
CsB Collamer	Moderate: wetness.	Moderate: wetness.	Moderate: slope, wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
CsC Collamer	Moderate: wetness, slope.	Moderate: wetness, slope.	Severe: slope.	Severe: erodes easily.	Moderate: wetness, slope.
CtB Collamer	Moderate: wetness.	Moderate: wetness.	Moderate: slope, wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
CuB Colonie	Slight	Slight	Moderate: slope.	Slight	Moderate: droughty.
CuC Colonie	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: droughty, slope.
Cv Cosad	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
DdA, DdB---------- Derb	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, erodes easily.	Severe: wetness.
DdC---------- Derb	Severe: wetness.	Severe: wetness.	Severe: slope, wetness.	Severe: wetness, erodes easily.	Severe: wetness.
ElA---------- Elnora	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness, droughty.
ElB---------- Elnora	Moderate: wetness.	Moderate: wetness.	Moderate: slope, wetness.	Moderate: wetness.	Moderate: wetness, droughty.
ErB---------- Ernest Variant	Moderate: wetness.	Moderate: wetness.	Moderate: slope, wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
ErC---------- Ernest Variant	Moderate: slope, wetness.	Moderate: slope, wetness.	Severe: slope.	Moderate: wetness.	Moderate: slope, wetness.
ErD---------- Ernest Variant	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: wetness.	Severe: slope.
FbB---------- Farnham	Moderate: wetness, small stones.	Moderate: wetness, small stones.	Severe: small stones.	Moderate: wetness.	Moderate: small stones, wetness.
Fu*: Fluvaquents.					
Udifluvents.					
FxB---------- Fremont	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness, erodes easily.	Severe: wetness.
GaA---------- Galen	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
GaB---------- Galen	Moderate: wetness.	Moderate: wetness.	Moderate: slope, wetness.	Moderate: wetness.	Moderate: wetness.
GlB---------- Gilpin	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Moderate: large stones.	Moderate: thin layer, small stones.
GlC---------- Gilpin	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: small stones, slope.	Moderate: large stones.	Moderate: slope, small stones.
GlD---------- Gilpin	Severe: slope.	Severe: slope.	Severe: small stones, slope.	Moderate: slope, large stones.	Severe: slope.
GlE, GlF---------- Gilpin	Severe: slope.	Severe: slope.	Severe: small stones, slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Ha Halsey	Severe: wetness.	Severe: wetness.	Severe: small stones, wetness.	Severe: wetness.	Severe: wetness.
Hn*. Haplaquolls					
HuB Hudson	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Severe: erodes easily.	Moderate: wetness.
HvE Hudson	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
Lc Lamson	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Ld Lamson	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.	Severe: ponding.
LoC Lordstown	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight	Moderate: small stones, thin layer, slope.
LoF Lordstown	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Ly Lyons	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.
MaA, MaB Manlius	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight	Moderate: small stones, droughty.
MaD Manlius	Severe: slope.	Severe: slope.	Severe: small stones, slope.	Moderate: slope.	Severe: slope.
MbE, MbF Manlius	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones, slope.	Severe: slope.	Severe: small stones, slope.
MdB Mardin	Severe: percs slowly.	Severe: percs slowly.	Severe: small stones, percs slowly.	Moderate: wetness.	Moderate: small stones.
MdC Mardin	Severe: percs slowly.	Severe: percs slowly.	Severe: slope, small stones, percs slowly.	Moderate: wetness.	Moderate: small stones, slope.
MdD Mardin	Severe: slope, percs slowly.	Severe: slope, percs slowly.	Severe: slope, small stones, percs slowly.	Severe: slope.	Severe: slope.
MfB Marilla	Severe: percs slowly.	Severe: percs slowly.	Severe: small stones, percs slowly.	Moderate: wetness.	Moderate: droughty, small stones.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
MfC---------- Marilla	Severe: percs slowly.	Severe: percs slowly.	Severe: slope, small stones, percs slowly.	Moderate: wetness.	Moderate: droughty, slope.
Mg---------- Middlebury	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Mh---------- Minoa	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
NfA, NfB, Nh---------- Niagara	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
OrA, OrB---------- Orpark	Severe: wetness, excess humus.	Severe: wetness, excess humus.	Severe: wetness, excess humus.	Severe: wetness, excess humus, slope.	Severe: wetness.
OrC---------- Orpark	Severe: wetness, excess humus.	Severe: wetness, excess humus.	Severe: slope, wetness, excess humus.	Severe: wetness, excess humus, slope.	Severe: wetness.
Pa---------- Palms	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: ponding, excess humus.
Pc---------- Patchin	Severe: wetness, excess humus.	Severe: wetness, excess humus.	Severe: wetness, excess humus.	Severe: wetness, excess humus.	Severe: wetness.
PhA---------- Phelps	Moderate: small stones, wetness.	Moderate: wetness, small stones.	Severe: small stones.	Moderate: wetness.	Moderate: small stones, large stones, wetness.
Pt*, Pu*. Pits					
RaB---------- Rayne	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight----------	Moderate: small stones.
RaC---------- Rayne	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight----------	Moderate: small stones, slope.
RaD---------- Rayne	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
RaE, RaF---------- Rayne	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
RbC---------- Rayne	Severe: large stones.	Severe: large stones.	Severe: large stones, slope, small stones.	Slight----------	Moderate: small stones, large stones, slope.
RbD---------- Rayne	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope, small stones.	Moderate: slope.	Severe: slope.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
RbE, RbF---------- Rayne	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: slope.
RcA, RcB---------- Raynham	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, erodes easily.	Severe: wetness.
Re---------- Red Hook	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
RgA---------- Rhinebeck	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, erodes easily.	Severe: wetness.
RkA---------- Rhinebeck	Severe: wetness.	Severe: wetness.	Severe: small stones, wetness.	Severe: wetness, erodes easily.	Severe: wetness.
ScB---------- Schuyler	Moderate: wetness.	Moderate: wetness.	Moderate: slope, small stones.	Severe: erodes easily.	Moderate: wetness.
ScD---------- Schuyler	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
Sd---------- Scio	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
To---------- Tioga	Severe: flooding.	Slight----------	Moderate: flooding.	Slight----------	Moderate: flooding.
Ua---------- Unadilla	Slight----------	Slight----------	Slight----------	Slight----------	Slight.
VaB---------- Valois	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight----------	Moderate: small stones.
VpA, VpB---------- Volusia	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: small stones, wetness.	Severe: wetness.	Severe: wetness, droughty.
VpC---------- Volusia	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: slope, small stones, wetness.	Severe: wetness.	Severe: wetness, droughty.
Wa---------- Wallington	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, erodes easily.	Severe: wetness.
Wd---------- Wayland	Severe: flooding, wetness, excess humus.	Severe: wetness, excess humus.	Severe: excess humus, wetness, flooding.	Severe: wetness, excess humus.	Severe: wetness, flooding.
WhC---------- Wharton	Moderate: slope, percs slowly, wetness.	Moderate: slope, wetness, percs slowly.	Severe: slope, small stones.	Moderate: wetness.	Moderate: slope, wetness.
WhD---------- Wharton	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, wetness.	Severe: slope.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
WmB---------- Williamson	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--WILDLIFE HABITAT

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that 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	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
AkA---- Allard	Good	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.
AkB---- Allard	Good	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.
AlA---- Allard Variant	Good	Good	Good	Good	Good	---	Poor	Poor	Good	Good	Poor.
AlB---- Allard Variant	Good	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.
AlC---- Allard Variant	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.
AmA, AmB, AmC---- Alton	Fair	Fair	Fair	Fair	Fair	---	Very poor.	Very poor.	Fair	Fair	Very poor.
AoA---- Angola	Fair	Good	Good	Good	Good	---	Fair	Fair	Good	Good	Fair.
ArC---- Arkport	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.
ArE---- Arkport	Very poor.	Fair	Good	Good	Good	---	Very poor.	Very poor.	Fair	Good	Very poor.
Be*. Beaches											
BlB---- Blasdell	Fair	Fair	Fair	Fair	Fair	---	Very poor.	Very poor.	Fair	Fair	Very poor.
BrB---- Brinkerton Variant	Fair	Fair	Good	Good	Good	---	Poor	Very poor.	Fair	Good	Very poor.
BrC---- Brinkerton Variant	Fair	Fair	Good	Good	Good	---	Very poor.	Very poor.	Fair	Good	Very poor.
BrD---- Brinkerton Variant	Poor	Fair	Good	Good	Good	---	Very poor.	Very poor.	Fair	Good	Very poor.
Ca, Cb---- Canadice	Very poor.	Poor	Poor	Poor	Poor	---	Good	Good	Poor	Poor	Good.
Cc, Cd, Ce---- Canandaigua	Very poor.	Poor	Poor	Poor	Poor	---	Good	Good	Very poor.	Poor	Good.
CfA---- Caneadea	Fair	Good	Good	Good	Good	---	Fair	Fair	Good	Good	Fair.
CfB---- Caneadea	Fair	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.
CgA---- Castile	Fair	Good	Good	Good	Good	---	Poor	Poor	Good	Good	Poor.
Ch, CkA, CkB, CkC-- Chenango	Fair	Fair	Fair	Fair	Fair	---	Very poor.	Very poor.	Fair	Fair	Very poor.
CkD---- Chenango	Poor	Fair	Fair	Fair	Fair	---	Very poor.	Very poor.	Fair	Fair	Very poor.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--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	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
CkE---- Chenango	Very poor.	Fair	Fair	Fair	Fair	---	Very poor.	Very poor.	Poor	Fair	Very poor.
ClA, ClB---- Chenango	Fair	Good	Good	Fair	Fair	---	Poor	Very poor.	Good	Fair	Very poor.
Cn---- Chippewa	Poor	Fair	Fair	Fair	Fair	---	Good	Good	Fair	Fair	Good.
CoA---- Churchville	Fair	Good	Good	Good	Good	---	Fair	Fair	Good	Good	Fair.
CoB---- Churchville	Fair	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.
CsB---- Collamer	Good	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.
CsC---- Collamer	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.
CtB---- Collamer	Good	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.
CuB, CuC---- Colonie	Fair	Fair	Fair	Fair	Fair	---	Very poor.	Very poor.	Fair	Fair	Very poor.
Cv---- Cosad	Fair	Fair	Good	Fair	Fair	---	Fair	Fair	Fair	Fair	Fair.
DdA---- Derb	Fair	Good	Good	Good	Good	---	Fair	Fair	Good	Good	Fair.
DdB---- Derb	Fair	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.
DdC---- Derb	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.
ElA---- Elnora	Fair	Good	Good	Fair	Fair	---	Poor	Poor	Good	Fair	Poor.
ElB---- Elnora	Fair	Good	Good	Fair	Fair	---	Poor	Very poor.	Good	Fair	Very poor.
ErB---- Ernest Variant	Fair	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.
ErC---- Ernest Variant	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.
ErD---- Ernest Variant	Poor	Fair	Good	Good	Good	---	Very poor.	Very poor.	Fair	Good	Very poor.
FbB---- Farnham	Fair	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.
Fu*: Fluvaquents.											
Udifluvents.											
FxB---- Fremont	Fair	Fair	Good	Good	Good	---	Poor	Very poor.	Fair	Good	Very poor.
GaA---- Galen	Good	Good	Good	Good	Good	---	Poor	Poor	Good	Good	Poor.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--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	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
GaB---- Galen	Good	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.
GlB---- Gilpin	Fair	Good	Good	Fair	Fair	---	Poor	Very poor.	Good	Fair	Very poor.
GlC---- Gilpin	Fair	Good	Good	Fair	Fair	---	Very poor.	Very poor.	Good	Fair	Very poor.
GlD---- Gilpin	Poor	Fair	Good	Fair	Fair	---	Very poor.	Very poor.	Fair	Fair	Very poor.
GlE---- Gilpin	Very poor.	Fair	Good	Fair	Fair	---	Very poor.	Very poor.	Fair	Fair	Very poor.
GlF---- Gilpin	Very poor.	Poor	Good	Fair	Fair	---	Very poor.	Very poor.	Poor	Fair	Very poor.
Ha---- Halsey	Very poor.	Poor	Poor	Poor	Poor	---	Good	Good	Poor	Poor	Good.
Hn*. Haplaquolls											
HuB---- Hudson	Fair	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.
HvE---- Hudson	Very poor.	Fair	Good	Good	Good	---	Very poor.	Very poor.	Fair	Good	Very poor.
Lc, Ld---- Lamson	Very poor.	Poor	Poor	Poor	Poor	---	Good	Good	Poor	Poor	Good.
LoC---- Lordstown	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.
LoF---- Lordstown	Very poor.	Poor	Good	Good	Good	---	Very poor.	Very poor.	Poor	Good	Very poor.
Ly---- Lyons	Very poor.	Poor	Poor	Poor	Poor	---	Good	Good	Poor	Poor	Good.
MaA, MaB---- Manlius	Fair	Good	Good	Fair	Fair	---	Poor	Very poor.	Good	Fair	Very poor.
MaD---- Manlius	Poor	Fair	Good	Fair	Fair	---	Very poor.	Very poor.	Fair	Fair	Very poor.
MbE---- Manlius	Very poor.	Fair	Good	Fair	Fair	---	Very poor.	Very poor.	Poor	Fair	Very poor.
MbF---- Manlius	Very poor.	Poor	Good	Fair	Fair	---	Very poor.	Very poor.	Poor	Fair	Very poor.
MdB---- Mardin	Fair	Good	Good	Fair	Fair	---	Poor	Very poor.	Good	Fair	Very poor.
MdC---- Mardin	Fair	Good	Good	Fair	Fair	---	Very poor.	Very poor.	Good	Fair	Very poor.
MdD---- Mardin	Very poor.	Fair	Good	Fair	Fair	---	Very poor.	Very poor.	Fair	Fair	Very poor.
MfB---- Marilla	Fair	Good	Good	Fair	Fair	---	Poor	Very poor.	Good	Fair	Very poor.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--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	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
MfC---- Marilla	Fair	Good	Good	Fair	Fair	---	Very poor.	Very poor.	Good	Fair	Very poor.
Mg---- Middlebury	Good	Good	Good	Good	Good	---	Poor	Poor	Good	Good	Poor.
Mh---- Minoa	Fair	Good	Good	Good	Good	---	Fair	Fair	Good	Good	Fair.
NfA---- Niagara	Fair	Good	Good	Good	Good	---	Fair	Fair	Good	Good	Fair.
NfB---- Niagara	Fair	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.
Nh---- Niagara	Fair	Good	Good	Good	Good	---	Fair	Fair	Good	Good	Fair.
OrA---- Orpark	Fair	Good	Good	Good	Good	---	Fair	Fair	Good	Good	Fair.
OrB---- Orpark	Fair	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.
OrC---- Orpark	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.
Pa---- Palms	Good	Poor	Poor	Poor	Poor	---	Good	Good	Fair	Poor	Good.
Pc---- Patchin	Very poor.	Poor	Poor	Poor	Poor	---	Good	Fair	Poor	Poor	Good.
PhA---- Phelps	Good	Good	Good	Good	Good	---	Poor	Poor	Good	Good	Poor.
Pt*, Pu*. Pits											
RaB---- Rayne	Fair	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.
RaC---- Rayne	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.
RaD, RaE---- Rayne	Poor	Fair	Good	Good	Good	---	Very poor.	Very poor.	Fair	Good	Very poor.
RaF---- Rayne	Very poor.	Poor	Good	Good	Good	---	Very poor.	Very poor.	Poor	Good	Very poor.
RbC, RbD, RbE---- Rayne	Very poor.	Very poor.	Good	Good	Good	---	Very poor.	Very poor.	Poor	Good	Very poor.
RbF---- Rayne	Very poor.	Very poor.	Good	Good	Good	---	Very poor.	Very poor.	Poor	Good	Very poor.
RcA---- Raynham	Fair	Fair	Fair	Fair	Fair	---	Good	Fair	Fair	Fair	Fair.
RcB---- Raynham	Fair	Fair	Fair	Fair	Fair	---	Poor	Very poor.	Fair	Fair	Very poor.
Re---- Red Hook	Fair	Good	Good	Good	Good	---	Fair	Fair	Good	Good	Fair.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--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	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
RgA, RkA---------- Rhinebeck	Fair	Good	Good	Good	Good	---	Fair	Fair	Good	Good	Fair.
ScB---------- Schuyler	Good	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.
ScD---------- Schuyler	Poor	Fair	Good	Good	Good	---	Very poor.	Very poor.	Fair	Good	Very poor.
Sd---------- Scio	Good	Good	Good	Good	Good	---	Poor	Poor	Good	Good	Poor.
To---------- Tioga	Good	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.
Ua---------- Unadilla	Good	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.
VaB---------- Valois	Fair	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.
VpA---------- Volusia	Fair	Fair	Fair	Poor	Poor	---	Fair	Fair	Fair	Poor	Fair.
VpB---------- Volusia	Fair	Fair	Fair	Poor	Poor	---	Poor	Very poor.	Fair	Poor	Very poor.
VpC---------- Volusia	Fair	Fair	Fair	Poor	Poor	---	Very poor.	Very poor.	Fair	Poor	Very poor.
Wa---------- Wallington	Fair	Good	Good	Good	Good	---	Fair	Fair	Good	Good	Fair.
Wd---------- Wayland	Very poor.	Poor	Poor	Poor	Poor	---	Good	Good	Poor	Poor	Good.
WhC---------- Wharton	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.
WhD---------- Wharton	Poor	Fair	Good	Good	Good	---	Very poor.	Very poor.	Fair	Good	Very poor.
WmB---------- Williamson	Good	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--BUILDING SITE DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the 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
AkA---------- Allard	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Severe: frost action.	Slight.
AkB---------- Allard	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Severe: frost action.	Slight.
AlA, AlB---------- Allard Variant	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Severe: low strength, frost action.	Slight.
AlC---------- Allard Variant	Severe: cutbanks cave, wetness.	Moderate: wetness, slope.	Severe: wetness.	Severe: slope.	Severe: low strength, frost action.	Moderate: slope.
AmA---------- Alton	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Moderate: frost action.	Moderate: small stones.
AmB---------- Alton	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Moderate: frost action.	Moderate: small stones.
AmC---------- Alton	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope, small stones.
AoA---------- Angola	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.
ArC---------- Arkport	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: droughty, slope.
ArE---------- Arkport	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Be*. Beaches						
BlB---------- Blasdell	Slight---------	Slight---------	Slight---------	Moderate: slope.	Moderate: frost action.	Moderate: small stones.
BrB---------- Brinkerton Variant	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, wetness, frost action.	Severe: wetness.
BrC---------- Brinkerton Variant	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: slope, wetness.	Severe: slope, low strength, frost action.	Severe: wetness.
BrD---------- Brinkerton Variant	Severe: slope, wetness.	Severe: slope, wetness.	Severe: slope, wetness.	Severe: slope, wetness.	Severe: slope, low strength, frost action.	Severe: slope, wetness.
Ca, Cb---------- Canadice	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, wetness.	Severe: wetness.
Cc---------- Canandaigua	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.

See footnote at end of table.

TABLE 10.--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
Cd, Ce--Canandaigua	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, frost action.	Severe: ponding, frost action.
CfA, CfB--Caneadea	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: low strength, frost action, shrink-swell.	Moderate: wetness.
CgA--Castile	Severe: wetness, cutbanks cave.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Severe: frost action.	Moderate: small stones, wetness.
Ch--Chenango	Severe: cutbanks cave.	Slight	Slight	Slight	Moderate: frost action.	Slight.
CkA--Chenango	Severe: cutbanks cave.	Slight	Slight	Slight	Moderate: frost action.	Moderate: small stones.
CkB--Chenango	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Moderate: frost action.	Moderate: small stones.
CkC--Chenango	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: small stones, slope.
CkD, CkE--Chenango	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
ClA, ClB--Chenango	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding, frost action.	Moderate: small stones, large stones, droughty.
Cn--Chippewa	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.
CoA, CoB--Churchville	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, wetness, frost action.	Severe: wetness.
CsB--Collamer	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Severe: frost action.	Moderate: wetness.
CsC--Collamer	Severe: cutbanks cave, wetness.	Moderate: wetness, slope.	Severe: wetness.	Severe: slope.	Severe: frost action.	Moderate: wetness, slope.
CtB--Collamer	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Severe: frost action.	Moderate: wetness.
CuB--Colonie	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Moderate: droughty.
CuC--Colonie	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope.
Cv--Cosad	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
DdA, DdB--Derb	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action, low strength, wetness.	Severe: wetness.

TABLE 10.--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
DdC---------- Derb	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.	Severe: slope, wetness.	Severe: frost action, low strength, wetness.	Severe: wetness.
ElA---------- Elnora	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, frost action.	Moderate: wetness, droughty.
ElB---------- Elnora	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Moderate: wetness, frost action.	Moderate: wetness, droughty.
ErB---------- Ernest Variant	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: slope, wetness, shrink-swell.	Severe: frost action.	Moderate: wetness.
ErC---------- Ernest Variant	Severe: wetness.	Moderate: slope, wetness, shrink-swell.	Severe: wetness.	Severe: slope.	Severe: frost action.	Moderate: slope, wetness.
ErD---------- Ernest Variant	Severe: slope, wetness.	Severe: slope.	Severe: slope, wetness.	Severe: slope.	Severe: slope, frost action.	Severe: slope.
FbB---------- Farnham	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Severe: frost action.	Moderate: small stones, wetness.
Fu*: Fluvaquents.						
Udifluvents.						
FxB---------- Fremont	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action, wetness.	Severe: wetness.
GaA---------- Galen	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, frost action.	Moderate: wetness.
GaB---------- Galen	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Moderate: wetness, frost action.	Moderate: wetness.
GlB---------- Gilpin	Moderate: depth to rock.	Slight---------	Moderate: depth to rock.	Moderate: slope.	Moderate: frost action.	Moderate: thin layer, small stones.
GlC---------- Gilpin	Moderate: slope, depth to rock.	Moderate: slope.	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope, small stones.
GlD, GlE, GlF----- Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Ha---------- Halsey	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.
Hn*. Haplaquolls						
HuB---------- Hudson	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: frost action, low strength.	Moderate: wetness.

See footnote at end of table.

TABLE 10.--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
HvE---------- Hudson	Severe: slope, wetness.	Severe: slope.	Severe: wetness, slope.	Severe: slope.	Severe: slope, frost action, low strength.	Severe: slope.
Lc---------- Lamson	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.
Ld---------- Lamson	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, frost action.	Severe: ponding.
LoC---------- Lordstown	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: slope, depth to rock, frost action.	Moderate: large stones, thin layer, slope.
LoF---------- Lordstown	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope.
Ly---------- Lyons	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.
MaA---------- Manlius	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: depth to rock.	Moderate: depth to rock, frost action.	Moderate: small stones, droughty.
MaB---------- Manlius	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.	Moderate: depth to rock, frost action.	Moderate: small stones, droughty.
MaD---------- Manlius	Severe: depth to rock, slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope.
MbE, MbF---------- Manlius	Severe: depth to rock, slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
MdB---------- Mardin	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: slope, wetness.	Moderate: frost action, wetness.	Moderate: small stones.
MdC---------- Mardin	Severe: wetness.	Moderate: slope, wetness.	Severe: wetness.	Severe: slope.	Moderate: slope, frost action, wetness.	Moderate: small stones, slope.
MdD---------- Mardin	Severe: slope, wetness.	Severe: slope.	Severe: slope, wetness.	Severe: slope.	Severe: slope.	Severe: slope.
MfB---------- Marilla	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: slope, wetness.	Moderate: frost action, wetness.	Severe: droughty.
MfC---------- Marilla	Severe: wetness.	Moderate: slope, wetness.	Severe: wetness.	Severe: slope.	Moderate: slope, frost action, wetness.	Severe: droughty.
Mg---------- Middlebury	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding, frost action.	Severe: wetness.

TABLE 10.--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
Mh---------- Minoa	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.
NfA, NfB, Nh------ Niagara	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.
OrA, OrB---------- Orpark	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, wetness.	Severe: wetness.
OrC---------- Orpark	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: slope, wetness.	Severe: low strength, wetness.	Severe: wetness.
Pa---------- Palms	Severe: excess humus, ponding.	Severe: ponding, low strength.	Severe: ponding, low strength.	Severe: ponding, low strength.	Severe: ponding, frost action.	Severe: ponding, excess humus.
Pc---------- Patchin	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.
PhA---------- Phelps	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Severe: frost action.	Moderate: small stones, large stones, wetness.
Pt*, Pu*. Pits						
RaB---------- Rayne	Slight---------	Slight---------	Slight---------	Moderate: slope.	Moderate: frost action.	Moderate: small stones.
RaC---------- Rayne	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: small stones, slope.
RaD, RaE, RaF----- Rayne	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
RbC---------- Rayne	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: small stones, large stones, slope.
RbD, RbE, RbF----- Rayne	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
RcA, RcB---------- Raynham	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action, wetness.	Severe: wetness.
Re---------- Red Hook	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.
RgA, RkA---------- Rhinebeck	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action, wetness.	Severe: wetness.
ScB---------- Schuyler	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Severe: frost action.	Moderate: wetness.
ScD---------- Schuyler	Severe: slope.	Severe: slope.	Severe: slope, wetness.	Severe: slope.	Severe: slope, frost action.	Severe: slope.

See footnote at end of table.

TABLE 10.--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
Sd---------- Scio	Severe: wetness, cutbanks cave.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Severe: frost action.	Moderate: wetness.
To---------- Tioga	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
Ua---------- Unadilla	Severe: cutbanks cave.	Slight----------	Slight----------	Slight----------	Severe: frost action.	Slight.
VaB---------- Valois	Slight----------	Slight----------	Slight----------	Moderate: slope.	Moderate: frost action.	Moderate: small stones.
VpA, VpB---------- Volusia	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness, droughty.
VpC---------- Volusia	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, slope.	Severe: wetness, frost action.	Severe: wetness, droughty.
Wa---------- Wallington	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.
Wd---------- Wayland	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness, flooding.
WhC---------- Wharton	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: wetness.	Severe: slope.	Severe: frost action, low strength.	Moderate: slope, wetness.
WhD---------- Wharton	Severe: slope, wetness.	Severe: slope.	Severe: slope, wetness.	Severe: slope.	Severe: slope, frost action, low strength.	Severe: slope.
WmB---------- Williamson	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Severe: frost action.	Moderate: wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good," "fair," and other terms. Absence of an entry indicates that the 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
AkA, AkB Allard	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
AlA, AlB Allard Variant	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: wetness, seepage.	Poor: seepage, small stones.
AlC Allard Variant	Severe: wetness, poor filter.	Severe: slope, seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: seepage, small stones.
AmA, AmB Alton	Severe: poor filter.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: small stones.
AmC Alton	Severe: poor filter.	Severe: slope, seepage.	Severe: seepage.	Severe: seepage.	Poor: small stones.
AoA Angola	Severe: depth to rock, wetness, percs slowly.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Poor: area reclaim, wetness.
ArC Arkport	Moderate: slope.	Severe: slope, seepage.	Severe: seepage, too sandy.	Severe: seepage.	Fair: slope, too sandy, thin layer.
ArE Arkport	Severe: slope.	Severe: slope, seepage.	Severe: slope, seepage, too sandy.	Severe: slope, seepage.	Poor: slope.
Be*. Beaches					
BlB Blasdell	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: small stones.
BrB Brinkerton Variant	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness.	Severe: wetness.	Poor: too clayey.
BrC Brinkerton Variant	Severe: wetness, percs slowly.	Severe: slope.	Severe: wetness.	Severe: wetness.	Poor: too clayey.
BrD Brinkerton Variant	Severe: slope.	Severe: slope.	Severe: slope, wetness.	Severe: slope, wetness.	Poor: slope, too clayey.
Ca, Cb Canadice	Severe: wetness, percs slowly.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
Cc Canandaigua	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.

See footnote at end of table.

TABLE 11.--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
Cd, Ce Canandaigua	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
CfA, CfB Caneadea	Severe: wetness, percs slowly.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
CgA Castile	Severe: wetness, poor filter.	Severe: wetness, seepage.	Severe: wetness, seepage, too sandy.	Severe: wetness, seepage.	Poor: seepage, too sandy, small stones.
Ch, CkA, CkB Chenango	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
CkC Chenango	Severe: poor filter.	Severe: slope, seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
CkD, CkE Chenango	Severe: poor filter, slope.	Severe: slope, seepage.	Severe: slope, seepage, too sandy.	Severe: slope, seepage.	Poor: seepage, too sandy, small stones.
ClA, ClB Chenango	Severe: wetness, poor filter.	Severe: flooding, seepage.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: small stones, seepage, too sandy.
Cn Chippewa	Severe: wetness, percs slowly.	Slight	Severe: wetness.	Severe: wetness.	Poor: small stones, wetness.
CoA, CoB Churchville	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness, too clayey.
CsB Collamer	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, wetness.
CsC Collamer	Severe: wetness, percs slowly.	Severe: slope, wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, slope, wetness.
CtB Collamer	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, wetness.
CuB Colonie	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: too sandy.
CuC Colonie	Severe: poor filter.	Severe: slope, seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: too sandy.
Cv Cosad	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: wetness, too clayey.	Severe: seepage, wetness.	Poor: too clayey, wetness.
DdA, DdB Derb	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.

TABLE 11.--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
DdC---------- Derb	Severe: wetness, percs slowly.	Severe: slope, wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
ElA, ElB---------- Elnora	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: too sandy.
ErB---------- Ernest Variant	Severe: percs slowly, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, small stones, wetness.
ErC---------- Ernest Variant	Severe: percs slowly, wetness.	Severe: slope, wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, small stones, wetness.
ErD---------- Ernest Variant	Severe: slope, percs slowly, wetness.	Severe: slope, wetness.	Severe: slope, wetness.	Severe: slope, wetness.	Poor: slope.
FbB---------- Farnham	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: small stones.
Fu*: Fluvaquents.					
Udifluvents.					
FxB---------- Fremont	Severe: percs slowly, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: small stones, wetness.
GaA, GaB---------- Galen	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: too sandy.
GlB---------- Gilpin	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, thin layer.
GlC---------- Gilpin	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, thin layer.
GlD, GlE, GlF------- Gilpin	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Poor: slope, area reclaim, thin layer.
Ha---------- Halsey	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: wetness, seepage.	Poor: seepage, too sandy, small stones.
Hn*. Haplaquolls					
HuB---------- Hudson	Severe: percs slowly, wetness.	Moderate: slope.	Severe: wetness, too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.

See footnote at end of table.

TABLE 11.--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
HvE---------- Hudson	Severe: slope, percs slowly, wetness.	Severe: slope.	Severe: slope, too clayey, wetness.	Severe: slope.	Poor: slope, too clayey, hard to pack.
Lc---------- Lamson	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: wetness, thin layer.
Ld---------- Lamson	Severe: ponding.	Severe: seepage, ponding.	Severe: seepage, ponding.	Severe: seepage, ponding.	Poor: ponding, thin layer.
LoC---------- Lordstown	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, thin layer.
LoF---------- Lordstown	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Poor: area reclaim, slope, thin layer.
Ly---------- Lyons	Severe: wetness, percs slowly.	Slight----------	Severe: wetness.	Severe: wetness.	Poor: wetness.
MaA, MaB---------- Manlius	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, seepage, small stones.
MaD, MbE, MbF------- Manlius	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Poor: area reclaim, seepage, small stones.
MdB---------- Mardin	Severe: percs slowly, wetness.	Moderate: slope, seepage.	Severe: wetness.	Moderate: wetness.	Poor: small stones.
MdC---------- Mardin	Severe: percs slowly, wetness.	Severe: slope.	Severe: wetness.	Moderate: slope, wetness.	Poor: small stones.
MdD---------- Mardin	Severe: slope, percs slowly, wetness.	Severe: slope.	Severe: slope, wetness.	Severe: slope.	Poor: slope, small stones.
MfB---------- Marilla	Severe: percs slowly, wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness.	Poor: small stones.
MfC---------- Marilla	Severe: percs slowly, wetness.	Severe: slope, wetness.	Severe: wetness.	Moderate: slope, wetness.	Poor: small stones.
Mg---------- Middlebury	Severe: flooding, wetness, poor filter.	Severe: flooding, wetness, seepage.	Severe: flooding, wetness, seepage.	Severe: flooding, wetness.	Poor: wetness.
Mh---------- Minoa	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: wetness.

TABLE 11.--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
NfA, NfB, Nh-------- Niagara	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
OrA, OrB---------- Orpark	Severe: depth to rock, wetness, percs slowly.	Severe: depth to rock, wetness.	Severe: wetness, depth to rock.	Severe: wetness, depth to rock.	Poor: area reclaim, wetness.
OrC---------- Orpark	Severe: depth to rock, wetness, percs slowly.	Severe: slope, depth to rock, wetness.	Severe: wetness, depth to rock.	Severe: wetness, depth to rock.	Poor: area reclaim, wetness.
Pa---------- Palms	Severe: subsides, ponding.	Severe: seepage, excess humus, ponding.	Severe: ponding, excess humus.	Severe: ponding, seepage.	Poor: ponding, excess humus.
Pc---------- Patchin	Severe: wetness, depth to rock.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Severe: wetness, depth to rock.	Poor: wetness, area reclaim.
PhA---------- Phelps	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, small stones.
Pt*, Pu*. Pits					
RaB---------- Rayne	Moderate: depth to rock, percs slowly.	Moderate: seepage, depth to rock, slope.	Severe: depth to rock.	Moderate: depth to rock.	Fair: small stones, thin layer.
RaC---------- Rayne	Moderate: depth to rock, percs slowly, slope.	Severe: slope.	Severe: depth to rock.	Moderate: depth to rock, slope.	Fair: small stones, thin layer, slope.
RaD, RaE, RaF------- Rayne	Severe: slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope.
RbC---------- Rayne	Moderate: depth to rock, percs slowly, slope.	Severe: slope.	Severe: depth to rock.	Moderate: depth to rock, slope.	Fair: small stones, thin layer, slope.
RbD, RbE, RbF------- Rayne	Severe: slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope.
RcA, RcB---------- Raynham	Severe: percs slowly, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Re---------- Red Hook	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: small stones, wetness.
RgA, RkA---------- Rhinebeck	Severe: percs slowly, wetness.	Slight----------	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.

See footnote at end of table.

TABLE 11.--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
ScB Schuyler	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, depth to rock.	Moderate: wetness, depth to rock.	Poor: small stones.
ScD Schuyler	Severe: slope, wetness, percs slowly.	Severe: slope, wetness.	Severe: slope, wetness, depth to rock.	Severe: slope.	Poor: slope.
Sd Scio	Severe: wetness, poor filter.	Severe: seepage.	Severe: seepage, wetness.	Severe: wetness.	Fair: wetness, thin layer.
To Tioga	Severe: flooding, wetness, poor filter.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Fair: wetness, small stones.
Ua Unadilla	Slight	Severe: seepage.	Severe: seepage.	Slight	Fair: thin layer.
VaB Valois	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: small stones.
VpA Volusia	Severe: wetness, percs slowly.	Slight	Severe: wetness.	Severe: wetness.	Poor: wetness.
VpB Volusia	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness.	Severe: wetness.	Poor: wetness.
VpC Volusia	Severe: wetness, percs slowly.	Severe: slope.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Wa Wallington	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Wd Wayland	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
WhC Wharton	Severe: percs slowly, wetness.	Severe: slope.	Severe: wetness.	Moderate: wetness, slope.	Fair: slope, too clayey.
WhD Wharton	Severe: slope, percs slowly, wetness.	Severe: slope.	Severe: slope, wetness.	Severe: slope.	Poor: slope.
WmB Williamson	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Moderate: wetness.	Fair: wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," "poor," "probable," and "improbable." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
AkA, AkB Allard	Good	Probable	Probable	Poor: too sandy, small stones, area reclaim.
AlA, AlB Allard Variant	Fair: wetness.	Probable	Probable	Poor: area reclaim, small stones.
AlC Allard Variant	Fair: wetness.	Probable	Probable	Poor: area reclaim, small stones.
AmA, AmB, AmC Alton	Good	Probable	Probable	Poor: small stones, area reclaim.
AoA Angola	Poor: area reclaim, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, wetness.
ArC Arkport	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
ArE Arkport	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Good.
Be*. Beaches				
BlB Blasdell	Good	Improbable: small stones.	Probable	Poor: small stones, area reclaim.
BrB, BrC Brinkerton Variant	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
BrD Brinkerton Variant	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, slope.
Ca, Cb Canadice	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, too clayey, thin layer.
Cc, Cd, Ce Canandaigua	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
CfA, CfB Caneadea	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
CgA Castile	Fair: wetness.	Probable	Probable	Poor: small stones, area reclaim.
Ch, CkA, CkB, CkC Chenango	Good	Probable	Probable	Poor: small stones, area reclaim.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
CkD---- Chenango	Fair: slope.	Probable----	Probable----	Poor: slope, small stones, area reclaim.
CkE---- Chenango	Poor: slope.	Probable----	Probable----	Poor: slope, small stones, area reclaim.
ClA, ClB---- Chenango	Good----	Probable----	Probable----	Poor: small stones, area reclaim.
Cn---- Chippewa	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, area reclaim, small stones.
CoA, CoB---- Churchville	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
CsB---- Collamer	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
CsC---- Collamer	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
CtB---- Collamer	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim.
CuB, CuC---- Colonie	Good----	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy.
Cv---- Cosad	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
DdA, DdB, DdC---- Derb	Poor----	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
ElA, ElB---- Elnora	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
ErB---- Ernest Variant	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
ErC---- Ernest Variant	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope, too clayey.
ErD---- Ernest Variant	Fair: slope, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
FbB---- Farnham	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Fu*: Fluvaquents.				
Udifluvents.				

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
FxB Fremont	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, wetness.
GaA, GaB Galen	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
GlB, GlC Gilpin	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
GlD Gilpin	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
GlE, GlF Gilpin	Poor: thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
Ha Halsey	Poor: wetness.	Probable	Probable	Poor: small stones, area reclaim, wetness.
Hn*. Haplaquolls				
HuB Hudson	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, too clayey.
HvE Hudson	Poor: slope, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, thin layer, too clayey.
Lc, Ld Lamson	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
LoC Lordstown	Poor: thin layer, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
LoF Lordstown	Poor: slope, thin layer, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
Ly Lyons	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, wetness.
MaA, MaB Manlius	Poor: area reclaim.	Improbable: small stones, excess fines.	Improbable: thin layer, excess fines.	Poor: small stones, area reclaim.
MaD Manlius	Poor: area reclaim.	Improbable: small stones, excess fines.	Improbable: thin layer, excess fines.	Poor: small stones, slope, area reclaim.
MbE, MbF Manlius	Poor: slope, area reclaim.	Improbable: small stones, excess fines.	Improbable: thin layer, excess fines.	Poor: small stones, slope, area reclaim.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
MdB, MdC Mardin	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
MdD Mardin	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
MfB, MfC Marilla	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Mg Middlebury	Poor: wetness.	Probable	Probable	Poor: small stones, area reclaim, wetness.
Mh Minoa	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
NfA, NfB, Nh Niagara	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
OrA, OrB, OrC Orpark	Poor: area reclaim, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Pa Palms	Poor: wetness.	Improbable: excess humus, excess fines.	Improbable: excess humus, excess fines.	Poor: wetness, excess humus.
Pc Patchin	Poor: wetness, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
PhA Phelps	Fair: wetness.	Probable	Probable	Poor: small stones, area reclaim.
Pt*, Pu*. Pits				
RaB, RaC Rayne	Fair: area reclaim, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
RaD Rayne	Fair: area reclaim, thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
RaE, RaF Rayne	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
RbC Rayne	Fair: area reclaim, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
RbD Rayne	Fair: area reclaim, thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
RbE, RbF Rayne	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
RcA, RcB Raynham	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Re Red Hook	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, wetness.
RgA, RkA Rhinebeck	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
ScB Schuyler	Fair: thin layer, wetness, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, area reclaim.
ScD Schuyler	Fair: thin layer, wetness, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Sd Scio	Fair: wetness.	Probable	Probable	Fair: area reclaim.
To Tioga	Good	Probable	Probable	Good.
Ua Unadilla	Good	Probable	Probable	Good.
VaB Valois	Good	Improbable: small stones.	Improbable: excess fines.	Poor: small stones, area reclaim.
VpA, VpB, VpC Volusia	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, wetness.
Wa Wallington	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Wd Wayland	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
WhC Wharton	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
WhD Wharton	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones, area reclaim.
WmB Williamson	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--WATER MANAGEMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated]

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
AkA, AkB---------- Allard	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Erodes easily, too sandy.	Erodes easily.
AlA, AlB---------- Allard Variant	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Cutbanks cave, frost action.	Wetness, erodes easily.	Erodes easily.
AlC---------- Allard Variant	Severe: slope, seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Cutbanks cave, frost action, slope.	Slope, wetness, erodes easily.	Slope, erodes easily.
AmA, AmB---------- Alton	Severe: seepage.	Moderate: thin layer, seepage, piping.	Severe: no water.	Deep to water	Large stones---	Large stones, droughty.
AmC---------- Alton	Severe: seepage, slope.	Moderate: thin layer, seepage, piping.	Severe: no water.	Deep to water	Slope, large stones.	Large stones, slope, droughty.
AoA---------- Angola	Moderate: depth to rock.	Severe: piping, wetness.	Severe: no water.	Percs slowly, depth to rock, frost action.	Depth to rock	Wetness, erodes easily.
ArC, ArE---------- Arkport	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope----------	Slope, droughty.
Be*. Beaches						
BlB---------- Blasdell	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Favorable------	Droughty.
BrB---------- Brinkerton Variant	Moderate: slope.	Severe: piping.	Severe: slow refill.	Slope, percs slowly, frost action.	Wetness, percs slowly.	Wetness, percs slowly.
BrC, BrD---------- Brinkerton Variant	Severe: slope.	Severe: piping.	Severe: slow refill.	Slope, percs slowly, frost action.	Slope, wetness, percs slowly.	Slope, wetness, percs slowly.
Ca, Cb---------- Canadice	Slight---------	Severe: hard to pack, wetness.	Severe: slow refill.	Percs slowly---	Erodes easily, wetness, percs slowly.	Wetness, percs slowly, erodes easily.
Cc---------- Canandaigua	Slight---------	Severe: piping, wetness.	Severe: slow refill.	Frost action---	Erodes easily, wetness.	Wetness, erodes easily.
Cd, Ce---------- Canandaigua	Slight---------	Severe: piping, ponding.	Severe: slow refill.	Frost action, ponding.	Erodes easily, ponding.	Wetness, erodes easily.
CfA---------- Caneadea	Slight---------	Moderate: hard to pack, wetness.	Severe: no water.	Percs slowly, frost action.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
CfB---------- Caneadea	Moderate: slope.	Moderate: hard to pack, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
CgA---------- Castile	Severe: seepage.	Severe: seepage, wetness.	Severe: cutbanks cave.	Frost action, cutbanks cave.	Wetness, too sandy.	Droughty.
Ch, CkA, CkB------ Chenango	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Too sandy------	Droughty.
CkC, CkD, CkE----- Chenango	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, too sandy.	Slope, droughty.
ClA, ClB---------- Chenango	Severe: seepage.	Severe: seepage.	Severe: cutbanks cave.	Deep to water	Large stones, too sandy.	Droughty, large stones.
Cn---------- Chippewa	Slight---------	Severe: piping, wetness.	Severe: slow refill.	Percs slowly, frost action.	Wetness, rooting depth, percs slowly.	Wetness, rooting depth, percs slowly.
CoA---------- Churchville	Slight---------	Severe: piping, wetness.	Severe: no water.	Percs slowly, frost action.	Erodes easily, wetness.	Wetness, erodes easily.
CoB---------- Churchville	Moderate: slope.	Severe: piping, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Erodes easily, wetness.	Wetness, erodes easily.
CsB---------- Collamer	Moderate: seepage, slope.	Severe: piping, wetness.	Severe: slow refill, cutbanks cave.	Percs slowly, frost action, slope.	Erodes easily, wetness.	Erodes easily, percs slowly.
CsC---------- Collamer	Severe: slope.	Severe: piping, wetness.	Severe: slow refill, cutbanks cave.	Percs slowly, frost action, slope.	Slope, erodes easily, wetness.	Slope, erodes easily, percs slowly.
CtB---------- Collamer	Moderate: seepage, slope.	Severe: piping, wetness.	Severe: slow refill, cutbanks cave.	Percs slowly, frost action, slope.	Erodes easily, wetness.	Erodes easily, percs slowly.
CuB---------- Colonie	Severe: seepage.	Severe: piping.	Severe: no water.	Deep to water	Too sandy------	Droughty.
CuC---------- Colonie	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, too sandy.	Slope, droughty.
Cv---------- Cosad	Severe: seepage.	Severe: piping, wetness.	Severe: no water.	Percs slowly, cutbanks cave.	Wetness, percs slowly.	Wetness, percs slowly.
DdA---------- Derb	Moderate: seepage, depth to rock.	Severe: piping, wetness.	Severe: no water.	Percs slowly, frost action.	Wetness, erodes easily.	Wetness, erodes easily.
DdB---------- Derb	Moderate: seepage, depth to rock, slope.	Severe: piping, wetness.	Severe: no water.	Slope, percs slowly, frost action.	Wetness, erodes easily.	Wetness, erodes easily.
DdC---------- Derb	Severe: slope.	Severe: piping, wetness.	Severe: no water.	Slope, percs slowly, frost action.	Slope, wetness, erodes easily.	Slope, wetness, erodes easily.
ElA---------- Elnora	Severe: seepage.	Severe: piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, too sandy.	Droughty.
ElB---------- Elnora	Severe: seepage.	Severe: piping, wetness.	Severe: cutbanks cave.	Slope, cutbanks cave.	Wetness, too sandy.	Droughty.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
ErB---- Ernest Variant	Moderate: slope.	Severe: piping.	Severe: slow refill.	Slope, percs slowly, frost action.	Wetness, percs slowly.	Favorable.
ErC, ErD---- Ernest Variant	Severe: slope.	Severe: piping.	Severe: slow refill.	Slope, percs slowly, frost action.	Slope, wetness, percs slowly.	Slope.
FbB---- Farnham	Severe: seepage.	Severe: seepage, wetness.	Slight----	Frost action, slope.	Wetness----	Favorable.
Fu*: Fluvaquents.						
Udifluvents.						
FxB---- Fremont	Moderate: seepage, depth to rock, slope.	Severe: piping, wetness.	Severe: no water.	Slope, percs slowly, frost action.	Wetness, erodes easily.	Erodes easily, wetness.
GaA---- Galen	Severe: seepage.	Severe: piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, too sandy.	Favorable.
GaB---- Galen	Severe: seepage.	Severe: piping, wetness.	Severe: cutbanks cave.	Slope, cutbanks cave.	Wetness, too sandy.	Favorable.
GlB---- Gilpin	Moderate: seepage, depth to rock, slope.	Severe: thin layer.	Severe: no water.	Deep to water	Depth to rock, large stones.	Depth to rock, large stones.
GlC, GlD, GlE, GlF---- Gilpin	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, depth to rock, large stones.	Slope, depth to rock, large stones.
Ha---- Halsey	Severe: seepage.	Severe: seepage, wetness.	Severe: cutbanks cave.	Frost action, cutbanks cave.	Wetness, too sandy.	Wetness.
Hn*. Haplaquolls						
HuB---- Hudson	Moderate: slope.	Moderate: hard to pack, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Erodes easily, wetness.	Percs slowly, erodes easily.
HvE---- Hudson	Severe: slope.	Moderate: hard to pack, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Slope, erodes easily, wetness.	Slope, percs slowly, erodes easily.
Lc---- Lamson	Severe: seepage.	Severe: piping, wetness.	Severe: cutbanks cave.	Frost action---	Wetness----	Wetness.
Ld---- Lamson	Severe: seepage.	Severe: piping, ponding.	Severe: cutbanks cave.	Ponding, frost action.	Ponding----	Wetness.
LoC, LoF---- Lordstown	Severe: slope.	Severe: piping, thin layer.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
Ly---- Lyons	Slight----	Severe: wetness.	Severe: slow refill.	Percs slowly, frost action.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, rooting depth.
MaA---- Manlius	Moderate: seepage, depth to rock.	Severe: seepage.	Severe: no water.	Deep to water	Large stones, depth to rock.	Droughty, large stones, depth to rock.
MaB---- Manlius	Moderate: seepage, depth to rock, slope.	Severe: seepage.	Severe: no water.	Deep to water	Large stones, depth to rock.	Droughty, large stones, depth to rock.
MaD, MbE, MbF----- Manlius	Severe: slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, large stones, depth to rock.	Slope, droughty, large stones.
MdB---- Mardin	Moderate: slope.	Moderate: piping.	Severe: no water.	Slope, percs slowly.	Wetness, rooting depth, percs slowly.	Wetness, rooting depth, percs slowly.
MdC, MdD---- Mardin	Severe: slope.	Moderate: piping.	Severe: no water.	Slope, percs slowly.	Slope, wetness, rooting depth.	Slope, wetness, rooting depth.
MfB---- Marilla	Moderate: slope.	Moderate: seepage, piping, wetness.	Severe: no water.	Slope, percs slowly.	Wetness, rooting depth.	Droughty, rooting depth.
MfC---- Marilla	Severe: slope.	Moderate: seepage, piping, wetness.	Severe: no water.	Slope, percs slowly.	Slope, wetness.	Slope, droughty, rooting depth.
Mg---- Middlebury	Moderate: seepage.	Severe: piping, wetness.	Severe: cutbanks cave.	Flooding, frost action, cutbanks cave.	Wetness----	Wetness.
Mh---- Minoa	Severe: seepage.	Severe: piping, wetness.	Severe: cutbanks cave.	Frost action, cutbanks cave.	Wetness----	Wetness.
NfA---- Niagara	Slight----	Severe: piping, wetness.	Severe: slow refill.	Frost action---	Erodes easily, wetness.	Wetness, erodes easily.
NfB---- Niagara	Moderate: slope.	Severe: piping, wetness.	Severe: slow refill.	Frost action, slope.	Erodes easily, wetness.	Wetness, erodes easily.
Nh---- Niagara	Slight----	Severe: piping, wetness.	Severe: slow refill.	Frost action---	Erodes easily, wetness.	Wetness, erodes easily.
OrA---- Orpark	Moderate: depth to rock.	Severe: piping, wetness.	Severe: no water.	Percs slowly, depth to rock, frost action.	Depth to rock, erodes easily.	Wetness, erodes easily.
OrB---- Orpark	Moderate: depth to rock, slope.	Severe: piping, wetness.	Severe: no water.	Percs slowly, depth to rock, frost action.	Depth to rock, erodes easily.	Wetness, erodes easily.
OrC---- Orpark	Severe: slope.	Severe: piping, wetness.	Severe: no water.	Percs slowly, depth to rock, frost action.	Slope, depth to rock, erodes easily.	Slope, wetness, erodes easily.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
Pa---- Palms	Severe: seepage.	Severe: excess humus, ponding.	Severe: slow refill.	Ponding, subsides.	Ponding, soil blowing.	Wetness.
Pc---- Patchin	Moderate: depth to rock.	Severe: piping, wetness.	Severe: no water.	Depth to rock, percs slowly, frost action.	Depth to rock, wetness, erodes easily.	Wetness, erodes easily, depth to rock.
PhA---- Phelps	Severe: seepage.	Severe: seepage, wetness.	Severe: cutbanks cave.	Frost action, cutbanks cave.	Wetness, too sandy.	Favorable.
Pt*, Pu*. Pits						
RaB---- Rayne	Moderate: seepage, depth to rock, slope.	Severe: piping.	Severe: no water.	Deep to water	Favorable------	Favorable.
RaC, RaD, RaE, RaF---- Rayne	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope----------	Slope.
RbC, RbD, RbE, RbF---- Rayne	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Large stones, slope.	Large stones, slope.
RcA---- Raynham	Slight---------	Severe: piping, wetness.	Severe: slow refill.	Percs slowly, frost action.	Wetness, percs slowly, erodes easily.	Wetness, percs slowly, erodes easily.
RcB---- Raynham	Moderate: slope.	Severe: piping, wetness.	Severe: slow refill.	Percs slowly, frost action, slope.	Wetness, percs slowly, erodes easily.	Wetness, percs slowly, erodes easily.
Re---- Red Hook	Moderate: seepage.	Severe: wetness.	Severe: slow refill.	Frost action---	Wetness--------	Wetness.
RgA, RkA---- Rhinebeck	Slight---------	Severe: wetness.	Severe: no water.	Percs slowly, frost action.	Erodes easily, wetness.	Wetness, erodes easily.
ScB---- Schuyler	Moderate: seepage, depth to rock, slope.	Severe: piping.	Severe: no water.	Percs slowly, frost action, slope.	Erodes easily, wetness.	Erodes easily, percs slowly.
ScD---- Schuyler	Severe: slope.	Severe: piping.	Severe: no water.	Percs slowly, frost action, slope.	Slope, erodes easily, wetness.	Slope, erodes easily, wetness.
Sd---- Scio	Moderate: seepage.	Severe: piping, wetness.	Severe: cutbanks cave.	Cutbanks cave, frost action.	Erodes easily, wetness.	Erodes easily.
To---- Tioga	Severe: seepage.	Severe: piping.	Severe: cutbanks cave.	Deep to water	Erodes easily	Erodes easily.
Ua---- Unadilla	Moderate: seepage.	Severe: piping.	Severe: no water.	Deep to water	Erodes easily	Erodes easily.
VaB---- Valois	Severe: seepage.	Severe: piping.	Severe: no water.	Deep to water	Favorable------	Favorable.
VpA---- Volusia	Slight---------	Severe: wetness.	Severe: no water.	Percs slowly, frost action.	Large stones---	Large stones, wetness.
VpB---- Volusia	Moderate: slope.	Severe: wetness.	Severe: no water.	Percs slowly, frost action, slope.	Large stones---	Large stones, wetness.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
VpC---------- Volusia	Severe: slope.	Severe: wetness.	Severe: no water.	Percs slowly, frost action, slope.	Slope, large stones.	Large stones, wetness, slope.
Wa---------- Wallington	Slight----------	Severe: piping, wetness.	Severe: no water.	Percs slowly, frost action.	Erodes easily, wetness, rooting depth.	Wetness, erodes easily, rooting depth.
Wd---------- Wayland	Slight----------	Severe: piping, wetness.	Severe: slow refill.	Percs slowly, flooding, frost action.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
WhC, WhD---------- Wharton	Severe: slope.	Moderate: thin layer, piping, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Wetness, slope, percs slowly.	Slope, percs slowly.
WmB---------- Williamson	Moderate: slope.	Severe: piping.	Severe: no water.	Percs slowly, frost action, slope.	Erodes easily, wetness.	Erodes easily, rooting depth.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--ENGINEERING INDEX PROPERTIES

[The symbol < means less than; > means more than. Absence of an entry indicates that 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	
AkA, AkB----------	0-9	Silt loam--------	ML	A-4	0	100	95-100	90-100	70-90	<35	NP-10
Allard	9-27	Silt loam, very fine sandy loam.	ML	A-4	0	100	95-100	90-100	70-90	<35	NP-10
	27-60	Stratified sand to very gravelly loamy sand.	GM, GW, SW, SM	A-1, A-2, A-3	0	25-100	20-100	10-75	0-30	---	NP
AlA, AlB, AlC----	0-9	Silt loam--------	ML, CL	A-4, A-6	0	95-100	95-100	90-100	70-90	20-35	2-15
Allard Variant	9-23	Silt loam--------	ML, CL	A-4, A-6	0	95-100	95-100	90-100	70-90	20-35	2-15
	23-36	Silty clay loam	ML, CL	A-4, A-6	0	95-100	95-100	90-100	80-90	20-40	2-25
	36-60	Very gravelly loamy sand.	GM, SM, GP-GM	A-1, A-2, A-3	0	25-100	20-100	10-75	0-30	---	NP
AmA, AmB, AmC----	0-9	Fine gravelly loam.	SM, ML, GM, GP-GM	A-2, A-4, A-1	0-5	65-75	60-70	30-65	10-60	<10	NP-3
Alton	9-30	Gravelly loam, very gravelly sandy loam.	GM, SM	A-2, A-4, A-1	5-25	45-70	35-55	20-50	20-40	<10	NP-3
	30-60	Very gravelly sand, very gravelly loamy sand.	GP, GM, SM, SP	A-1	10-25	45-60	40-50	20-40	2-15	---	NP
AoA----------	0-11	Silt loam--------	ML, CL	A-4, A-5, A-6, A-7	0	100	75-100	65-100	55-95	25-45	3-20
Angola	11-26	Silty clay loam, clay loam, shaly loam.	GM, GC, ML, CL	A-4, A-6	0-5	60-100	55-95	45-95	35-90	15-35	3-20
	26-30	Shaly clay loam, very shaly loam, channery silty clay loam.	GM, GC, ML, CL	A-1, A-2, A-4, A-6	0-5	40-80	35-75	30-75	20-70	15-35	3-20
	30	Weathered bedrock	---	---	---	---	---	---	---	---	---
ArC, ArE----------	0-4	Very fine sandy loam.	SM, ML	A-4	0	95-100	95-100	65-95	40-65	<15	NP-4
Arkport	4-23	Very fine sandy loam, loamy very fine sand, loamy fine sand.	SM, ML	A-2, A-4	0	95-100	95-100	70-95	30-65	<15	NP-4
	23-56	Very fine sand, loamy fine sand, loamy very fine sand.	SM, ML	A-2, A-4	0	95-100	95-100	65-95	20-60	---	NP
	56-70	Loamy fine sand, fine sand, loamy very fine sand.	SM	A-2, A-4	0	95-100	95-100	60-95	15-50	---	NP
Be*. Beaches											
BlB----------	0-8	Shaly silt loam	GM, SM, ML	A-5, A-2	0-15	55-80	50-75	40-75	25-70	40-50	5-10
Blasdell	8-36	Very shaly silt loam, very shaly loam.	GM, GM-GC, GW-GM	A-1, A-2, A-4	0-15	25-60	20-55	15-55	10-50	25-35	5-10
	36-60	Very shaly silt loam, very shaly loam.	GM, GM-GC, GW-GM	A-1, A-2	0-15	15-45	10-40	10-40	5-35	25-35	5-10

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--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	
BrB, BrC, BrD---- Brinkerton Variant	0-3	Silt loam--------	ML, CL	A-4, A-6	0-2	95-100	95-100	85-100	70-95	25-40	5-15
	3-15	Silt loam, silty clay loam.	ML, CL	A-4, A-6	0-2	95-100	95-100	85-100	70-95	20-40	5-15
	15-38	Silt loam, silty clay loam, channery silty clay loam.	ML, CL	A-4, A-6	5-10	70-95	70-95	65-95	55-90	20-45	5-25
	38-60	Silt loam, silty clay loam, channery loam.	ML, CL, GM	A-4, A-6	5-10	70-95	70-95	55-95	45-90	20-45	5-25
Ca---------- Canadice	0-8	Silt loam--------	ML, MH, OL, OH	A-7	0	100	95-100	85-100	65-95	40-65	10-25
	8-53	Silty clay, clay, silty clay loam.	CL, CH, MH, ML	A-7	0	100	95-100	85-100	70-95	45-65	20-30
	53-65	Silty clay, clay, silty clay loam.	CL, CH, MH, ML	A-7	0	100	95-100	85-100	70-95	45-65	20-30
Cb---------- Canadice	0-4	Silty clay loam	ML, MH, OL, OH	A-7	0	100	95-100	85-100	65-95	40-65	10-25
	4-45	Silty clay, clay, silty clay loam.	CL, CH, MH, ML	A-7	0	100	95-100	85-100	70-95	45-65	20-30
	45-60	Silty clay, clay, silty clay loam.	CL, CH, MH, ML	A-7	0	100	95-100	85-100	70-95	45-65	20-30
Cc---------- Canandaigua	0-9	Silt loam--------	ML, MH	A-4, A-5, A-7	0	95-100	95-100	90-100	85-100	35-55	5-15
	9-37	Silt loam, very fine sandy loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	95-100	95-100	90-100	70-95	20-40	5-15
	37-60	Silt loam, very fine sandy loam.	ML, CL, CL-ML	A-4	0	95-100	95-100	90-100	70-95	20-30	3-10
Cd---------- Canandaigua	0-9	Mucky silt loam	ML, OL, MH, OH	A-4, A-5, A-7	0	95-100	95-100	90-100	85-100	35-55	5-15
	9-37	Silt loam, very fine sandy loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	95-100	95-100	90-100	70-95	20-40	5-15
	37-60	Silt loam, very fine sandy loam.	ML, CL, CL-ML	A-4	0	95-100	95-100	90-100	70-95	20-30	3-10
Ce---------- Canandaigua	0-9	Silt loam--------	ML, MH	A-4, A-5, A-7	0	95-100	95-100	90-100	85-100	35-55	5-15
	9-37	Silt loam, very fine sandy loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	95-100	95-100	90-100	70-95	20-40	5-15
	37-60	Silt loam, very fine sandy loam.	ML, CL, CL-ML	A-4	0	95-100	95-100	90-100	70-95	20-30	3-10
CfA, CfB---------- Caneadea	0-3	Silty clay loam	CL	A-7, A-6	0	100	90-100	90-100	80-100	38-50	15-25
	3-28	Silty clay, clay, silty clay loam.	CH, CL	A-7	0	100	95-100	90-100	85-100	40-60	18-34
	28-60	Silty clay, silty clay loam, loam.	CH, CL, ML	A-7, A-6	0	85-100	80-100	70-100	55-100	34-55	12-28
CgA---------- Castile	0-8	Gravelly loam----	ML, GM, SM, CL-ML	A-2, A-4	0-5	55-85	50-75	40-75	30-65	<30	NP-10
	8-31	Very gravelly loam, very gravelly sandy loam, gravelly silt loam.	GM, SM, ML, GM-GC	A-1, A-2, A-4	5-10	40-75	35-70	15-65	5-60	<30	NP-10
	31-65	Very gravelly sand, very gravelly loam, very gravelly loamy sand.	GW, GP, GW-GM, SW-SM	A-1, A-2, A-4	5-10	30-85	25-70	10-45	0-40	---	NP

TABLE 14.--ENGINEERING INDEX PROPERTIES--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	
Ch---------- Chenango	0-14	Sandy loam--------	SM, SC	A-4, A-2	0	90-100	85-100	50-70	25-40	<35	NP-10
	14-30	Gravelly silt loam, gravelly fine sandy loam, very gravelly silt loam.	ML, GM, SM	A-2, A-4, A-1	5-10	35-80	30-75	25-75	15-65	<40	NP-10
	30-60	Very gravelly loamy coarse sand, very gravelly sand, gravelly loamy fine sand.	GW, GM, SM, SP	A-1	5-10	25-65	20-60	10-50	1-20	---	NP
CkA, CkB, CkC, CkD, CkE-------- Chenango	0-8	Gravelly loam----	ML, SM, GM	A-2, A-4, A-1	5-15	55-85	55-80	35-80	15-70	<35	NP-10
	8-30	Gravelly silt loam, gravelly fine sandy loam, very gravelly silt loam.	ML, GM, SM	A-2, A-4, A-1	5-10	35-80	30-75	25-75	15-65	<40	NP-10
	30-60	Very gravelly loamy coarse sand, very gravelly sand, gravelly loamy fine sand.	GW, GM, SM, SP	A-1	5-10	25-65	20-60	10-50	1-20	---	NP
ClA, ClB--------- Chenango	0-8	Channery silt loam.	ML, GM, SM	A-2, A-4, A-1	5-15	55-85	55-80	35-80	15-70	<35	NP-10
	8-30	Channery silt loam, channery loam, very gravelly fine sandy loam.	ML, GM, SM, GP-GM	A-2, A-4, A-1	5-20	25-75	20-70	15-70	10-65	<40	NP-10
	30-60	Very gravelly loamy coarse sand, very gravelly sand, gravelly loamy fine sand.	GW, GM, SM, SP	A-1	10-20	15-60	10-55	5-45	0-20	---	NP
Cn---------- Chippewa	0-13	Silt loam--------	ML, OL	A-7, A-5	0-5	80-100	75-100	65-95	55-85	40-50	5-15
	13-36	Very channery silt loam, channery loam, channery silty clay loam.	CL, GC, SC, CL-ML	A-2, A-4	10-15	60-80	55-70	45-70	30-65	15-25	5-10
	36-60	Very channery silt loam, channery loam, channery silty clay loam.	GM, ML, CL-ML, SM	A-2, A-4	10-15	60-80	55-70	45-70	30-65	25-35	5-10
CoA, CoB--------- Churchville	0-11	Silt loam--------	ML, CL, MH	A-7	0	95-100	90-100	80-100	75-90	40-55	15-25
	11-26	Silty clay loam, silty clay, clay loam.	CL	A-7	0	95-100	95-100	90-100	75-95	40-50	25-35
	26-60	Gravelly loam, silt loam, silty clay loam.	ML, GM, CL, GC	A-2, A-4	0-5	60-90	55-85	45-80	30-75	10-20	1-8

TABLE 14.--ENGINEERING INDEX PROPERTIES--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	
CsB, CsC---------- Collamer	0-10	Silt loam--------	ML, SM, CL-ML, SM-SC	A-4	0	95-100	95-100	65-100	40-90	25-35	5-10
	10-15	Silt loam, very fine sandy loam, fine sandy loam.	ML, CL, CL-ML, SM-SC	A-4	0	95-100	95-100	65-100	40-90	20-30	3-10
	15-32	Silt loam, silty clay loam, sandy clay loam.	CL, CL-ML, ML	A-4, A-6	0	95-100	95-100	90-100	75-95	20-35	5-15
	32-60	Silt loam, very fine sand, silty clay loam.	ML, SM, CL-ML, CL	A-4, A-6	0	95-100	95-100	70-100	40-90	20-35	3-15
CtB---------- Collamer	0-8	Silt loam--------	ML, SM, CL-ML, SM-SC	A-4	0	95-100	95-100	65-100	40-90	25-35	5-10
	8-15	Silt loam, very fine sandy loam, fine sandy loam.	ML, CL, CL-ML, SM-SC	A-4	0	95-100	95-100	65-100	40-90	20-30	3-10
	15-48	Silt loam, silty clay loam, sandy clay loam.	CL, CL-ML, ML	A-4, A-6	0	95-100	95-100	90-100	75-95	20-35	5-15
	48-60	Shaly silty clay loam, gravelly loam, gravelly silt loam.	GM, SM, ML, CL-ML	A-2, A-4	5-10	55-80	50-75	40-75	30-70	25-35	5-10
CuB, CuC---------- Colonie	0-7	Loamy fine sand	SM	A-2, A-4	0	100	95-100	65-95	20-40	---	NP
	7-60	Loamy fine sand, fine sand.	SM	A-2, A-4	0	100	95-100	65-95	20-40	---	NP
	60-70	Fine sand, loamy fine sand.	SM	A-2, A-4	0	100	95-100	65-95	20-40	---	NP
Cv---------- Cosad	0-9	Loamy fine sand	SM, SW, SW-SM, SP-SM	A-2, A-4, A-1, A-3	0	100	90-100	45-85	4-40	---	NP
	9-21	Loamy fine sand, fine sand, sand.	SM, SW, SW-SM, SP-SM	A-2, A-4, A-1, A-3	0	100	90-100	45-85	4-40	---	NP
	21-24	Loamy fine sand, fine sandy loam, sand.	SM, SW, SW-SM, SP-SM	A-2, A-4, A-1, A-3	0	100	90-100	45-85	4-50	---	NP
	24-60	Silty clay, clay, silty clay loam.	CL, CL-ML	A-7, A-4, A-6	0	100	90-100	90-100	75-95	20-50	5-30
DdA, DdB, DdC---- Derb	0-6	Silt loam--------	CL-ML, CL, OL	A-6, A-4	0-5	95-100	90-100	80-100	65-95	20-40	5-20
	6-38	Silt loam, silty clay loam.	CL-ML, CL	A-6, A-4	0-5	95-100	90-100	80-100	65-95	20-40	5-20
	38-60	Silt loam, silty clay loam, shaly silty clay loam.	CL-ML, CL	A-6, A-4	0-5	80-95	75-90	70-90	55-85	20-40	5-20
ElA, ElB---------- Elnora	0-4	Loamy fine sand	SM, ML	A-2, A-4	0	100	100	70-95	25-60	---	NP
	4-17	Loamy fine sand, fine sand.	SM	A-2, A-4	0	100	100	70-95	25-45	---	NP
	17-60	Fine sand, loamy fine sand.	SM	A-2, A-4	0	100	100	60-85	20-45	---	NP
ErB, ErC---------- Ernest Variant	0-2	Silt loam--------	ML, CL	A-4, A-6	0	95-100	95-100	95-100	70-95	25-40	2-15
	2-20	Silt loam, silty clay loam.	ML, CL	A-4, A-6	0	95-100	95-100	90-100	70-90	20-40	2-25
	20-46	Silty clay loam, loam, shaly clay loam.	ML, CL	A-4, A-6	0-10	70-95	70-95	55-90	45-90	20-45	2-25
	46-60	Silty clay loam, loam, shaly clay loam.	ML, CL	A-4, A-6	5-10	70-95	70-95	45-90	45-90	20-45	2-25

TABLE 14.--ENGINEERING INDEX PROPERTIES--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	
ErD---------- Ernest Variant	0-2	Silt loam--------	ML, CL	A-4, A-6	0	95-100	95-100	95-100	70-95	25-40	2-15
	2-20	Silt loam, silty clay loam.	ML, CL	A-4, A-6	0	95-100	95-100	90-100	70-90	20-40	2-25
	20-46	Silty clay loam, loam, shaly clay loam.	ML, CL	A-4, A-6	0-10	70-95	70-95	55-90	45-90	20-45	2-25
	46-60	Silty clay loam, loam, shaly clay loam.	ML, CL	A-4, A-6	5-10	70-95	70-95	45-90	45-90	20-45	2-25
FbB---------- Farnham	0-7	Shaly silt loam	GM, ML, SM	A-4, A-2	0-5	55-80	50-75	40-75	30-65	25-40	1-8
	7-38	Very shaly silt loam, shaly loam.	GM, ML, SM	A-1, A-4, A-2	5-10	35-80	30-75	25-70	20-65	25-40	1-8
	38-60	Very shaly loam, very shaly silt loam.	GM	A-1, A-2, A-4	5-10	30-55	25-50	20-50	15-45	25-40	1-8
Fu*: Fluvaquents.											
Udifluvents.											
FxB---------- Fremont	0-10	Silt loam--------	ML, CL, OL	A-6, A-7	0-10	80-90	75-85	70-85	55-80	35-45	10-20
	10-35	Silt loam, silty clay loam, shaly silty clay loam.	CL, GC, SC	A-6	0-10	55-90	50-85	45-85	35-80	25-40	10-20
	35-60	Shaly silt loam, shaly silty clay loam, channery silt loam.	CL, GC, CL-ML, SM-SC	A-6, A-4, A-1, A-2	0-10	30-75	25-70	20-70	15-65	25-40	5-15
GaA, GaB---------- Galen	0-8	Very fine sandy loam.	SM, ML	A-4	0	100	95-100	70-95	40-60	<15	NP-4
	8-24	Fine sandy loam, very fine sandy loam, fine sand.	SM, ML	A-2, A-4	0	100	95-100	70-95	25-65	<15	NP-4
	24-36	Loamy fine sand, loamy very fine sand, fine sand.	SM, ML	A-2, A-4	0	100	95-100	70-95	25-60	<15	NP-4
	36-60	Stratified fine sand to very fine sand.	SM	A-2, A-4	0	100	95-100	60-90	20-50	---	NP
GlB, GlC, GlD, GlE, GlF-------- Gilpin	0-8	Shaly silt loam	GC, SC, CL, CL-ML	A-2, A-4, A-6	0-30	50-90	45-85	35-75	30-70	20-40	4-15
	8-12	Channery loam, shaly silt loam, silty clay loam.	GC, SC, CL, CL-ML	A-2, A-4, A-6	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	12-26	Channery loam, very channery silt loam, very shaly silty clay loam.	GC, GM-GC	A-1, A-2, A-4, A-6	0-35	25-55	20-50	15-45	15-40	20-40	4-15
	26	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Ha---------- Halsey	0-8	Silt loam--------	ML, CL, SM	A-2, A-4	0-2	80-100	75-100	35-90	25-90	20-30	3-10
	8-25	Loam, silt loam, gravelly fine sandy loam.	SM, GC, ML, CL	A-2, A-4	0-2	65-100	50-100	35-90	30-85	20-30	3-10
	25-60	Stratified sandy loam to very gravelly sand.	SP, GP, GM, SM	A-1, A-2, A-3	5-10	30-90	25-85	20-70	0-35	---	NP
Hn*. Haplaquolls											

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--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	
HuB---------- Hudson	0-14	Silt loam--------	ML, CL-ML, OL, CL	A-4, A-6, A-7	0	95-100	95-100	85-100	65-95	25-48	5-19
	14-23	Silty clay, silty clay loam.	CL, CH	A-7, A-6	0	95-100	90-100	80-100	80-100	35-65	15-35
	23-29	Silty clay, silty clay loam.	CL, CH	A-7, A-6	0	95-100	90-100	80-100	80-100	35-65	15-35
	29-60	Silty clay, silt loam, clay.	CL, CH	A-7, A-6	0	95-100	90-100	80-100	60-100	35-65	15-35
HvE---------- Hudson	0-8	Silty clay loam	ML, CL-ML, OL, CL	A-4, A-6, A-7	0	95-100	95-100	85-100	65-95	25-48	5-19
	8-23	Silty clay, silty clay loam.	CL, CH	A-7, A-6	0	95-100	90-100	80-100	80-100	35-65	15-35
	23-29	Silty clay, silty clay loam.	CL, CH	A-7, A-6	0	95-100	90-100	80-100	80-100	35-65	15-35
	29-60	Silty clay, silt loam, clay.	CL, CH	A-7, A-6	0	95-100	90-100	80-100	60-100	35-65	15-35
Lc---------- Lamson	0-9	Very fine sandy loam.	SM, ML	A-4	0	95-100	90-100	70-90	40-85	<20	NP-4
	9-40	Fine sandy loam, very fine sandy loam.	SM, ML	A-4	0	95-100	80-100	55-95	45-65	<20	NP-4
	40-60	Fine sand, very fine sand, silt loam.	SM, ML	A-2, A-4	0	95-100	80-100	60-90	20-90	---	NP
Ld---------- Lamson	0-9	Mucky very fine sandy loam.	SM, ML, OL	A-4	0	95-100	90-100	70-90	40-85	<20	NP-4
	9-40	Fine sandy loam, very fine sandy loam.	SM, ML	A-4	0	95-100	80-100	55-95	45-65	<20	NP-4
	40-60	Fine sand, very fine sand, silt loam.	SM, ML	A-2, A-4	0	95-100	80-100	60-90	20-90	---	NP
LoC, LoF---------- Lordstown	0-4	Channery silt loam.	ML, GM, SM	A-4	5-20	65-85	50-75	50-75	40-65	<30	NP-4
	4-29	Channery silt loam, channery loam.	ML, GM, SM	A-4	5-10	65-85	50-75	50-75	40-65	<30	NP-4
	29-36	Very channery loam, channery silt loam, very channery fine sandy loam.	ML, GM, SM	A-2, A-4, A-1	5-25	40-75	30-70	25-70	15-60	<30	NP-4
	36	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Ly---------- Lyons	0-9	Silt loam--------	ML, SM	A-5, A-7, A-2, A-4	0	80-100	75-100	50-95	30-90	35-45	5-15
	9-32	Silt loam, gravelly loam, silty clay loam.	CL, GC, CL-ML, GM-GC	A-4, A-6, A-2	0-5	60-95	55-90	45-85	25-80	20-35	5-15
	32-65	Gravelly loam, silty clay loam, very gravelly fine sandy loam.	CL, GC, SC, GM-GC	A-2, A-4, A-6, A-1	5-10	35-95	30-90	25-85	15-80	20-35	5-15
MaA, MaB, MaD---- Manlius	0-8	Shaly silt loam	ML, GM, SM, CL-ML	A-4, A-2	5-25	55-80	50-75	35-75	25-70	25-35	4-10
	8-21	Very shaly silt loam, very shaly loam.	GM, GM-GC, GW-GM	A-2, A-4, A-1	10-25	25-60	20-55	15-55	10-50	25-35	4-10
	21-31	Very shaly silt loam, very shaly loam.	GM, GM-GC, GW-GM	A-1, A-2, A-4	10-25	20-60	15-55	10-55	5-50	25-35	4-10
	31	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

TABLE 14.--ENGINEERING INDEX PROPERTIES--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	
MbE,. MbF--------- Manlius	0-8	Very shaly silt loam.	GM, GM-GC	A-2, A-4, A-1	10-25	45-55	40-50	30-50	20-45	25-35	4-10
	8-21	Very shaly silt loam, very shaly loam.	GM, GM-GC, GW-GM	A-2, A-4, A-1	10-25	25-60	20-55	15-55	10-50	25-35	4-10
	21-31	Very shaly silt loam, very shaly loam.	GM, GM-GC, GW-GM	A-1, A-2, A-4	10-25	20-60	15-55	10-55	5-50	25-35	4-10
	31	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
MdB, MdC, MdD---- Mardin	0-8	Channery silt loam.	GM, ML, CL, GC	A-4	5-20	65-75	60-70	50-70	35-60	25-35	5-10
	8-16	Channery silt loam, loam, gravelly loam.	CL, GC, CL-ML, SM-SC	A-4	5-10	60-90	55-90	45-90	35-80	15-25	5-10
	16-50	Channery loam, channery silt loam, very channery loam.	CL, GC, SC, CL-ML	A-2, A-4, A-1	10-25	40-80	35-75	30-70	20-65	20-30	5-10
	50-60	Channery loam, channery silt loam, very channery silt loam.	CL, GC, SC, CL-ML	A-2, A-4, A-1	10-25	40-80	35-75	30-70	20-65	20-30	5-10
MfB, MfC--------- Marilla	0-8	Shaly silt loam	ML, GM, SM	A-4, A-7, A-2	0-5	55-75	50-70	40-70	30-60	35-45	5-15
	8-18	Shaly silt loam, shaly loam.	SM-SC, CL, GC, GM-GC	A-4, A-6, A-2	0-5	55-75	50-70	40-70	30-60	15-30	5-15
	18-60	Very shaly silt loam, very shaly loam, shaly silt loam.	GM, GC, GM-GC, SM-SC	A-4, A-2, A-1	5-10	35-75	30-70	25-65	20-60	15-30	2-10
Mg--------------- Middlebury	0-9	Silt loam---------	ML, SM, SM-SC, CL-ML	A-4, A-2	0	80-100	75-100	50-100	30-90	25-35	5-10
	9-37	Silt loam, loam, gravelly fine sandy loam.	ML, SM, SM-SC, CL-ML	A-4, A-2	0	75-100	70-100	50-100	30-85	20-25	2-5
	37-60	Stratified gravelly sandy loam to sand.	GW, GM, SW, SM	A-1, A-2, A-3	0-5	40-100	35-100	20-100	0-35	---	NP
Mh--------------- Minoa	0-9	Very fine sandy loam.	ML, SM	A-4	0	95-100	90-100	75-100	35-90	<20	NP-4
	9-24	Loamy very fine sand, silt loam, fine sandy loam.	ML, SM	A-4	0	95-100	90-100	65-95	35-90	<20	NP-4
	24-40	Loamy very fine sand, fine sandy loam, silt loam.	SM, ML	A-4	0	95-100	90-100	65-95	35-90	<20	NP-4
	40-60	Loamy fine sand, fine sandy loam, silt loam.	SM, ML	A-2, A-4	0	95-100	90-100	60-100	20-90	<20	NP-4
NfA, NfB--------- Niagara	0-11	Silt loam---------	ML	A-4, A-7, A-6, A-5	0	95-100	95-100	70-100	55-90	30-45	5-15
	11-27	Silt loam, silty clay loam, very fine sandy loam.	ML, CL, CL-ML	A-4, A-6	0	95-100	95-100	90-100	70-100	25-35	3-13
	27-72	Silt loam, very fine sandy loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6	0	95-100	95-100	90-100	70-100	25-35	3-13

TABLE 14.--ENGINEERING INDEX PROPERTIES--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	
Nh---------- Niagara	0-14	Silt loam---------	ML	A-4, A-7, A-6, A-5	0	95-100	95-100	70-100	55-90	30-45	5-15
	14-40	Silt loam, silty clay loam, very fine sandy loam.	ML, CL, CL-ML	A-4, A-6	0	95-100	95-100	90-100	70-100	25-35	3-13
	40-60	Shaly silty clay loam, gravelly loam.	GM, GC, ML, CL	A-4, A-2, A-6	5-10	55-80	50-75	40-75	30-70	25-35	3-13
OrA, OrB, OrC---- Orpark	0-9	Silty clay loam	ML, OL	A-4, A-5, A-7	0	90-100	85-100	70-100	70-100	35-49	6-15
	9-27	Silt loam, silty clay loam.	ML, CL	A-4, A-6	0	90-100	85-100	75-100	70-100	30-40	6-15
	27	Weathered bedrock	---	---	---	---	---	---	---	---	---
Pa---------- Palms	0-38	Sapric material	PT	---	---	---	---	---	---	---	---
	38-60	Clay 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
Pc---------- Patchin	0-10	Silt loam---------	ML, OL	A-4, A-6, A-7	0	90-100	85-100	75-100	60-95	30-48	6-15
	10-23	Silt loam, silty clay loam.	ML, CL-ML, CL	A-4, A-6	0-10	90-100	85-100	75-100	60-95	23-40	6-14
	23	Weathered bedrock	---	---	---	---	---	---	---	---	---
PhA---------- Phelps	0-10	Gravelly loam----	ML, SM, GM, CL-ML	A-2, A-4, A-1	0-25	50-80	45-75	25-75	15-70	20-35	2-10
	10-15	Gravelly loam, gravelly clay loam, silt loam.	ML, SM, GM, CL-ML	A-2, A-4	0-25	50-95	45-90	35-90	25-70	20-35	2-10
	15-32	Gravelly clay loam, clay loam, gravelly sandy loam.	ML, SM, GM, CL-ML	A-2, A-4	0-25	50-95	45-90	35-90	15-70	20-35	2-10
	32-60	Stratified very gravelly sand to very gravelly loamy sand.	GW, GP, GM, GW-GM	A-1	5-30	15-55	10-50	5-40	0-15	<20	NP-2
Pt*, Pu*. Pits											
RaB, RaC, RaD, RaE, RaF-------- Rayne	0-7	Channery silt loam.	GM, ML, SM, CL	A-4	0-10	60-85	55-80	50-80	45-65	---	---
	7-20	Loam, shaly silty clay loam, channery clay loam.	GM, ML, GC, CL	A-4, A-6, A-2	0-15	60-95	55-85	40-85	30-60	20-40	2-15
	20-60	Channery sandy loam, shaly silt loam, very shaly silty clay loam.	SM, ML, GM, GP-GM	A-4, A-2, A-1	0-35	40-90	15-80	15-75	10-60	20-35	NP-10
RbC, RbD, RbE, RbF---------- Rayne	0-7	Extremely bouldery silt loam.	GM, ML, SM, CL	A-4	15-25	60-85	55-80	50-80	45-65	---	---
	7-20	Loam, shaly silty clay loam, channery clay loam.	GM, ML, SC, CL	A-4, A-6, A-2	0-15	60-95	55-85	40-85	30-60	20-40	2-15
	20-60	Channery sandy loam, shaly silt loam, very shaly silty clay loam.	SM, ML, GM, GP-GM	A-4, A-2, A-1	0-50	40-90	15-80	15-75	10-60	20-35	NP-10

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--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	
RcA, RcB--------- Raynham	0-8	Silt loam---------	ML	A-4	0	100	95-100	80-100	55-95	<25	NP-10
	8-26	Silt loam, silt, very fine sandy loam.	ML	A-4	0	100	95-100	80-100	55-95	<25	NP-10
	26-60	Silt loam, very fine sandy loam, fine sand.	ML,SM	A-4, A-2	0	100	95-100	65-100	20-95	<25	NP-10
Re--------------- Red Hook	0-10	Silt loam---------	ML, SM, SM-SC, CL-ML	A-4, A-2	0-5	80-100	75-95	50-95	30-80	15-40	1-15
	10-23	Silt loam, loam, very gravelly sandy loam.	ML, SM, GM, SM-SC	A-1, A-2, A-4	0-5	30-90	25-85	15-80	10-70	15-30	1-15
	23-60	Gravelly loam, gravelly silt loam, very gravelly sandy loam.	GM, SM, SM-SC, ML	A-1, A-2, A-4	5-10	30-80	25-75	15-75	10-70	15-30	1-15
RgA-------------- Rhinebeck	0-9	Silt loam---------	ML, MH, CL, CH	A-6, A-7	0	80-100	75-100	70-100	60-90	30-55	10-25
	9-37	Silty clay loam, silty clay.	CH, CL	A-7, A-6	0	90-100	85-100	80-100	70-100	30-55	15-30
	37-70	Silty clay loam, silty clay, clay.	CH, CL	A-7, A-6	0	90-100	85-100	80-100	70-100	30-55	15-30
RkA-------------- Rhinebeck	0-9	Gravelly loam-----	GM, CL, MH, ML	A-6, A-7	0	70-80	65-75	60-75	40-70	30-55	10-25
	9-37	Silty clay loam, silty clay.	CH, CL	A-7, A-6	0	90-100	85-100	80-100	70-100	30-55	15-30
	37-70	Silty clay loam, silty clay, clay.	CH, CL	A-7, A-6	0	90-100	85-100	80-100	70-100	30-55	15-30
ScB, ScD--------- Schuyler	0-6	Silt loam---------	CL, SC, SM-SC, CL-ML	A-2, A-4, A-6	0-5	80-95	75-90	50-90	30-80	25-40	5-20
	6-42	Silt loam, very shaly loam, shaly silty clay loam.	SC, GC, CL, CL-ML	A-4, A-6, A-2	5-15	50-95	45-90	40-90	25-85	25-40	5-20
	42-48	Very shaly silt loam, shaly loam, shaly silty clay loam.	GC, CL, SC, CL-ML	A-4, A-6, A-1, A-2	5-15	25-75	20-70	15-70	10-65	25-40	5-20
	48	Weathered bedrock	---	---	---	---	---	---	---	---	---
Sd--------------- Scio	0-10	Silt loam---------	ML	A-4	0	100	95-100	90-100	70-90	<20	NP-4
	10-42	Silt loam, very fine sandy loam.	ML	A-4	0	100	95-100	90-100	70-90	<20	NP-4
	42-60	Stratified very gravelly sand to silt loam.	ML, SM, SP, GP-GM	A-4, A-2, A-1, A-3	0	35-95	30-90	15-85	2-80	<10	NP-4
To--------------- Tioga	0-10	Silt loam---------	ML, SM	A-4	0	100	95-100	65-95	40-85	<15	NP-4
	10-43	Silt loam, loam, gravelly fine sandy loam.	SM, GM, ML	A-1, A-2, A-4	0	55-100	50-100	35-90	20-80	<15	NP-2
	43-60	Silt loam, gravelly loam, very gravelly loamy sand.	GW-GM, GM, SM, ML	A-1, A-2, A-4, A-3	0-10	35-100	30-100	15-90	5-80	<15	NP-2

TABLE 14.--ENGINEERING INDEX PROPERTIES--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	
Ua Unadilla	0-9	Silt loam	ML	A-4	0	100	95-100	90-100	70-90	<35	NP-10
	9-44	Silt loam, very fine sandy loam.	ML, CL-ML	A-4	0	100	95-100	90-100	70-90	<25	NP-10
	44-60	Very gravelly sand, gravelly sand, loamy sand.	GM, GP, SM, SP	A-2, A-1, A-3	0-10	35-100	25-95	10-70	1-30	---	NP
VaB Valois	0-8	Gravelly silt loam.	ML, GM, SM, GM-GC	A-4, A-2, A-1	0-5	55-80	50-75	35-75	20-70	20-40	1-12
	8-31	Gravelly loam, gravelly silt loam, fine sandy loam.	GM, ML, SM, GM-GC	A-4, A-2, A-1	0-10	55-95	50-90	35-90	20-80	15-25	NP-5
	31-52	Gravelly silt loam, gravelly loam, gravelly sandy loam.	GM, GM-GC, SM, ML	A-4, A-2, A-1	0-10	55-75	50-70	30-70	15-65	15-25	NP-5
	52-65	Very gravelly fine sandy loam, very gravelly loam, very gravelly sandy loam.	GM, GW-GM, GW, GM-GC	A-1, A-2, A-4	0-15	20-60	15-55	10-50	4-40	15-25	NP-7
VpA, VpB, VpC Volusia	0-9	Channery silt loam.	GM, ML, SM	A-4, A-5	5-10	70-85	65-80	55-80	40-70	35-45	5-10
	9-15	Channery silt loam, channery loam, silt loam.	CL-ML, CL, GM-GC, SC	A-4	5-10	65-90	60-85	50-85	35-75	15-25	5-10
	15-50	Channery silt loam, channery loam, silty clay loam.	SM-SC, CL, SC, CL-ML	A-4	10-25	75-90	70-85	60-85	40-80	20-30	5-10
	50-60	Very channery loam, channery loam, silt loam.	GM-GC, SC, CL, CL-ML	A-2, A-4, A-1	10-25	40-90	35-85	30-85	20-75	20-30	5-10
Wa Wallington	0-2	Silt loam	ML, CL-ML	A-4	0	100	95-100	90-100	70-90	15-20	3-6
	2-12	Very fine sandy loam, silt loam.	ML, CL-ML	A-4	0	100	95-100	90-100	70-90	15-20	3-6
	12-30	Fine sandy loam, silt loam.	ML, CL-ML, SM	A-4	0	100	95-100	65-100	40-90	15-20	3-6
	30-60	Very fine sandy loam, loamy very fine sand, silt loam.	ML, SM	A-4	0	95-100	90-100	65-95	40-90	<20	NP-3
Wd Wayland	0-9	Silt loam	ML, OL	A-7, A-5	0	100	95-100	90-100	70-95	40-50	5-15
	9-45	Silt loam, silty clay loam.	ML, CL-ML, CL	A-6, A-4, A-7	0	100	95-100	90-100	70-95	25-45	5-15
	45-60	Stratified silt loam to gravelly fine sandy loam.	CL, CL-ML, SC, GC	A-2, A-4	0	65-100	55-100	50-95	25-90	15-25	5-10
WhC, WhD Wharton	0-4	Silt loam	ML, CL	A-4, A-6	0-5	95-100	90-100	80-95	70-90	---	---
	4-34	Clay loam, shaly silty clay loam, shaly silt loam.	ML, CL	A-7, A-6	0-25	75-100	70-100	65-95	60-90	35-45	10-25
	34-60	Silt loam, shaly clay, very shaly silt loam.	ML, GM, SM	A-4, A-6, A-7, A-2	0-50	45-100	30-100	25-95	25-90	30-45	5-15

TABLE 14.--ENGINEERING INDEX PROPERTIES--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	
WmB---------- Williamson	0-7	Silt loam--------	ML, SM	A-4, A-5, A-6, A-7	0	95-100	95-100	60-100	35-95	30-45	5-15
	7-18	Silt loam, very fine sandy loam.	ML, CL-ML, CL	A-4	0	95-100	95-100	90-100	70-95	<30	NP-10
	18-45	Silt loam, very fine sandy loam.	ML, CL-ML, CL	A-4	0	95-100	95-100	90-100	70-95	<30	NP-10
	45-60	Stratified silt loam to very fine sandy loam.	ML, CL-ML, CL	A-4	0	95-100	95-100	90-100	70-95	<30	NP-10

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

[The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated]

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	G/cm^3	In/hr	In/in	pH				Pct
AkA, AkB--------- Allard	0-9 9-27 27-60	2-6 1-6 1-3	1.20-1.50 1.20-1.50 1.45-1.65	0.6-2.0 0.6-2.0 >6.0	0.16-0.21 0.15-0.20 0.01-0.03	4.5-6.0 4.5-6.0 5.1-7.3	Low---------- Low---------- Low----------	0.49 0.64 0.17	3	2-7
AlA, AlB, AlC---- Allard Variant	0-9 9-23 23-36 36-60	10-25 10-25 18-35 0-15	1.20-1.40 1.20-1.40 1.20-1.60 1.20-1.40	0.6-2.0 0.6-2.0 0.2-2.0 >6.0	0.18-0.20 0.18-0.21 0.15-0.20 0.01-0.05	4.5-6.0 4.5-6.0 4.5-6.0 4.5-6.0	Low---------- Low---------- Moderate----- Low----------	0.32 0.32 0.43 0.17	3	2-7
AmA, AmB, AmC---- Alton	0-9 9-30 30-60	1-12 1-12 1-4	1.35-1.65 1.45-1.65 1.45-1.65	2.0-6.0 2.0-6.0 >6.0	0.04-0.14 0.07-0.09 0.02-0.04	4.5-5.5 5.1-7.3 6.6-7.8	Low---------- Low---------- Low----------	0.17 0.17 0.17	3	2-5
AoA-------------- Angola	0-11 11-26 26-30 30	8-30 18-35 10-30 ---	1.10-1.40 1.60-1.85 1.70-1.95 ---	0.6-2.0 0.06-0.2 0.06-0.2 ---	0.17-0.22 0.11-0.19 0.06-0.13 ---	5.6-7.8 5.6-7.8 6.1-8.4 ---	Low---------- Low---------- Low---------- ----------	0.37 0.28 0.28 ----	3	3-6
ArC, ArE--------- Arkport	0-4 4-23 23-56 56-70	5-18 3-15 1-5 1-5	1.10-1.40 1.25-1.55 1.25-1.55 1.25-1.55	2.0-6.0 2.0-6.0 2.0-6.0 2.0-6.0	0.09-0.17 0.06-0.16 0.06-0.12 0.02-0.06	4.5-7.3 4.5-7.3 5.1-7.3 5.6-8.4	Low---------- Low---------- Low---------- Low----------	0.28 0.28 0.28 0.28	3	1-3
Be*. Beaches										
BlB-------------- Blasdell	0-8 8-36 36-60	6-18 6-18 6-18	1.10-1.40 1.25-1.55 1.45-1.65	2.0-6.0 2.0-6.0 2.0-6.0	0.10-0.17 0.07-0.11 0.05-0.09	4.5-6.0 4.5-6.0 5.1-6.5	Low---------- Low---------- Low----------	0.28 0.17 0.17	3	3-6
BrB, BrC, BrD---- Brinkerton Variant	0-3 3-15 15-38 38-60	15-25 15-25 18-35 18-35	1.20-1.40 1.20-1.40 1.30-1.60 1.30-1.60	0.6-2.0 0.6-2.0 0.06-0.6 0.06-0.6	0.18-0.21 0.16-0.20 0.12-0.19 0.12-0.18	4.5-5.5 4.5-5.5 4.5-5.5 4.5-6.0	Low---------- Moderate----- Moderate----- Moderate-----	0.32 0.43 0.28 0.28	3	3-7
Ca--------------- Canadice	0-8 8-53 53-65	20-40 35-60 35-60	1.35-1.55 1.40-1.75 1.40-1.50	0.2-2.0 <0.06 <0.06	0.17-0.21 0.12-0.17 0.13-0.17	4.5-6.5 5.1-7.8 6.6-8.4	Moderate----- Moderate----- Moderate-----	0.49 0.28 0.28	5	3-11
Cb--------------- Canadice	0-4 4-45 45-60	20-40 35-60 35-60	1.35-1.55 1.40-1.75 1.40-1.50	0.2-0.6 <0.06 <0.06	0.17-0.21 0.12-0.17 0.13-0.17	4.5-5.5 5.1-6.0 5.1-5.5	Moderate----- Moderate----- Moderate-----	0.49 0.28 0.28	5	3-11
Cc--------------- Canandaigua	0-9 9-37 37-60	18-35 18-35 18-35	1.00-1.25 1.20-1.40 1.15-1.40	0.6-2.0 0.2-0.6 0.2-0.6	0.20-0.35 0.19-0.20 0.19-0.20	5.6-7.8 6.1-7.8 6.6-8.4	Low---------- Low---------- Low----------	0.49 0.49 0.49	5	4-15
Cd--------------- Canandaigua	0-9 9-37 37-60	18-35 18-35 18-35	1.00-1.25 1.20-1.40 1.15-1.40	0.6-2.0 0.2-0.6 0.2-0.6	0.25-0.40 0.19-0.20 0.19-0.20	5.6-7.8 6.1-7.8 6.6-8.4	Low---------- Low---------- Low----------	0.49 0.49 0.49	5	10-20
Ce--------------- Canandaigua	0-9 9-37 37-60	18-35 18-35 18-35	1.00-1.25 1.20-1.40 1.15-1.40	0.6-2.0 0.2-0.6 0.2-0.6	0.20-0.35 0.19-0.20 0.19-0.20	5.1-6.5 4.5-8.0 4.5-5.5	Low---------- Low---------- Low----------	0.49 0.49 0.49	5	4-15
CfA, CfB--------- Caneadea	0-3 3-28 28-60	27-35 35-60 35-55	1.30-1.50 1.35-1.70 1.45-1.75	0.2-0.6 0.06-0.2 0.06-0.2	0.21-0.23 0.10-0.13 0.10-0.14	4.5-5.5 4.5-5.5 4.5-5.5	Moderate----- High---------- High----------	0.43 0.32 0.32	3	2-4
CgA-------------- Castile	0-8 8-31 31-65	6-18 4-15 2-10	1.10-1.40 1.25-1.55 1.45-1.65	0.6-6.0 2.0-6.0 >6.0	0.09-0.16 0.05-0.13 0.01-0.02	4.5-6.0 4.5-6.0 5.1-7.3	Low---------- Low---------- Low----------	0.17 0.17 0.17	3	4-10

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	G/cm^3	In/hr	In/in	pH				Pct
Ch----------	0-14	6-18	1.20-1.50	0.6-6.0	0.11-0.19	4.5-5.5	Low----------	0.32	3	2-6
Chenango	14-30	6-18	1.25-1.55	0.6-6.0	0.05-0.14	4.5-6.0	Low----------	0.17		
	30-60	1-8	1.45-1.65	6.0-20	0.01-0.03	5.1-7.8	Low----------	0.17		
CkA, CkB, CkC, CkD, CkE, ClA, ClB----------	0-8	6-18	1.20-1.50	0.6-6.0	0.08-0.15	4.5-5.5	Low----------	0.24	3	2-6
Chenango	8-30	6-18	1.25-1.55	0.6-6.0	0.05-0.14	4.5-6.0	Low----------	0.17		
	30-60	1-8	1.45-1.65	6.0-20	0.01-0.03	5.1-7.8	Low----------	0.17		
Cn----------	0-13	10-27	1.10-1.40	0.6-2.0	0.14-0.21	4.5-6.5	Low----------	0.32	3	3-10
Chippewa	13-36	10-35	1.70-2.00	<0.2	0.01-0.02	5.1-7.3	Low----------	0.24		
	36-60	10-35	1.65-1.95	<0.2	0.01-0.02	5.6-8.4	Low----------	0.24		
CoA, CoB----------	0-11	15-35	1.00-1.25	0.6-2.0	0.16-0.21	5.6-7.3	Low----------	0.49	3	2-6
Churchville	11-26	40-60	1.20-1.40	<0.2	0.13-0.17	6.1-7.8	Moderate-----	0.28		
	26-60	15-40	1.50-1.80	<0.2	0.07-0.17	7.4-8.4	Low----------	0.28		
CsB, CsC----------	0-10	15-27	1.20-1.50	0.6-2.0	0.14-0.21	5.1-7.3	Low----------	0.49	3	2-5
Collamer	10-15	15-27	1.20-1.50	0.6-2.0	0.14-0.20	5.1-7.3	Low----------	0.49		
	15-32	18-35	1.20-1.50	0.06-0.6	0.16-0.20	5.6-7.8	Low----------	0.49		
	32-60	4-27	1.45-1.65	0.06-0.6	0.12-0.20	6.1-8.4	Low----------	0.64		
CtB----------	0-8	15-27	1.20-1.50	0.6-2.0	0.14-0.21	5.1-7.3	Low----------	0.49	3	2-5
Collamer	8-15	15-27	1.20-1.50	0.6-2.0	0.14-0.20	5.1-7.3	Low----------	0.49		
	15-48	18-35	1.20-1.50	0.06-0.6	0.16-0.20	5.6-7.8	Low----------	0.49		
	48-60	10-35	1.70-1.95	0.06-0.6	0.08-0.13	6.1-8.4	Low----------	0.28		
CuB, CuC----------	0-7	1-2	1.20-1.50	2.0-20	0.09-0.10	5.1-6.5	Low----------	0.17	4	1-2
Colonie	7-60	1-2	1.20-1.50	2.0-20	0.06-0.08	5.1-6.5	Low----------	0.17		
	60-70	1-2	1.45-1.65	2.0-20	0.02-0.06	5.6-7.3	Low----------	0.17		
Cv----------	0-9	1-3	1.20-1.50	6.0-20	0.08-0.09	5.1-6.5	Low----------	0.17	3	3-7
Cosad	9-21	1-3	1.20-1.50	6.0-20	0.05-0.07	5.1-6.5	Low----------	0.17		
	21-24	1-3	1.20-1.50	6.0-20	0.05-0.07	5.6-7.3	Low----------	0.17		
	24-60	30-50	1.15-1.40	<0.2	0.12-0.17	6.6-8.4	Moderate-----	0.28		
DdA, DdB, DdC----	0-6	10-35	1.10-1.40	0.6-2.0	0.15-0.22	4.5-5.5	Low----------	0.43	3	3-6
Derb	6-38	18-35	1.20-1.50	0.2-2.0	0.15-0.20	4.5-5.5	Low----------	0.49		
	38-60	18-35	1.70-1.95	0.06-0.2	0.13-0.18	4.5-5.5	Low----------	0.49		
ElA, ElB----------	0-4	2-10	1.20-1.50	2.0-6.0	0.08-0.16	4.5-6.5	Low----------	0.17	4	2-6
Elnora	4-17	2-5	1.20-1.50	6.0-20	0.06-0.08	4.5-6.5	Low----------	0.17		
	17-60	2-5	1.45-1.65	6.0-20	0.03-0.06	5.1-7.3	Low----------	0.17		
ErB, ErC----------	0-2	15-25	1.20-1.40	0.6-2.0	0.18-0.21	4.5-5.5	Low----------	0.32	3	2-4
Ernest Variant	2-20	15-25	1.20-1.40	0.6-2.0	0.16-0.20	4.5-5.5	Moderate-----	0.43		
	20-46	18-35	1.30-1.60	0.06-0.6	0.11-0.18	4.5-5.5	Moderate-----	0.28		
	46-60	18-35	1.30-1.60	0.06-0.6	0.12-0.17	4.5-6.0	Moderate-----	0.28		
ErD----------	0-2	15-25	1.20-1.40	0.6-2.0	0.18-0.21	4.5-5.5	Low----------	0.32	3	2-4
Ernest Variant	2-20	15-25	1.20-1.40	0.6-2.0	0.16-0.20	4.5-5.5	Moderate-----	0.43		
	20-46	18-35	1.30-1.60	0.06-0.6	0.11-0.18	4.5-5.5	Moderate-----	0.28		
	46-60	18-35	1.30-1.60	0.06-0.6	0.12-0.17	4.5-6.0	Moderate-----	0.28		
FbB----------	0-7	5-15	1.10-1.40	2.0-6.0	0.09-0.16	4.5-6.0	Low----------	0.17	3	3-7
Farnham	7-38	5-15	1.25-1.55	2.0-6.0	0.05-0.15	4.5-6.0	Low----------	0.17		
	38-60	3-10	1.45-1.65	2.0-6.0	0.04-0.10	5.1-6.5	Low----------	0.17		
Fu*:										
Fluvaquents.										
Udifluvents.										
FxB----------	0-10	15-35	1.10-1.40	0.6-2.0	0.17-0.21	4.5-6.0	Low----------	0.37	3	3-8
Fremont	10-35	18-35	1.20-1.50	0.2-2.0	0.12-0.19	4.5-6.0	Low----------	0.37		
	35-60	18-35	1.70-1.95	<0.2	0.11-0.16	5.1-7.3	Low----------	0.28		

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	G/cm^3	In/hr	In/in	pH				Pct
GaA, GaB--------- Galen	0-8 8-24 24-36 36-60	2-8 2-8 1-4 1-4	1.33-1.68 1.45-1.70 1.45-1.70 1.45-1.70	0.6-6.0 0.6-6.0 0.6-6.0 2.0-6.0	0.09-0.17 0.08-0.16 0.06-0.16 0.06-0.09	5.1-7.3 5.6-7.3 5.6-7.3 5.6-7.8	Low---------- Low---------- Low---------- Low----------	0.28 0.28 0.28 0.17	3	2-4
GlB, GlC, GlD, GlE, GlF-------- Gilpin	0-8 8-12 12-26 26	15-27 18-35 15-35 ---	1.20-1.40 1.20-1.50 1.20-1.50 ---	0.6-2.0 0.6-2.0 0.6-2.0 ---	0.10-0.16 0.10-0.16 0.06-0.10 ---	4.5-5.5 4.5-5.5 4.5-5.5 ---	Low---------- Low---------- Low---------- ----------	0.28 0.24 0.24 ----	3	1-4
Ha--------------- Halsey	0-8 8-25 25-60	7-25 7-25 2-10	1.10-1.30 1.20-1.40 1.40-1.60	0.6-2.0 0.6-6.0 6.0-20	0.14-0.24 0.12-0.18 0.02-0.07	5.6-7.3 5.6-7.3 6.1-8.4	Low---------- Low---------- Low----------	0.24 0.32 0.20	5	3-5
Hn*. Haplaquolls										
HuB, HvE--------- Hudson	0-14 14-23 23-29 29-60	20-40 35-60 25-60 35-60	1.00-1.25 1.15-1.40 1.15-1.40 1.15-1.40	0.2-2.0 <0.2 <0.2 <0.2	0.16-0.21 0.13-0.17 0.13-0.17 0.12-0.20	5.1-7.3 5.1-7.3 5.6-7.8 6.6-8.4	Moderate----- Moderate----- Moderate----- Moderate-----	0.49 0.28 0.28 0.28	3	3-6
Lc--------------- Lamson	0-9 9-40 40-60	5-18 5-18 1-10	1.10-1.40 1.25-1.55 1.45-1.65	0.6-6.0 0.6-6.0 0.6-6.0	0.15-0.22 0.12-0.17 0.02-0.04	5.6-7.8 6.1-8.4 6.1-8.4	Low---------- Low---------- Low----------	0.28 0.20 0.20	5	3-10
Ld--------------- Lamson	0-9 9-40 40-60	5-18 5-18 1-10	1.10-1.40 1.25-1.55 1.45-1.65	0.6-6.0 0.6-6.0 0.6-6.0	0.17-0.24 0.12-0.17 0.02-0.04	5.6-7.8 6.1-8.4 6.1-8.4	Low---------- Low---------- Low----------	0.28 0.20 0.20	5	10-20
LoC, LoF--------- Lordstown	0-4 4-29 29-36 36	8-18 8-18 5-18 ---	1.10-1.40 1.20-1.50 1.20-1.50 ---	0.6-2.0 0.6-2.0 0.6-2.0 ---	0.11-0.17 0.10-0.16 0.05-0.14 ---	4.5-6.5 4.5-6.0 5.1-6.0 ---	Low---------- Low---------- Low---------- ----------	0.20 0.28 0.28 ----	3	2-6
Ly--------------- Lyons	0-9 9-32 32-65	15-30 18-28 18-28	1.10-1.40 1.20-1.50 1.70-1.95	0.2-2.0 0.2-2.0 <0.2	0.15-0.20 0.08-0.18 0.06-0.15	5.6-7.3 6.1-7.8 7.4-8.4	Low---------- Low---------- Low----------	0.37 0.37 0.28	5	3-15
MaA, MaB, MaD---- Manlius	0-8 8-21 21-31 31	6-18 6-18 6-18 ---	1.10-1.40 1.20-1.50 1.70-1.95 ---	0.6-2.0 0.6-2.0 0.6-2.0 ---	0.10-0.18 0.08-0.12 0.03-0.09 ---	3.6-5.5 3.6-5.5 4.5-6.5 ---	Low---------- Low---------- Low---------- ----------	0.28 0.20 0.20 ----	3	1-5
MbE, MbF--------- Manlius	0-8 8-21 21-31 31	6-18 6-18 6-18 ---	1.10-1.40 1.20-1.50 1.70-1.95 ---	0.6-2.0 0.6-2.0 0.6-2.0 ---	0.08-0.12 0.08-0.12 0.03-0.09 ---	3.6-5.5 3.6-5.5 4.5-6.5 ---	Low---------- Low---------- Low---------- ----------	0.20 0.20 0.20 ----	3	1-5
MdB, MdC, MdD---- Mardin	0-8 8-16 16-50 50-60	10-18 10-18 10-18 10-18	1.10-1.40 1.20-1.50 1.70-2.00 1.65-1.95	0.6-2.0 0.6-2.0 <0.2 <0.2	0.11-0.17 0.09-0.16 0.01-0.03 0.01-0.03	3.6-6.5 3.6-6.5 4.5-7.3 5.1-8.4	Low---------- Low---------- Low---------- Low----------	0.24 0.24 0.24 0.24	3	3-7
MfB, MfC--------- Marilla	0-8 8-18 18-60	15-27 18-27 18-27	1.10-1.40 1.20-1.50 1.70-2.00	0.6-2.0 0.6-2.0 <0.06	0.09-0.15 0.08-0.14 0.01-0.02	4.5-5.5 4.5-5.5 5.1-6.5	Low---------- Low---------- Low----------	0.24 0.28 0.28	3	3-7
Mg--------------- Middlebury	0-9 9-37 37-60	5-18 5-18 1-10	1.15-1.40 1.15-1.45 1.25-1.55	0.6-2.0 0.6-2.0 2.0-20	0.14-0.21 0.10-0.20 0.01-0.10	5.1-6.5 5.6-7.3 5.6-7.3	Low---------- Low---------- Low----------	0.28 0.28 0.20	5	3-7
Mh--------------- Minoa	0-9 9-24 24-40 40-60	5-18 5-18 3-15 3-15	1.20-1.50 1.20-1.50 1.20-1.50 1.20-1.50	0.6-2.0 0.6-2.0 0.6-2.0 0.6-6.0	0.13-0.21 0.13-0.20 0.13-0.20 0.07-0.20	5.1-7.3 5.1-7.3 5.6-7.3 5.6-8.4	Low---------- Low---------- Low---------- Low----------	0.32 0.32 0.24 0.24	4	3-6

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	G/cm^3	In/hr	In/in	pH				Pct
NfA, NfB--------- Niagara	0-11 11-27 27-72	15-25 18-35 5-35	1.20-1.50 1.20-1.50 1.20-1.50	0.6-2.0 0.2-0.6 0.2-0.6	0.17-0.22 0.16-0.20 0.12-0.20	5.1-7.3 5.6-7.8 6.6-8.4	Low---------- Low---------- Low----------	0.49 0.49 0.64	3	2-6
Nh--------------- Niagara	0-14 14-40 40-60	15-25 18-35 8-35	1.20-1.50 1.20-1.50 1.70-1.95	0.6-2.0 0.2-0.6 0.06-0.6	0.17-0.22 0.16-0.20 0.08-0.13	5.1-7.3 5.6-7.8 6.6-8.4	Low---------- Low---------- Low----------	0.49 0.49 0.28	3	2-6
OrA, OrB, OrC---- Orpark	0-9 9-27 27	18-35 18-35 ---	1.10-1.40 1.20-1.60 ---	0.6-2.0 0.06-0.6 ---	0.14-0.21 0.14-0.20 ---	4.5-5.5 4.5-5.5 ---	Low---------- Low---------- ----------	0.37 0.37 ----	3	3-7
Pa--------------- Palms	0-38 38-60	--- 7-35	0.25-0.45 1.45-1.75	0.2-6.0 0.2-2.0	0.35-0.45 0.14-0.22	5.1-7.8 6.1-8.4	---------- Low----------	---- ----	2	>75
Pc--------------- Patchin	0-10 10-23 23	18-35 18-35 ---	1.20-1.50 1.40-1.70 ---	0.2-0.6 0.06-0.2 ---	0.15-0.21 0.14-0.20 ---	4.5-5.5 4.5-5.5 ---	Low---------- Low---------- ----------	0.37 0.37 ----	3	3-8
PhA-------------- Phelps	0-10 10-15 15-32 32-60	10-28 18-35 18-35 1-5	1.10-1.40 1.25-1.55 1.25-1.55 1.45-1.65	0.6-2.0 0.6-2.0 0.6-2.0 2.0-20	0.10-0.16 0.08-0.13 0.09-0.18 0.01-0.04	5.6-7.3 5.6-7.3 5.6-7.3 7.4-8.4	Low---------- Low---------- Low---------- Low----------	0.24 0.24 0.24 0.17	3	3-6
Pt*, Pu*. Pits										
RaB, RaC, RaD, RaE, RaF-------- Rayne	0-7 7-20 20-60	10-27 18-35 10-30	1.20-1.40 1.40-1.60 1.40-1.60	0.6-2.0 0.6-2.0 0.6-2.0	0.12-0.16 0.12-0.16 0.10-0.16	4.5-5.5 4.5-5.5 4.5-5.5	Low---------- Low---------- Low----------	0.20 0.20 0.20	3	1-3
RbC, RbD, RbE, RbF-------------- Rayne	0-7 7-20 20-60	10-27 18-35 10-30	1.20-1.40 1.40-1.60 1.40-1.60	0.6-2.0 0.6-2.0 0.6-2.0	0.10-0.14 0.12-0.16 0.10-0.16	4.5-5.5 4.5-5.5 4.5-5.5	Low---------- Low---------- Low----------	0.20 0.20 0.20	3	---
RcA, RcB--------- Raynham	0-8 8-26 26-60	3-16 3-16 3-16	1.20-1.50 1.20-1.50 1.20-1.50	0.6-2.0 0.2-2.0 0.06-0.2	0.20-0.30 0.18-0.26 0.18-0.22	5.1-7.3 5.1-7.3 5.6-8.4	Low---------- Low---------- Low----------	0.49 0.64 0.64	3	3-10.
Re--------------- Red Hook	0-10 10-23 23-60	8-18 5-18 5-18	1.10-1.40 1.25-1.55 1.45-1.65	0.6-2.0 0.6-2.0 0.6-2.0	0.14-0.19 0.04-0.17 0.04-0.11	5.1-6.5 5.6-7.8 6.1-8.4	Low---------- Low---------- Low----------	0.32 0.24 0.24	3	3-12
RgA-------------- Rhinebeck	0-9 9-37 37-70	15-40 35-60 35-60	1.00-1.25 1.20-1.40 1.15-1.40	0.2-0.6 0.06-0.2 0.06-0.2	0.16-0.21 0.12-0.14 0.12-0.14	5.1-7.3 5.1-7.8 6.1-8.4	Moderate----- Moderate----- Moderate-----	0.49 0.28 0.28	3	3-7
RkA-------------- Rhinebeck	0-9 9-37 37-70	15-40 35-60 35-60	1.00-1.25 1.20-1.40 1.15-1.40	0.2-0.6 0.06-0.2 0.06-0.2	0.11-0.15 0.12-0.14 0.12-0.14	5.1-7.3 5.1-7.8 6.1-8.4	Moderate----- Moderate----- Moderate-----	0.37 0.28 0.28	3	3-7
ScB, ScD--------- Schuyler	0-6 6-42 42-48 48	10-27 18-35 18-35 ---	1.10-1.40 1.20-1.50 1.70-1.95 ---	0.6-2.0 0.2-2.0 0.06-0.6 ---	0.12-0.19 0.11-0.18 0.09-0.18 ---	3.6-6.0 3.6-6.0 3.6-6.0 ---	Low---------- Low---------- Low---------- ----------	0.37 0.37 0.28 ----	3	2-6
Sd--------------- Scio	0-10 10-42 42-60	2-15 2-15 0-5	1.20-1.50 1.20-1.50 1.45-1.65	0.6-2.0 0.6-2.0 2.0-20	0.18-0.21 0.17-0.20 0.02-0.19	4.5-6.0 4.5-6.0 5.1-7.8	Low---------- Low---------- Low----------	0.49 0.64 0.17	3	2-8
To--------------- Tioga	0-10 10-43 43-60	5-18 5-18 3-15	1.15-1.40 1.15-1.45 1.25-1.55	0.6-6.0 0.6-6.0 0.6-20	0.15-0.21 0.07-0.20 0.02-0.20	5.1-7.3 5.1-7.3 5.6-7.8	Low---------- Low---------- Low----------	0.37 0.28 0.28	5	2-6

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	G/cm^3	In/hr	In/in	pH				Pct
Ua	0-9	2-18	1.20-1.50	0.6-2.0	0.18-0.21	4.5-6.0	Low	0.49	3	2-7
Unadilla	9-44	1-18	1.20-1.50	0.6-2.0	0.17-0.20	4.5-6.0	Low	0.64		
	44-60	1-3	1.45-1.65	2.0-20	0.01-0.07	5.1-7.8	Low	0.17		
VaB	0-8	6-18	1.10-1.40	0.6-2.0	0.08-0.16	4.5-6.0	Low	0.24	3	2-6
Valois	8-31	6-18	1.20-1.50	0.6-2.0	0.07-0.14	4.5-6.0	Low	0.24		
	31-52	6-18	1.20-1.50	0.6-6.0	0.07-0.14	4.5-6.0	Low	0.24		
	52-65	6-18	1.60-1.80	0.6-6.0	0.03-0.09	5.6-7.3	Low	0.24		
VpA, VpB, VpC	0-9	18-27	1.10-1.40	0.6-2.0	0.11-0.17	4.5-6.5	Low	0.24	3	2-7
Volusia	9-15	18-27	1.30-1.60	0.6-2.0	0.09-0.16	4.5-6.5	Low	0.24		
	15-50	15-35	1.70-2.00	<0.2	0.01-0.02	5.1-7.3	Low	0.24		
	50-60	15-27	1.65-1.95	<0.2	0.01-0.02	5.6-8.4	Low	0.24		
Wa	0-2	5-18	1.20-1.50	0.6-2.0	0.19-0.21	4.5-6.0	Low	0.49	3	2-6
Wallington	2-12	5-18	1.20-1.50	0.6-2.0	0.18-0.20	4.5-6.0	Low	0.64		
	12-30	5-18	1.50-1.80	0.06-0.2	0.04-0.05	5.1-6.5	Low	0.64		
	30-60	2-18	1.45-1.65	0.06-0.2	0.10-0.14	5.1-6.5	Low	0.64		
Wd	0-9	15-35	1.05-1.40	0.2-2.0	0.17-0.22	5.1-7.8	Low	0.43	5	4-8
Wayland	9-45	18-35	1.10-1.60	0.06-0.2	0.16-0.20	5.1-8.4	Low	0.43		
	45-60	15-25	1.25-1.55	0.06-0.2	0.08-0.19	5.6-8.4	Low	0.43		
WhC, WhD	0-4	15-25	1.10-1.30	0.6-2.0	0.16-0.20	4.0-5.5	Low	0.32	3	1-4
Wharton	4-34	15-35	1.20-1.50	0.06-0.6	0.12-0.16	4.0-5.5	Moderate	0.24		
	34-60	20-45	1.20-1.60	0.06-0.6	0.08-0.12	4.0-5.5	Moderate	0.17		
WmB	0-7	4-18	1.10-1.40	0.6-2.0	0.18-0.20	4.5-6.0	Low	0.49	3	3-6
Williamson	7-18	4-18	1.10-1.40	0.6-2.0	0.18-0.20	4.5-6.0	Low	0.64		
	18-45	4-18	1.30-1.60	0.06-0.2	0.04-0.06	4.5-6.0	Low	0.64		
	45-60	4-18	1.30-1.60	0.06-0.2	0.10-0.14	5.1-7.3	Low	0.64		

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--SOIL AND WATER FEATURES

["Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern]

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				
AkA, AkB---------- Allard	B	None--------	---	---	>6.0	---	---	>60	---	High-----	Low------	Moderate.
AlA, AlB, AlC----- Allard Variant	B	None--------	---	---	2.0-3.0	Apparent	Dec-May	>60	---	High-----	Low------	Moderate.
AmA, AmB, AmC----- Alton	A	None--------	---	---	>6.0	---	---	>60	---	Moderate	Low------	High.
AoA--------------- Angola	C	None--------	---	---	0.5-1.5	Perched	Dec-May	20-40	Soft	High-----	High-----	Low.
ArC, ArE---------- Arkport	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Low------	Moderate.
Be*. Beaches												
BlB--------------- Blasdell	A	None--------	---	---	>6.0	---	---	>60	---	Moderate	Low------	Moderate.
BrB, BrC, BrD----- Brinkerton Variant	C	None--------	---	---	0.5-1.5	Perched	Oct-May	>60	---	High-----	High-----	High.
Ca, Cb------------ Canadice	D	None--------	---	---	0-1.0	Apparent	Dec-Jun	>60	---	Moderate	High-----	Moderate
Cc---------------- Canandaigua	D	None--------	---	---	0-1.0	Apparent	Nov-May	>60	---	High-----	High-----	Low.
Cd**, Ce**-------- Canandaigua	D	None--------	---	---	+1-0.5	Apparent	Nov-May	>60	---	High-----	High-----	Low.
CfA, CfB---------- Caneadea	D	None--------	---	---	1.0-2.5	Perched	Dec-May	>60	---	High-----	High-----	Moderate.
CgA--------------- Castile	B	None--------	---	---	1.5-2.0	Apparent	Mar-May	>60	---	High-----	Moderate	Moderate.
Ch, CkA, CkB, CkC, CkD, CkE--------- Chenango	A	None--------	---	---	>6.0	---	---	>60	---	Moderate	Low------	Moderate.
ClA, ClB---------- Chenango	A	Rare--------	Very brief	Dec-Apr	3.0-6.0	Apparent	Apr-May	>60	---	Moderate	Low------	Moderate.
Cn---------------- Chippewa	D	None--------	---	---	0-0.5	Apparent	Nov-May	>60	---	High-----	High-----	Moderate.
CoA, CoB---------- Churchville	D	None--------	---	---	0.5-1.5	Perched	Dec-May	>60	---	High-----	High-----	Low.

See footnotes 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				
CsB, CsC, CtB----- Collamer	C	None--------	---	---	1.5-2.0	Apparent	Mar-May	>60	---	High-----	Moderate	Low.
CuB, CuC---------- Colonie	A	None--------	---	---	>6.0	---	---	>60	---	Low------	Low------	Moderate.
Cv---------- Cosad	C	None--------	---	---	0.5-1.5	Perched	Nov-May	>60	---	Moderate	High-----	Moderate.
DdA, DdB, DdC----- Derb	C	None--------	---	---	0.5-1.5	Perched	Nov-May	>40	Soft	High-----	High-----	High.
ElA, ElB---------- Elnora	B	None--------	---	---	1.5-2.0	Apparent	Feb-May	>60	---	Moderate	Low------	Moderate.
ErB, ErC, ErD----- Ernest Variant	C	None--------	---	---	1.5-3.0	Perched	Dec-May	>60	---	High-----	Moderate	High.
FbB---------- Farnham	B	None--------	---	---	1.5-2.0	Apparent	Jan-May	>60	---	High-----	High-----	Moderate.
Fu*: Fluvaquents.												
Udifluvents.												
FxB---------- Fremont	C	None--------	---	---	0.5-1.5	Perched	Dec-May	>60	---	High-----	High-----	High.
GaA, GaB---------- Galen	B	None--------	---	---	1.5-2.0	Apparent	Mar-May	>60	---	Moderate	Moderate	Low.
GlB, GlC, GlD, GlE, GlF--------- Gilpin	C	None--------	---	---	>6.0	---	---	20-40	Soft	Moderate	Low------	High.
Ha---------- Halsey	D	None--------	---	---	0-0.5	Apparent	Sep-Jun	>60	---	High-----	High-----	Low.
Hn*. Haplaquolls												
HuB, HvE---------- Hudson	C	None--------	---	---	1.5-2.0	Perched	Nov-Apr	>60	---	High-----	High-----	Low.
Lc---------- Lamson	D	None--------	---	---	0.-0.5	Apparent	Dec-May	>60	---	High-----	High-----	Low.
Ld**---------- Lamson	D	None--------	---	---	+1-0	Apparent	Dec-May	>60	---	High-----	High-----	Low.
LoC, LoF---------- Lordstown	C	None--------	---	---	>6.0	---	---	20-40	Hard	Moderate	Low------	High.
Ly---------- Lyons	D	None--------	---	---	0-0.5	Apparent	Nov-Jun	>60	---	High-----	High-----	Low.

See footnotes 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				
MaA, MaB, MaD, MbE, MbF---------- Manlius	C	None--------	---	---	>6.0	---	---	20-40	Hard	Moderate	Low------	Moderate.
MdB, MdC, MdD----- Mardin	C	None--------	---	---	1.5-2.0	Perched	Mar-May	>60	---	Moderate	Moderate	Low.
MfB, MfC---------- Marilla	C	None--------	---	---	1.5-2.0	Perched	Mar-May	>60	---	Moderate	Moderate	Moderate.
Mg---------- Middlebury	B	Occasional	Brief-----	Nov-May	0.5-2.0	Apparent	Feb-Apr	>60	---	High-----	Moderate	Low.
Mh---------- Minoa	C	None--------	---	---	0.5-1.5	Apparent	Feb-Apr	>60	---	High-----	Moderate	Moderate.
NfA, NfB, Nh------ Niagara	C	None--------	---	---	0.5-1.5	Apparent	Dec-May	>60	---	High-----	High-----	Low.
OrA, OrB, OrC----- Orpark	C	None--------	---	---	0.5-1.5	Perched	Nov-May	20-40	Soft	High-----	High-----	High.
Pa**---------- Palms	A/D	Frequent----	Brief to long.	Oct-Jun	+1-1.0	Apparent	Nov-May	>60	---	High-----	High-----	Moderate.
Pc---------- Patchin	D	None--------	---	---	0-0.5	Perched	Oct-Jun	20-40	Soft	High-----	High-----	High.
PhA---------- Phelps	B	None--------	---	---	1.5-2.0	Apparent	Mar-May	>60	---	High-----	Moderate	Low.
Pt*, Pu*. Pits												
RaB, RaC, RaD, RaE, RaF, RbC, RbD, RbE, RbF---- Rayne	B	None--------	---	---	>6.0	---	---	>40	Soft	Moderate	Low------	High.
RcA, RcB---------- Raynham	C	None--------	---	---	0.5-2.0	Apparent	Nov-May	>60	---	High-----	High-----	Moderate.
Re---------- Red Hook	C	None--------	---	---	0.5-1.5	Apparent	Dec-May	>60	---	High-----	High-----	Moderate.
RgA, RkA---------- Rhinebeck	D	None--------	---	---	0.5-1.5	Perched	Jan-May	>60	---	High-----	High-----	Low.
ScB, ScD---------- Schuyler	B	None--------	---	---	1.5-2.0	Perched	Mar-May	40-60	Soft	High-----	Moderate	High.
Sd---------- Scio	B	None--------	---	---	1.5-2.0	Apparent	Mar-May	>60	---	High-----	Moderate	Moderate.

See footnotes 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				
To---------- Tioga	B	Occasional	Brief-----	Nov-May	3.0-6.0	Apparent	Feb-Apr	>60	---	Moderate	Low------	Moderate.
Ua---------- Unadilla	B	None--------	---	---	>6.0	---	---	>60	---	High-----	Low------	Moderate.
VaB---------- Valois	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Low------	High.
VpA, VpB, VpC----- Volusia	C	None--------	---	---	0.5-1.5	Perched	Dec-May	>60	---	High-----	High-----	Moderate.
Wa---------- Wallington	C	None--------	---	---	0.5-1.5	Perched	Jan-Apr	>60	---	High-----	High-----	Moderate.
Wd---------- Wayland	D	Frequent----	Brief to long.	Nov-Jun	0-0.5	Apparent	Nov-Jun	>60	---	High-----	High-----	Low.
WhC, WhD---------- Wharton	C	None--------	---	---	1.5-3.0	Perched	Nov-Mar	>40	Soft	High-----	High-----	High.
WmB---------- Williamson	C	None--------	---	---	1.5-2.0	Perched	Feb-Apr	>60	---	High-----	Moderate	Moderate.

* See description of the map unit for composition and behavior characteristics of the map unit.

** In the "High water table--Depth" column, 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.

TABLE 17.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Allard	Coarse-silty over sandy or sandy-skeletal, mixed, mesic Typic Dystrochrepts
Allard Variant	Fine-silty over sandy or sandy-skeletal, mixed, mesic Aquic Hapludalfs
Alton	Loamy-skeletal, mixed, mesic Dystric Eutrochrepts
Angola	Fine-loamy, mixed, mesic Aeric Ochraqualfs
Arkport	Coarse-loamy, mixed, mesic Psammentic Hapludalfs
Blasdell	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Brinkerton Variant	Fine-loamy, mixed, mesic Aquic Hapludults
*Canadice	Fine, illitic, mesic Typic Ochraqualfs
*Canandaigua	Fine-silty, mixed, nonacid, mesic Mollic Haplaquepts
**Caneadea	Fine, illitic, mesic Aeric Ochraqualfs
Castile	Loamy-skeletal, mixed, mesic Aquic Dystrochrepts
*Chenango	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Chippewa	Fine-loamy, mixed, mesic Typic Fragiaquepts
Churchville	Fine, illitic, mesic Aeric Ochraqualfs
Collamer	Fine-silty, mixed, mesic Glossoboric Hapludalfs
Colonie	Mixed, mesic Alfic Udipsamments
**Cosad	Sandy over clayey, mixed, nonacid, mesic Aquic Udorthents
Derb	Fine-silty, mixed, acid, mesic Aeric Haplaquepts
Elnora	Mixed, mesic Aquic Udipsamments
Ernest Variant	Fine-loamy, mixed, mesic Aquic Hapludults
Farnham	Loamy-skeletal, mixed, mesic Aquic Dystrochrepts
Fluvaquents	Fluvaquents
Fremont	Fine-loamy, mixed, acid, mesic Aeric Haplaquepts
Galen	Coarse-loamy, mixed, mesic Psammentic Hapludalfs
Gilpin	Fine-loamy, mixed, mesic Typic Hapludults
Halsey	Coarse-loamy over sandy or sandy-skeletal, mixed, nonacid, mesic Mollic Haplaquepts
Haplaquolls	Haplaquolls
Hudson	Fine, illitic, mesic Glossaquic Hapludalfs
Lamson	Coarse-loamy, mixed, nonacid, mesic Aeric Haplaquepts
Lordstown	Coarse-loamy, mixed, mesic Typic Dystrochrepts
Lyons	Fine-loamy, mixed, nonacid, mesic Mollic Haplaquepts
Manlius	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Mardin	Coarse-loamy, mixed, mesic Typic Fragiochrepts
Marilla	Fine-loamy, mixed, mesic Typic Fragiochrepts
Middlebury	Coarse-loamy, mixed, mesic Fluvaquentic Eutrochrepts
Minoa	Coarse-loamy, mixed, mesic Aquic Dystric Eutrochrepts
Niagara	Fine-silty, mixed, mesic Aeric Ochraqualfs
Orpark	Fine-loamy, mixed, acid, mesic Aeric Haplaquepts
Palms	Loamy, mixed, euic, mesic Terric Medisaprists
Patchin	Fine-silty, mixed, acid, mesic Aeric Haplaquepts
Phelps	Fine-loamy over sandy or sandy-skeletal, mixed, mesic Glossaquic Hapludalfs
Rayne	Fine-loamy, mixed, mesic Typic Hapludults
**Raynham	Coarse-silty, mixed, nonacid, mesic Aeric Haplaquepts
**Red Hook	Coarse-loamy, mixed, nonacid, mesic Aeric Haplaquepts
Rhinebeck	Fine, illitic, mesic Aeric Ochraqualfs
Schuyler	Fine-loamy, mixed, mesic Aquic Dystrochrepts
Scio	Coarse-silty, mixed, mesic Aquic Dystrochrepts
**Tioga	Coarse-loamy, mixed, mesic Dystric Fluventic Eutrochrepts
Udifluvents	Udifluvents
Unadilla	Coarse-silty, mixed, mesic Typic Dystrochrepts
Valois	Coarse-loamy, mixed, mesic Typic Dystrochrepts
Volusia	Fine-loamy, mixed, mesic Aeric Fragiaquepts
**Wallington	Coarse-silty, mixed, mesic, Aeric Fragiaquepts
Wayland	Fine-silty, mixed, nonacid, mesic Mollic Fluvaquents
Wharton	Fine-loamy, mixed, mesic Aquic Hapludults
Williamson	Coarse-silty, mixed, mesic Typic Fragiochrepts

* These soils are a taxadjunct to the series only in the Allegany Reservation part of this survey area. See text for a description of those characteristics of the soil that are outside the range of the series.

** These soils throughout the survey area are a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series.

TABLE 18.--RELATIONSHIP BETWEEN SOIL SERIES AND THEIR POSITION, PARENT MATERIAL, AND DRAINAGE

Parent material and soil characteristics*	Excessively drained	Somewhat excessively drained	Well drained	Moderately well drained	Somewhat poorly drained	Poorly drained	Very poorly drained
	SOILS ON UPLANDS						
Deep, medium-textured or moderately fine-textured residual material			Rayne	Wharton			
Moderately deep, medium-textured or moderately fine-textured residual material over acid shale and siltstone bedrock			Gilpin				
Deep, medium-textured or moderately fine-textured colluvium				Ernest Variant	Brinkerton Variant		
Deep, moderately coarse-textured and medium-textured, gravelly glacial till			Valois				
Deep, medium-textured, channery glacial till; fragipan				Mardin	Volusia	Chippewa	
Deep, medium-textured, shaly glacial till; fragipan				Marilla			
Deep, medium-textured or moderately fine-textured glacial till				Schuyler	Fremont		
Deep, moderately coarse-textured to moderately fine-textured glacial till						Lyons	Lyons
Deep, medium-textured or moderately fine-textured silty glacial till; high silt content					Derb		
Moderately deep, medium-textured or moderately fine-textured glacial till over alkaline shale bedrock					Angola		
Moderately deep, moderately fine-textured or medium-textured glacial till over acid shale bedrock					Orpark	Patchin	
Moderately deep, medium-textured, shaly glacial till over acid shale bedrock	Manlius	Manlius	Manlius				
Moderately deep, medium-textured channery glacial till over acid siltstone or sandstone bedrock			Lordstown				

See footnote at end of table.

TABLE 18.--RELATIONSHIP BETWEEN SOIL SERIES AND THEIR POSITION, PARENT MATERIAL, AND DRAINAGE--Continued

Parent material and soil characteristics*	Excessively drained	Somewhat excessively drained	Well drained	Moderately well drained	Somewhat poorly drained	Poorly drained	Very poorly drained
	SOILS ON OUTWASH TERRACES AND ALLUVIAL FANS						
Deep, moderately coarse-textured or medium-textured, gravelly glaciofluvial material over mildly alkaline stratified sand and gravel		Alton	Alton	Phelps			
Deep, moderately coarse-textured or medium-textured, gravelly glaciofluvial material over acid stratified sand and gravel		Chenango	Chenango	Castile	Red Hook		Halsey
Deep, medium-textured glaciofluvial material over stratified sand and gravel			Allard Variant	Allard			
Deep, medium-textured, shaly glaciofluvial material over weakly stratified sand and shale fragments			Blasdell	Farnham			
	SOILS ON LACUSTRINE PLAINS AND DELTAS						
Deep, medium-textured or moderately fine-textured glaciolacustrine deposits; clay accumulation in subsoil				Collamer	Niagara	Canandaigua	Canandaigua
Deep, medium-textured glaciolacustrine deposits; no clay accumulation in subsoil			Unadilla	Scio	Raynham		
Deep, medium-textured glaciolacustrine deposits; fragipan			Williamson		Wallington		
Deep, fine-textured and moderately fine-textured alkaline glaciolacustrine deposits				Hudson	Rhinebeck		
Deep, fine-textured and moderately fine-textured acid glaciolacustrine deposits					Canadea	Canadice	
Deep, fine-textured and moderately fine-textured glaciolacustrine deposits overlying glacial till					Church-ville		
Deep, coarse-textured glaciolacustrine deposits; thin subsoil bands		Colonie	Colonie	Elnora			

See footnote at end of table.

TABLE 18.--RELATIONSHIP BETWEEN SOIL SERIES AND THEIR POSITION, PARENT MATERIAL, AND DRAINAGE--Continued

Parent material and soil characteristics*	Excessively drained	Somewhat excessively drained	Well drained	Moderately well drained	Somewhat poorly drained	Poorly drained	Very poorly drained
	SOILS ON LACUSTRINE PLAINS AND DELTAS						
Deep, coarse-textured to medium-textured glaciolacustrine deposits; thick subsoil bands			Arkport	Galen	Minoa	Lamson	Lamson
Deep, coarse-textured glaciofluvial deposits over fine-textured or moderately fine-textured glaciolacustrine deposits					Cosad		
	SOILS ON FLOOD PLAINS						
Deep, medium-textured or moderately coarse-textured alluvial sediments over stratified sand and gravel			Tioga	Middlebury	Middlebury		
Deep, medium-textured or moderately fine-textured alluvial sediments over stratified deposits						Wayland	Wayland
	SOILS IN SWAMPS AND BOGS						
Organic material 16 to 51 inches thick over loamy mineral soil							Palms

* Texture given is dominant subsoil texture.

☆U.S. GPO: 1984-403-119/10002

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.