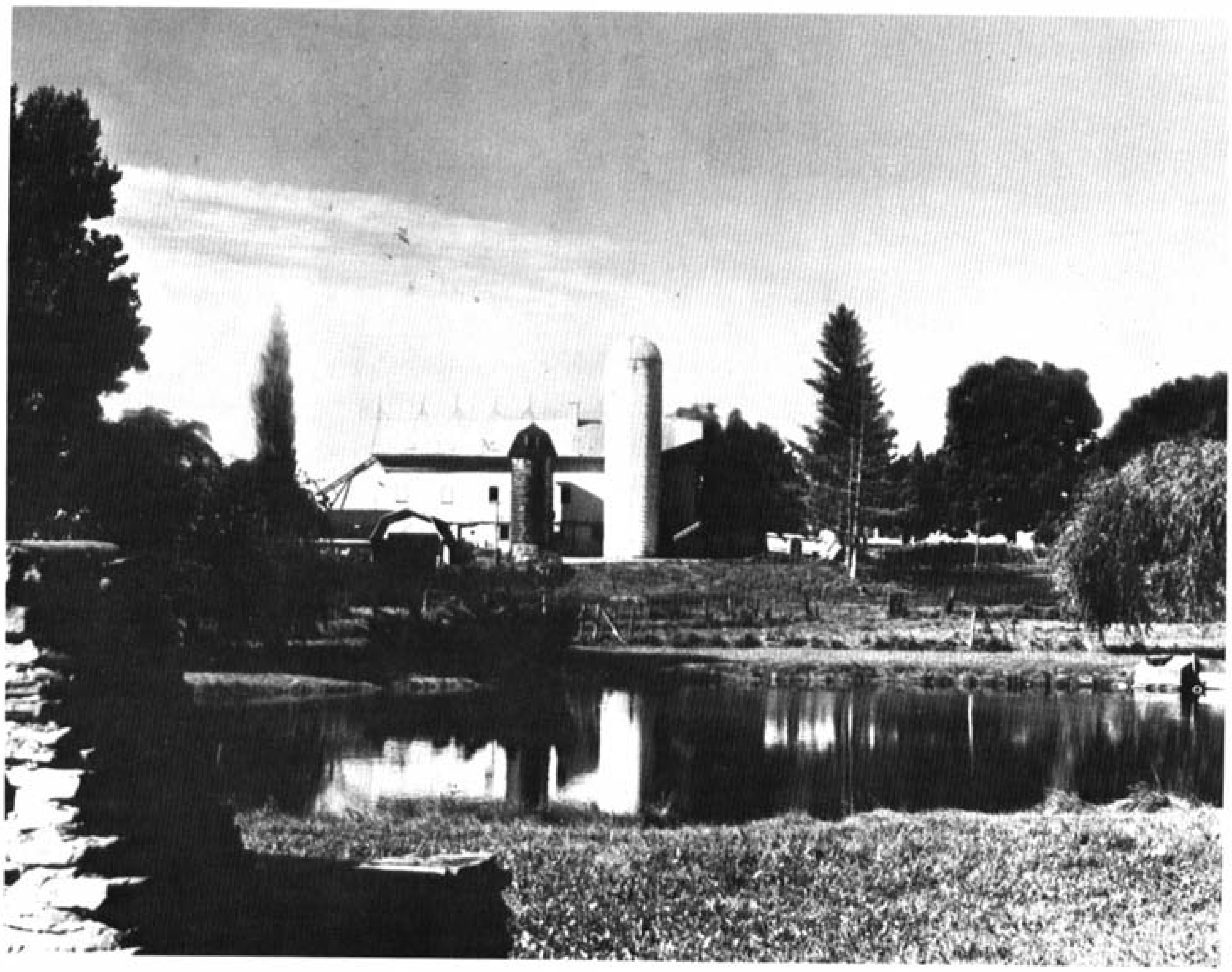
SOIL SURVEY OF

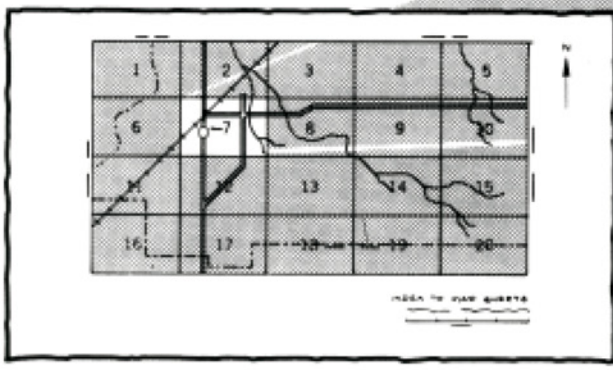
Oswego County, New York

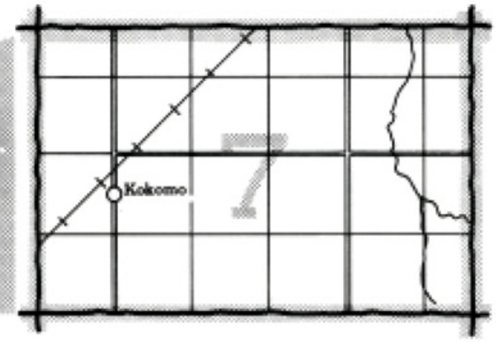


United States Department of Agriculture
Soil Conservation Service
In cooperation with
Cornell University Agricultural Experiment Station

HOW TO USE

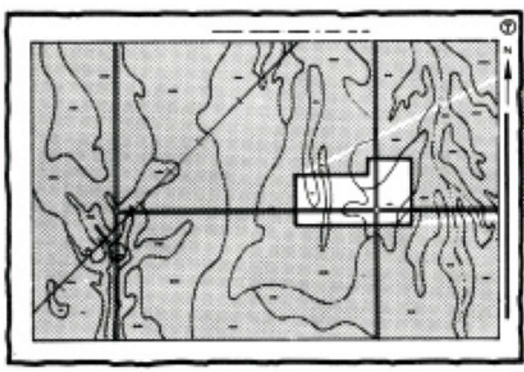
1. Locate your area of interest on the "Index to Map Sheets"

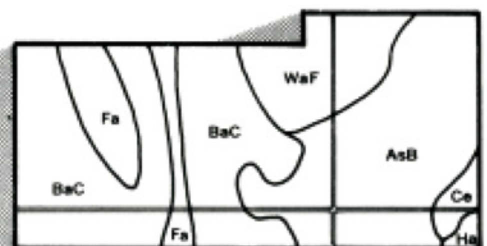




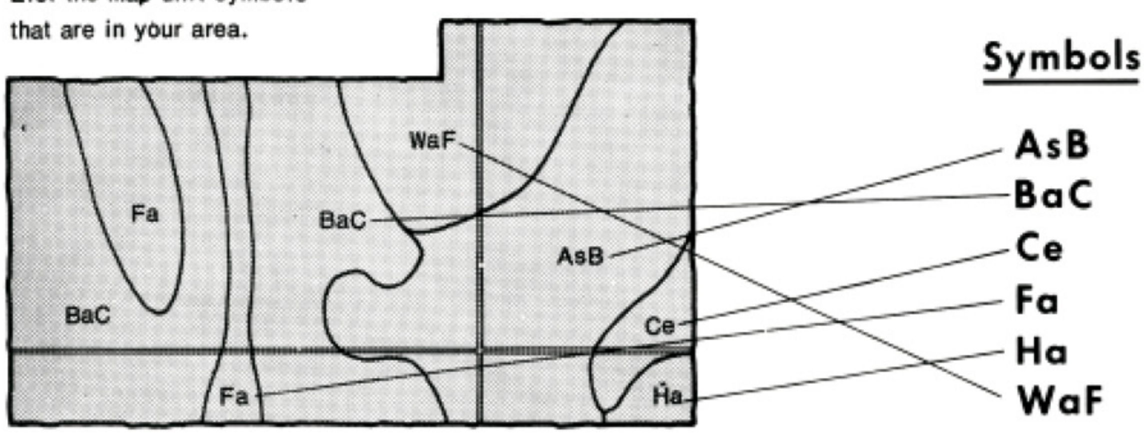
2. Note the number of the map sheet and turn to that sheet.

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



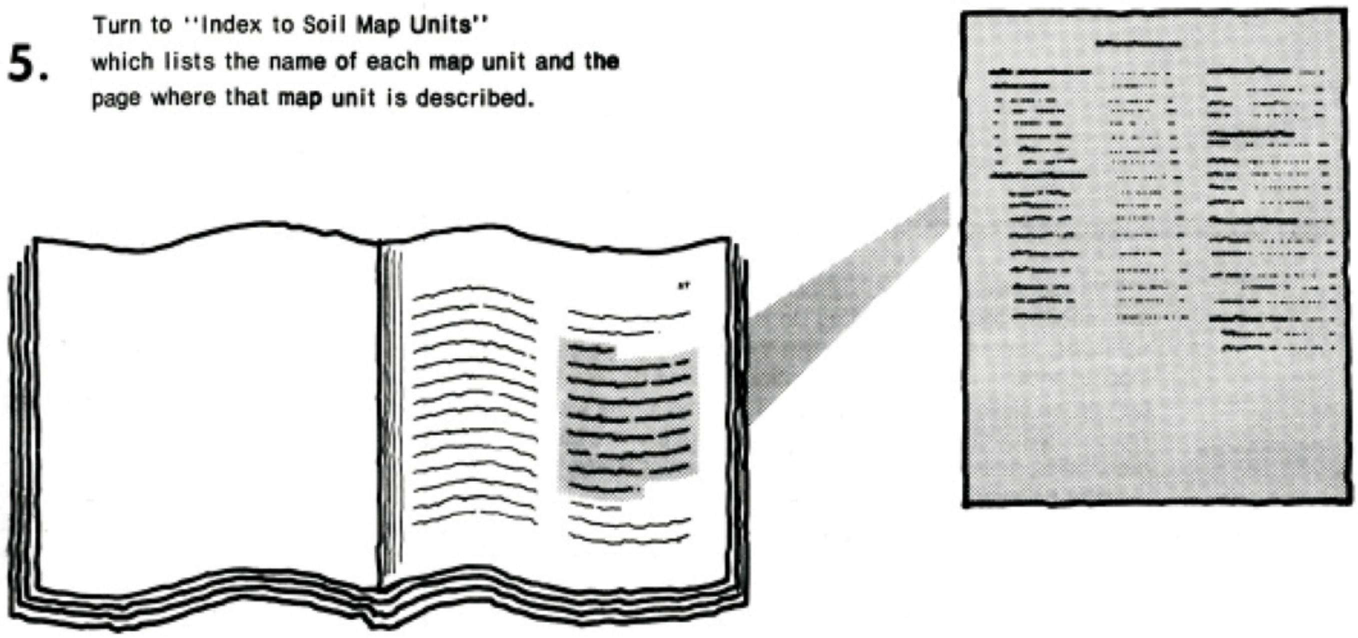


4. List the map unit symbols that are in your area.

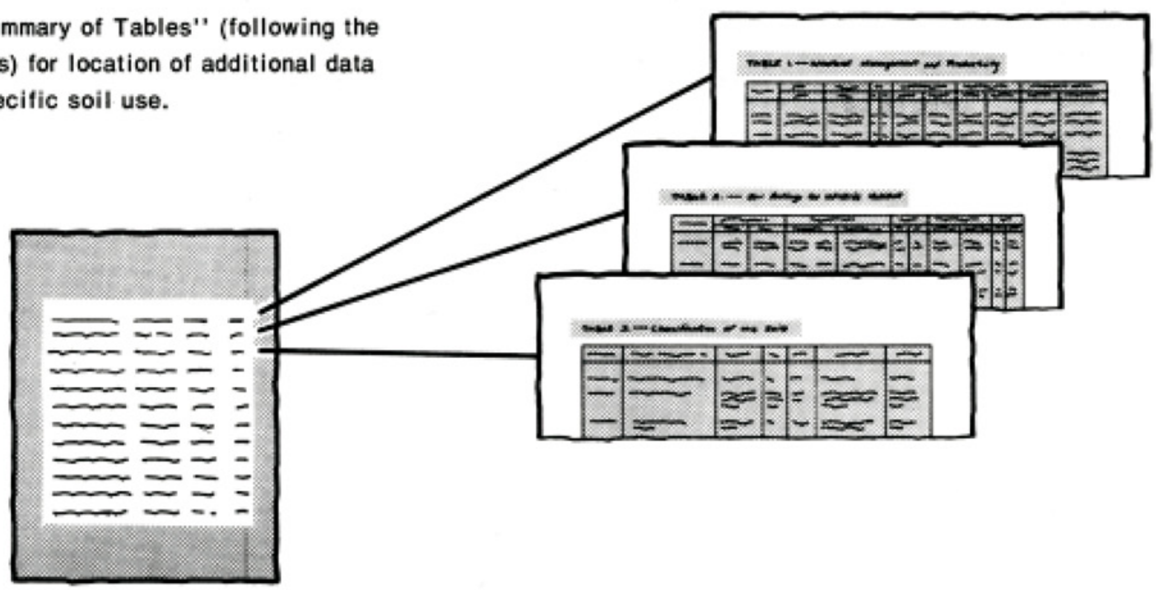


THIS SOIL SURVEY

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



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



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

This is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and agencies of the States, usually the Agricultural Experiment Stations. In some surveys, other Federal and local agencies also contribute. 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 the period 1965 to 1973. Soil names and descriptions were approved in 1974. Unless otherwise indicated, statements in the publication refer to conditions in the survey area in 1974. This survey was made cooperatively by the Soil Conservation Service and the Cornell University Agricultural Experiment Station. Some funds were provided by the Oswego County Legislature. It is part of the technical assistance furnished to the Oswego County Soil and Water Conservation District.

Soil maps in this survey may be copied without permission, but any enlargement of these maps can cause misunderstanding of the detail of mapping and result in erroneous interpretations. Enlarged maps do not show small areas of contrasting soils that could have been shown at a larger mapping scale.

Cover: The multipurpose pond in the foreground is on Minoa-Lamson, nearly level, which is well suited to this use. Williamson-Amboy, gently sloping, in the background is used as a site for dairy farm operations.

Contents

Contents—continued

Issued September 1981

Index to map units

Index to map units—continued

Summary of Tables

Summary of Tables—Continued

Foreword

The Soil Survey of Oswego County contains much information useful in any land-planning program. Of prime importance are the predictions of soil behavior for selected land uses. Also highlighted are limitations or hazards to land uses that are inherent in the soil, improvements needed to overcome these limitations, and the impact that selected land uses will have on the environment.

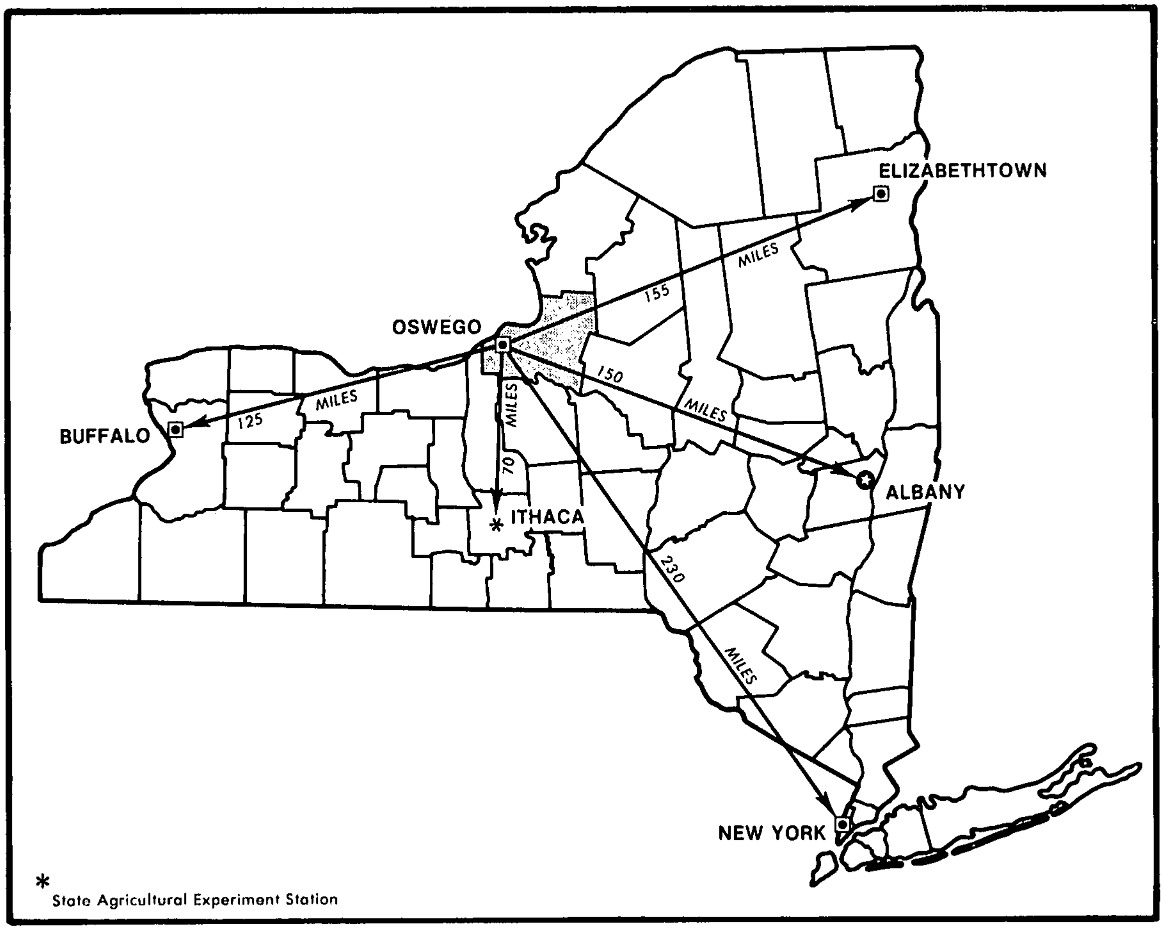
This soil survey has been prepared for many different users. Farmers, ranchers, foresters, and agronomists can use it to determine the potential of the soil and the management practices required for food and fiber production. Planners, community officials, engineers, developers, builders, and homebuyers can use it to plan land use, select sites for construction, develop soil resources, or identify any special practices that may be needed to insure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the soil survey to help them understand, protect, and enhance the environment.

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

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map; the location of each kind of soil is shown on detailed soil maps. Each kind of soil in the survey area is described, and much information is given about each soil for specific uses. Additional information or assistance in using this publication can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

This soil survey can be useful in the conservation, development, and productive use of soil, water, and other resources.

Robert L. Hilliard
State Conservationist
Soil Conservation Service



Location of Oswego County in New York.

SOIL SURVEY OF OSWEGO COUNTY, NEW YORK

By Donald F. Rapparlie, Cornell University Agricultural Experiment Station

Soils surveyed by Russell A. Parsons, John A. Neeley, C. Erwin Rice, L. W. Kick, F Z. Hutton, Jr., L. McDowell, and A. H. Hanson, Soil Conservation Service, and Donald F. Rapparlie, Gerald M. Coen, Ivan J. Jansen, and G. F. Kling, Cornell University Agricultural Experiment Station

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

OSWEGO COUNTY is in the north-central part of New York at the eastern end of Lake Ontario (see facing page). It is bounded on the north by Lake Ontario and Jefferson County, on the east by Lewis and Oneida Counties, on the south by Onondaga County, and on the west by Cayuga County and Lake Ontario. The Oneida River and part of the southern shore of Oneida Lake form part of the southern boundary of the county. The county covers an area of 968 square miles, or 619,520 acres. Oswego County is in two physiographic provinces. The eastern part is on the Tug Hill Plateau, and the western part is on the Erie-Ontario Plain (*5*).

Approximately one-third of the county is farmed. Dairying is the predominant farm enterprise, but the number of dairy farms is declining. A substantial amount of milk is produced. A considerable acreage of green snap beans is grown in the area around the city of Fulton. There are a few farms, especially in the towns that border Lake Ontario, that derive their major source of income from raising tree fruits, primarily apples.

Oswego County contains one of the largest acreages of wetland in the state. Most of these wetlands have muck soils. There are about 46,500 acres of muck land in the county. Presently, only about 4,000 to 5,000 acres of the muck is drained and under cultivation. The raising of truck crops, especially onions and lettuce, is the most important farm enterprise on the muck soils, and a smaller acreage of potatoes, carrots, sweet corn, and beets is grown.

Approximately two-thirds of the county is in woodland (*9*). The greatest concentration of woodland is east of Interstate 81. Most woodland is privately owned. Hardwoods predominate, but there is a large acreage of softwoods, especially in reforested areas.

How this survey was made

Soil scientists made this survey to learn what kinds of soil are in the survey area, where they are, and how they can be used. The soil scientists went into the area knowing they likely would locate many soils they already knew something about and perhaps identify some they had never seen before. 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; the kinds of rock; and many facts about the soils. They dug many holes to expose 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 the action of plant roots.

The soil scientists recorded the characteristics of the profiles they studied, and they compared those profiles with others in counties nearby and in places more distant. Thus, through correlation, they classified and named the soils according to nationwide, uniform procedures.

After a guide for classifying and naming the soils was worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodlands, buildings, field borders, roads, and other details that help in drawing boundaries accurately. The soil map at the back of this publication was prepared from aerial photographs.

The areas shown on a soil map are called soil map units. Some map units are made up of one kind of soil, others are made up of two or more kinds of soil, and a few have little or no soil material at all. Map units are discussed in the sections "General soil map for broad land use planning" and "Descriptions of the soils."

While a soil survey is in progress, samples of soils are taken as needed for laboratory measurements and for engineering tests. The soils are field tested, and interpretations of their behavior are modified as necessary during the course of the survey. New interpretations are added to meet local needs, mainly through field observations of different kinds of soil in different uses under different levels of management. Also, data are assembled from other sources, such as test results, records, field experience, and information available from state and local specialists. For example, data on crop yields under defined practices 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 is readily available to different groups of users, among them farmers, managers of rangeland and woodland, engineers, planners, developers and builders, homebuyers, and those seeking recreation.

General soil map for broad land use planning

The general soil map at the back of this publication shows, in color, map units that have a distinct pattern of soils and of relief and drainage. Each map unit is a unique natural landscape. Typically, a map unit consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one unit can occur in other units but in a different pattern.

The general soil map provides a broad perspective of the soils and landscapes in the survey area. It provides a basis for comparing the potential of large areas for general kinds of land use. Areas that are, for the most part, suited to certain kinds of farming or to other land uses can be identified on the map. Likewise, areas of soils having properties that are distinctly unfavorable for certain land uses can be located.

Because of its small scale, the map does not show the kind of soil at a specific site. Thus, it is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The kinds of soil in any one map unit differ from place to place in slope, depth, stoniness, drainage, or other characteristics that affect their management.

The soils in the survey area vary widely in their suitability for major land uses. An interpretive table is enclosed with the general soil map in an envelope at the back of this survey. The table shows the proportionate extent of the major soils in each map unit shown on the general soil map. It gives general ratings of the suitability of the major soils in each map unit for selected land uses: community development, recreational development, farming, and woodland. Soil properties that pose limitations to the use are indicated. The ratings of soil suitability are based on the assumption that practices in common use in the survey area are being used to overcome soil limitations. These ratings reflect the ease of overcoming the soil limitations and the probability of soil problems persisting after such practices are used.

The map units are grouped into five general kinds of landscapes for broad interpretive purposes. Each of the broad groups and their included map units are discussed in the following pages.

The terms for drainage used in the descriptive headings of the map units apply to the major soils in the unit. The name of each unit indicates its dominant slope. Most of the units contain soils that are less sloping or more sloping than the name suggests; however, the text indicates the range in slope for all of the soils in the unit.

The Oswego County general soil map joins with that of Onondaga County. It does not join with the general soil maps of Cayuga and Lewis Counties, because it is published at a different scale. Also, the concepts and names of some soil series have changed as a result of changes in the classification system since the soil surveys of Cayuga and Lewis Counties were published. Jefferson and Oneida Counties are also adjacent to Oswego County, but mapping of these survey areas has not been completed.

Deep soils that formed in glacial till and have a fragipan

The 11 map units in this group are on dissected till plains in uplands and in other areas scattered throughout the survey area. These map units make up about 49.9 percent of the county. The soils formed in glacial till deposits derived mainly from sandstone. They are mainly well drained to somewhat poorly drained and are dominantly moderately coarse textured. Most of the soils have a strongly expressed fragipan. Slopes are mostly nearly level to moderately steep, but in a few areas they are steep and very steep. About 60 percent of the area is very stony or extremely stony and is used mostly for woodland, wildlife habitat, or native pasture or is idle. The remaining 40 percent is used mainly for crops, pasture, orchards, and woodland. A few areas are used for community development.

1. Ira-Sodus, gently sloping

Deep, moderately well drained and well drained, moderately coarse textured soils that have a fragipan; on uplands

These soils are nearly level to sloping and are on glacial till plains. They are on the slightly convex top of broad, elongated hills and in irregularly shaped, undulating areas.

This map unit makes up about 8 percent of the county. About 55 percent of the unit is Ira soils, and 15 percent is Sodus soils. The remaining 30 percent is minor soils.

Ira and Sodus soils formed in glacial till deposits derived mostly from gray and red sandstone.

The Ira soils are deep, moderately well drained, and moderately coarse textured. A well developed fragipan that restricts rooting and causes a perched seasonal high water table is at a depth of 13 to 22 inches. Permeability is moderate above the fragipan and slow in the fragipan. These soils are in slightly convex positions on the landscape. They commonly receive runoff from higher soils.

Sodus soils are deep, well drained, and moderately coarse textured. A dense, slowly permeable fragipan is at a depth of 15 to 24 inches. These soils have a perched water table that is deeper than that in the more extensive Ira soils. Permeability is moderate above the fragipan. Sodus soils are on the higher parts of the landscape, generally above the Ira soils. They receive little or no runoff.

Minor soils are mainly in the Alton, Hinckley, Scriba, Sun, and Williamson series. The Alton and Hinckley soils are on remnant beach ridges. They are well drained to excessively drained and are gravelly. The Scriba and Sun soils are in wet spots and drainageways where runoff accumulates. Scriba soils are somewhat poorly drained, and Sun soils are poorly drained to very poorly drained. The Williamson soils formed in lacustrine deposits of silt and very fine sand. They are moderately well drained.

This map unit is used mainly for crops. A few orchards are in some areas near Lake Ontario. Some areas have been reforested. Stone fences and hedges and piles of stone that resulted from clearing of the fields are prominent on the landscape. Seasonal wetness and the slowly permeable fragipan are the main management concerns.

2. Ira-Sodus, rolling

Deep, moderately well drained and well drained, moderately coarse textured soils that have a fragipan; on uplands

These soils are undulating and rolling on glacial till plains and sloping and gently sloping on convex upper sides of broad, elongated hills.

This map unit makes up about 1.2 percent of the county. About 50 percent of the unit is Ira soils, and 35 percent is Sodus soils. The remaining 15 percent is minor soils.

Ira and Sodus soils formed in similar glacial till deposits derived mainly from gray and red sandstone.

The Ira soils are deep, moderately well drained, and moderately coarse textured. A dense, firm fragipan that restricts rooting and causes a perched seasonal high water table is at a depth of 13 to 22 inches. Permeability is moderate above the fragipan and slow in the fragipan. These soils are in slightly lower positions on the landscape than the better drained Sodus soils. They commonly receive runoff from higher soils.

Sodus soils are deep, well drained, and moderately coarse textured. A fragipan is at a depth of 15 to 24 inches. Sodus soils have a seasonal perched water table that generally is deeper than that in the more extensive Ira soils. These soils are on higher, convex parts of the landscape. They receive little or no runoff.

Minor soils are mainly in the Scriba and Williamson series. The Scriba soils are in wet spots, seeps at the base of hills, and narrow drainageways. The Williamson soils formed in lacustrine deposits of silt and very fine sand. These soils are nearly free of coarse fragments and are at a slightly lower elevation than the Ira and Sodus soils. Scriba soils are somewhat poorly drained, and Williamson soils are moderately well drained.

Cleared areas are used mainly for farming. Some steeper areas are reverting to brush or are in native pasture. Many areas have been reforested. Stone fences, stone hedges, and piles of stones are prominent on the landscape. Seasonal wetness, slope, and the slowly permeable fragipan are the main management concerns.

3. Ira-Sodus, very stony, moderately steep

Deep, moderately well drained and well drained, moderately coarse textured, very stony soils that have a fragipan; on uplands

These soils are moderately steep and steep and are on glacial till plains. They are on valley sides, on sides of elongated hills, and on hills that have short, convex, irregular slopes. Large stones are on the surface about 5 to 30 feet apart.

This map unit makes up about 2.5 percent of the county. About 60 percent of the unit is Ira soils, and 25 percent is Sodus soils. The remaining 15 percent is minor soils.

Ira and Sodus soils formed in similar deposits of glacial till derived mainly from gray and red sandstone.

Ira soils are deep, moderately well drained, and moderately coarse textured. Sodus soils are deep, well drained, and moderately coarse textured. Both of these soils have a dense, firm fragipan that restricts rooting and causes a perched seasonal high water table. In both of these soils, permeability is moderate above the fragipan and slow in the fragipan.

Minor soils are mainly in the Scriba and Sun series. These soils are in wet spots, seeps, and drainageways. Scriba soils are somewhat poorly drained, and Sun soils poorly drained to very poorly drained. A few areas of soils that are not stony or are extremely stony are also in this map unit.

Some of the less stony areas that were once cleared for crops are in pasture or are reverting to brush. Because of steep slopes, it is not practical to remove stones so that modern tillage equipment can be used. Most of this map unit is wooded and provides food and cover for wildlife. Slope, stoniness, and the slowly permeable fragipan are the main management concerns. Some areas have potential for recreational use.

4. Sodus, moderately steep

Deep, well drained, moderately coarse textured soils that have a fragipan; on uplands

These soils are moderately steep to very steep. They are on the northern end and on the sides of sharply rising, elongated hills and on the sides of deeply dissected valleys and gullies (fig. 1).

This map unit makes up about 0.1 percent of the county. About 65 percent of the unit is Sodus soils. The remaining 35 percent is minor soils.

Sodus soils formed in glacial till deposits derived mainly from gray and red sandstone. These soils are deep, well drained, and moderately coarse textured. A dense, slowly permeable fragipan that restricts root penetration and causes a perched seasonal high water table for brief periods in spring is at a depth of 15 to 24 inches. Permeability is moderate above the fragipan. These soils are on convex or plane side slopes. They commonly receive runoff from higher adjacent soils.

Minor soils are in the Ira, Amboy, and Williamson series. Ira soils formed in deposits similar to those in which Sodus soils formed. They are on foot slopes. Amboy and Williamson soils formed in lacustrine deposits of silt and very fine sand and are in lower positions on the landscape than Sodus soils. Ira and Williamson soils are moderately well drained, and Amboy soils are well drained. A few areas of stony soils are also in the map unit.

Most areas are wooded. A few areas have been cleared and are used for pasture. Slope and slow permeability in the fragipan are the main management concerns. Some areas have potential for recreational developments, for example, ski slopes, and some areas have potential for development of wildlife habitat.

5. Empeyville-Worth, gently sloping

Deep, moderately well drained and well drained, moderately coarse textured soils that have a fragipan; on uplands

These soils are gently sloping and sloping and are on glacial till plains. They are on the top and sides of convex hills at the higher elevations in the county.

This map unit makes up about 2.4 percent of the county. About 45 percent of the unit is Empeyville soils, and 40 percent is Worth soils. The remaining 15 percent is minor soils.

Empeyville and Worth soils formed in similar glacial till deposits derived from acid, gray and red sandstone and from some shale and siltstone.

The Empeyville soils are deep, moderately well drained, and moderately coarse textured. A dense, firm fragipan that restricts rooting and causes a perched seasonal high water table is at a depth of 16 to 21 inches. Permeability is moderate above the fragipan and slow in the fragipan. These soils are in slightly convex positions on the landscape. They commonly receive runoff from higher adjacent soils, for example, the well drained Worth soils.

Worth soils are deep, well drained, and moderately coarse textured. A well developed fragipan is at a depth of 20 to 30 inches. These soils have a perched seasonal high water table that is deeper than that in the Empeyville soils. Permeability is moderate above the fragipan and slow in the fragipan. These soils are in convex positions on higher parts of the landscape than the Empeyville soils. They receive little or no runoff.

Minor soils are mainly in the Westbury and Dannemora series. The Westbury and Dannemora soils are in seeps, wet spots, and drainageways where runoff accumulates. Westbury soils are somewhat poorly drained, and Dannemora soils are poorly drained. Also in this map unit are a few areas of very stony soils, and areas of soils that are not so stony in places where there are surficial deposits of silt and very fine sand 1 1/2 to 3 feet thick.

Most areas are wooded or are idle. Because of the short growing season, low natural fertility, and seasonal wetness, only a very small acreage is used for crops. The slowly permeable fragipan and seasonal wetness are the main concerns for nonfarm uses. Some areas have potential for recreational uses, particularly winter sports, or for development of wildlife habitat.

6. Worth-Empeyville, very stony, sloping

Deep, well drained and moderately well drained, moderately coarse textured, very stony soils that have a fragipan; on uplands

These soils are gently sloping and sloping and are on glacial till plains. They are on convex hillsides and hilltops at the higher elevations in the county and are also along valley sides. Large stones are on the surface about 5 to 30 feet apart. This is the most extensive map unit in Oswego County.

This map unit makes up about 22.3 percent of the county. About 40 percent of the unit is Worth soils, and 35 percent is Empeyville soils. The remaining 25 percent is minor soils.

The Worth and Empeyville soils formed in similar glacial till deposits derived from acid gray and red sandstone.

The Worth soils are deep, well drained, and moderately coarse textured. A dense, firm, slowly permeable fragipan that restricts rooting and causes a perched seasonal high water table is at a depth of 20 to 30 inches. Permeability is moderate above the fragipan. These soils are on broad, convex hillsides and ridges. They receive little runoff.

Empeyville soils are deep, moderately well drained, and moderately coarse textured. A dense, firm, slowly permeable fragipan that restricts rooting and causes a perched seasonal high water table is at a depth of 16 to 21 inches. Permeability above the fragipan is moderate. These soils are on slightly convex hilltops and on the lower part of hillsides. They commonly receive some runoff. They commonly are lower on the landscape than the Worth soils.

Minor soils are mainly in the Colton, Dannemora, Hinckley, and Westbury series. Small areas of Colton and Hinckley soils are on glacial outwash terraces, beaches, eskers, and kames. These soils are excessively drained and coarse textured. The Westbury and Dannemora soils are in hillside seeps, wet spots, and drainageways. Westbury soils are somewhat poorly drained, and Dannemora soils are poorly drained. In some areas and most commonly in the town of Redfield, soils that have surficial deposits of silt and very fine sand 1 1/2 to 3 feet thick are in the map unit. Areas of soils that range from nearly free of stones to extremely stony are also in this map unit.

The soils in this map unit are not suited to most crops because of stoniness, slope, general low fertility, and a short growing season. They are mainly used for woodland, are idle, or are used as habitat for upland wildlife. These soils have potential for recreation uses, especially winter sports.

7. Worth-Empeyville, extremely stony, moderately steep

Deep, well drained and moderately well drained, moderately coarse textured, extremely stony soils that have a fragipan; on uplands

These soils are moderately steep and steep and are on glacial till plains. They are on hillsides and valley sides in uplands. Large stones are on the surface about 3 to 5 feet apart.

This map unit makes up about 1.7 percent of the county. About 65 percent of the unit is Worth soils, and 25 percent is Empeyville soils. The remaining 10 percent is minor soils.

Worth and Empeyville soils formed in similar glacial till deposits derived from acid gray and red sandstone.

The Worth soils are deep, well drained, and moderately coarse textured. A well developed fragipan that restricts rooting and causes a perched seasonal high water table is at a depth of 20 to 30 inches. Permeability is moderate above the fragipan and slow in the fragipan. These soils are moderately steep and steep and are on convex hillsides. They commonly are higher on the landscape than the wetter Empeyville soils.

Empeyville soils are deep, moderately well drained, and moderately coarse textured. A dense, firm fragipan that restricts rooting and causes a seasonal perched water table is at a depth of 16 to 21 inches. Permeability is moderate above the fragipan and slow in the fragipan. These soils are moderately steep and are on hillsides. They receive runoff from adjacent higher soils and commonly from the well drained Worth soils.

Minor soils are mainly in the Colton, Dannemora, Hinckley, and Westbury series. Colton and Hinckley soils are intricately mixed in small areas on glacial outwash terraces, remnant beaches, eskers, and kames. They are gravelly and coarse textured. The Westbury and Dannemora soils are in wet spots, hillside seeps, and drainageways. Colton and Hinckley soils are excessively drained, Westbury soils are somewhat poorly drained, and Dannemora soils are poorly drained. A few areas of soils that range from nearly free of stones to very stony are also in the map unit.

This map unit mainly is forested, is idle, or is used as wildlife habitat. Extreme stoniness, slow permeability in the fragipan, and slope are the main concerns for most uses. Some areas have potential for recreational uses, especially winter sports.

8. Scriba-Sun, nearly level

Deep, somewhat poorly drained to very poorly drained, medium textured and moderately coarse textured soils; on uplands

These soils are nearly level and gently sloping and are on glacial till plains. They are in slightly concave areas and depressions, along drainageways, and in low areas between elongated hills.

This map unit makes up about 1.1 percent of the county. About 65 percent of the unit is Scriba soils, and 25 percent is Sun soils. The remaining 10 percent is minor soils.

Scriba and Sun soils formed in similar glacial till deposits derived from acid gray and red sandstone.

Scriba soils are deep, somewhat poorly drained, and moderately coarse textured. A dense, slowly permeable fragipan that restricts rooting and causes a perched seasonal high water table is at a depth of 12 to 15 inches. Scriba soils are on flats and in concave areas that receive runoff from higher soils.

Sun soils are deep, poorly drained and very poorly drained, and medium textured to moderately coarse textured. They do not have a fragipan. They have a high water table for long periods. Permeability is slow in the subsoil and substratum. These soils are on flats and in depressions in the lower part of the landscape and receive a considerable amount of runoff from adjacent, higher soils.

Minor soils are in the Carlisle, Fredon, Ira, Palms, and Raynham series. The Raynham and Fredon soils are in places where lacustrine deposits and outwash deposits merge with till plains. The Ira soils are on small knolls. They are moderately well drained. The Carlisle and Palms soils are organic soils in depressions. They are very poorly drained. Raynham soils are silty and are somewhat poorly drained and poorly drained. Fredon soils are gravelly and are somewhat poorly drained and poorly drained. Some areas of stony soils are also in this map unit.

Areas of this map unit are mostly wooded, but the trees are of poor commercial quality. In some areas the soils are used for low quality hay and pasture or as habitat for wetland wildlife. This map unit has potential for small ponds or lakes that can be used for recreation and other purposes. Prolonged seasonal wetness and slow permeability are the main management concerns.

9. Scriba-Ira, gently sloping

Deep, somewhat poorly drained and moderately well drained, moderately coarse textured soils that have a fragipan; on uplands

These soils are nearly level to sloping and are on glacial till plains. They are on the top and lower sides of broad, elongated hills and in gently undulating areas.

This map unit makes up about 6.9 percent of the county. About 50 percent of the unit is Scriba soils, and 30 percent is Ira soils. The remaining 20 percent is minor soils.

Scriba and Ira soils formed in similar till deposits derived from acid gray and red sandstone.

Scriba soils are deep, somewhat poorly drained, and moderately coarse textured. A slowly permeable fragipan that restricts rooting and causes a perched seasonal high water table is at a depth of 12 to 15 inches. These soils are on slightly concave foot slopes, the top of broad hills, and low plains between hills.

Ira soils are deep, moderately well drained, and moderately coarse textured. A dense fragipan that restricts rooting and causes a perched seasonal water table is at a depth of 13 to 22 inches. These soils are on slightly convex tops and lower sides of elongated hills and on low undulating till plains. They are in a slightly higher position on the landscape than Scriba soils.

Minor soils are in the Alton, Fredon, Hinckley, Palms, Raynham, Sodus, and Sun series. The Alton and Hinckley soils are in outwash deposits. The Fredon soils are in seeps in places where outwash deposits join the higher till plains. The Raynham soils are in places where lacustrine deposits merge with till plains. The Palms soils are in low swampy spots. The Sodus soils are on landforms that are more sloping and higher on the landscape than the Scriba and Ira soils. The Sun soils are in low concave areas. Alton and Hinckley soils are well drained to excessively drained and are gravelly. Fredon and Raynham soils are somewhat poorly drained to poorly drained. The Raynham soils are silty. Palms soils are very poorly drained organic soils. Sodus soils are well drained. Sun soils are poorly drained to very poorly drained.

Most areas of this map unit are no longer farmed. High quality strawberries were once grown in some areas. Much of the acreage of this map unit is in second-growth woodland. Where cleared, the fields are small and are surrounded by large stone hedgerows (fig. 2). Some areas have potential for development of wildlife habitat, and the wetter areas have potential for small ponds or lakes. Low natural fertility, seasonal wetness, and slow permeability in the fragipan are the main management concerns.

10. Scriba, very stony, gently sloping

Deep, somewhat poorly drained, moderately coarse textured, very stony soils that have a fragipan; on uplands

These soils are nearly level to sloping and are on glacial till plains. They are on the top and lower sides of elongated hills and in low, undulating areas. Stones are 5 to 30 feet apart on the surface.

This map unit makes up about 1.7 percent of the county. About 65 percent of the unit is Scriba soils. The remaining 35 percent is minor soils.

Scriba soils formed in moderately coarse textured, very stony glacial till that consists mainly of acid, gray and red sandstone and also has some siltstone and shale fragments. They are deep and somewhat poorly drained. A dense, slowly permeable fragipan is at a depth of 12 to 15 inches. These soils are on the nearly level tops of broad hills, on the lower part of slightly concave hillsides, on low undulating plains, and in low areas between hills. They commonly receive runoff from adjacent soils.

Minor soils are mainly in the Ira, Sodus, and Sun series. All of these soils formed in glacial till deposits similar to those in which Scriba soils formed. The Ira and Sodus soils are on convex knolls and on parts of the landscape higher than the Scriba soils. Sun soils lack a fragipan and are in low, nearly level areas and depressions. Ira soils are moderately well drained, Sodus soils are well drained, and Sun soils are poorly drained and very poorly drained. Areas of soils that range from nearly free of stones to extremely stony are also in the map unit.

A small acreage of this map unit was partially cleared of stones and farmed early in the history of the county. Because of stoniness, it is not practical to use modern tillage equipment on these soils. Most acreage is in brush or second-growth woodland. Some areas have potential for development of wildlife habitat or for development of ponds and small lakes. Stoniness, seasonal wetness, and the slowly permeable fragipan are the main management concerns.

11. Westbury-Dannemora, very stony, gently sloping

Deep, somewhat poorly drained and poorly drained, moderately coarse textured, very stony soils that have a fragipan; on uplands

These soils are nearly level and gently sloping or undulating and are on till plains. They are on toeslopes and in depressions at the higher elevations in the county. Stones are about 5 to 30 feet apart on the surface.

This map unit makes up about 2 percent of the county. About 60 percent of the unit is Westbury soils, and 25 percent is Dannemora soils. The remaining 15 percent is minor soils.

Westbury and Dannemora soils formed in similar deposits of very stony, acid glacial till.

The Westbury soils are somewhat poorly drained and moderately coarse textured. A dense, slowly permeable fragipan that restricts rooting and causes a perched seasonal high water table is at a depth of 17 to 20 inches. Permeability is moderate above the fragipan. These soils are nearly level and gently sloping. They are on concave foot slopes and toeslopes and in narrow areas along drainageways. They receive runoff from higher adjacent soils.

Dannemora soils are poorly drained and moderately coarse textured. A slowly permeable fragipan is at a depth of 13 to 18 inches. Permeability is moderate above the fragipan. These soils are in low, concave areas and depressions. They receive a considerable amount of runoff from higher soils. They are lower on the landscape than the Westbury soils.

Minor soils are mainly in the Empeyville, Granby, and Naumburg series. The Empeyville soils are on slightly elevated knolls. The Granby and Naumburg soils are on level, low-lying sandy plains. Empeyville soils are moderately well drained, Granby soils are poorly drained and very poorly drained, and Naumburg soils are somewhat poorly drained and poorly drained. Areas of nonstony and extremely stony soils are also in this map unit.

Very few of the areas in this map unit are used for crops. Most areas are wooded or are in low quality pasture (fig. 3). Hay is grown in a few areas, but stones cause difficulty in cutting and harvesting operations. Some areas have potential for ponds or for development of habitat for wetland wildlife. Prolonged seasonal wetness and the slowly permeable fragipan are the main management concerns.

Deep soils that formed in glaciolacustrine deposits

The 7 map units in this group are on lake plains. They make up about 18.3 percent of the county. The soils formed mainly in lacustrine deposits of silt, clay, and sand that are free of coarse fragments. They are well drained to very poorly drained and are dominantly medium textured to fine textured. Many of the well drained and moderately well drained soils in this group have a well expressed fragipan. The soils are mainly nearly level to rolling. Most areas of the well drained and moderately well drained soils are used intensively for farming. Many of the farms are dairy farms, and some farms produce fruit and vegetable crops. Some of the soils in this group, particularly the wetter soils, are used for woodland, pasture, water-tolerant forage crops, or wildlife habitat or are idle. Some of the better drained soils are used for community development.

12. Williamson-Amboy, gently sloping

Deep, moderately well drained and well drained, medium textured soils that have a fragipan; on lake plains

These soils are nearly level to sloping and are on lake plains. They are mainly on low ridges, hills that have complex slopes, and convex flats.

This map unit makes up about 4.6 percent of the county. About 70 percent of the unit is Williamson soils, and 15 percent is Amboy soils. The remaining 15 percent is minor soils.

Williamson and Amboy soils formed in lacustrine deposits that have a high content of silt and very fine sand.

Williamson soils are deep, moderately well drained, and dominantly medium textured. A well expressed, slowly permeable fragipan that restricts rooting and the downward movement of water is at a depth of 17 to 24 inches. These soils have a perched seasonal high water table above the fragipan. They are nearly level, gently sloping, and undulating and are on slightly elevated parts of lake plains. Runoff is commonly received from higher adjacent soils.

Amboy soils are deep, well drained, and medium textured. A well developed, moderately slowly permeable fragipan that restricts rooting and the downward movement of water is at a depth of 20 to 30 inches. These soils have a perched temporary seasonal high water table above the fragipan. They are mainly gently sloping, undulating, and rolling on a slightly higher part of the lake plain than the Williamson soils. Runoff is rapid. These soils receive very little runoff from adjacent soils.

Minor soils are mainly Alton, Canandaigua, Hinckley, Lamson, Minoa, Oakville, Raynham, and Windsor soils and Fluvaquents and Udifluvents, frequently flooded. The minor soils are excessively drained to very poorly drained. The gravelly Alton and Hinckley soils and the sandy Oakville and Windsor soils are on outwash terraces, deltas, and remnant beaches on the lake plain. The Canandaigua, Lamson, and Minoa soils are in low areas and depressions. Alton and Hinckley soils are well drained, and Canandaigua, Lamson, and Minoa soils are poorly drained. Raynham soils are somewhat poorly drained and poorly drained. Fluvaquents and Udifluvents, frequently flooded, are in alluvial areas of narrow flood plains along meandering streams.

These soils are used mainly for farming, including production of vegetable crops. Crops respond well to liberal applications of lime and fertilizer. Practices to control erosion are needed in the more sloping areas. Some areas in this map unit need to be drained to obtain optimum yields. Seasonal wetness and slow or moderately slow permeability in the fragipan are the main management concerns for most uses of these soils.

13. Amboy-Williamson, rolling

Deep, well drained and moderately well drained, medium textured soils that have a fragipan; on lake plains

These soils are rolling or sloping and gently sloping and are on lake plains. They are mainly on low hills that have complex slopes.

This map unit makes up about 1.0 percent of the county. About 45 percent of the unit is Amboy soils, and 35 percent is Williamson soils. The remaining 20 percent is minor soils.

Amboy and Williamson soils formed in lacustrine deposits that have a high content of silt and very fine sand.

Amboy soils are deep, well drained, and medium textured. A moderately slowly permeable fragipan that restricts rooting and causes a perched seasonal high water table is at a depth of 20 to 30 inches. Amboy soils are on the top and upper sides of low, rolling hills. They receive little or no runoff.

Williamson soils are deep, moderately well drained, and medium textured. A dense, slowly permeable fragipan that restricts rooting and the downward movement of water is at a depth of 17 to 24 inches. A seasonal high water table is perched above the fragipan. These soils are rolling and undulating. They are on short, lower side slopes and foot slopes of hills. They commonly receive runoff from higher adjacent soils, for example, Amboy soils.

Minor soils are mainly in the Adams, Alton, Hinckley, Ira, Oakville, Raynham, and Windsor series. The minor soils are somewhat poorly drained to excessively drained. The better drained, gravelly Alton and Hinckley soils and sandy Adams, Oakville, and Windsor soils are on outwash terraces, deltas, and remnant beach ridges on the lake plain. The wetter, silty Raynham soils are in drainageways. Alton and Hinckley soils are well drained, and Raynham soils are somewhat poorly drained and poorly drained. Moderately well drained Ira soils formed in glacial till and are in islandlike areas that protrude above the lake plain. Areas of moderately steep soils along gullies and severely eroded soils are also in this map unit.

Cleared areas are used mainly for farming. The steeply sloping areas are used for hay, pasture, or woodland. The severe hazard of erosion, slow or moderately slow permeability in the fragipan, and seasonal wetness are the main management concerns.

14. Raynham-Canandaigua, nearly level

Deep, somewhat poorly drained to very poorly drained, medium textured soils; on lake plains

These soils are nearly level and gently sloping or undulating and are on lake plains and terraces parallel to small streams. They are on low flats in slight depressions and on foot slopes and toeslopes. They are closely intermingled in the areas on lake plains.

This map unit makes up about 6.2 percent of the county. About 40 percent of the unit is Raynham soils, and 30 percent is Canandaigua soils. The remaining 30 percent is minor soils.

Raynham and Canandaigua soils formed in similar silty lacustrine deposits.

Raynham soils are deep, somewhat poorly drained and poorly drained, and generally have a medium textured subsoil and substratum. Permeability is moderate or moderately slow in the subsoil. These soils have a seasonal high water table near the surface. Raynham soils are in moderately low areas and in areas that have concave slopes. Runoff is slow.

Canandaigua soils are deep, poorly drained and very poorly drained, and medium textured. Permeability is moderately slow. These soils have a seasonal high water table for long periods and are slightly heavier textured in the subsoil than Raynham soils. Canandaigua soils are nearly level and commonly are in depressions and drainageways in a position lower on the landscape than Raynham soils. They are subject to ponding. Runoff is very slow, and water accumulates on the Canandaigua soils.

Minor soils are mainly in the Fonda, Halsey, Hudson, Ira, Lamson, Madalin, Rhinebeck, Sodus, and Williamson series. The mucky Fonda, gravelly Halsey, and sandy Lamson soils are in depressions, wet spots, and drainageways. The heavier textured Madalin and Rhinebeck soils are intermingled in slack water areas on the lake plain. The better drained Williamson and Hudson soils are on small knolls. Ira and Sodus soils contain more coarse fragments and are better drained. They are on islandlike till areas that protrude above the lake plain. The minor soils are very poorly drained to well drained.

The artificially drained areas of this map unit are used for field crops and truck crops. The undrained areas are mostly idle. A few areas have been reforested. Some areas are seeded to water-tolerant forage crops or are in native pasture. Wetness, slow permeability, and high potential frost action are the main management concerns. Some areas have potential for development of habitat for wetland wildlife.

15. Minoa-Lamson, nearly level

Deep, somewhat poorly drained to very poorly drained, medium textured soils; on lake plains

These soils are nearly level to gently sloping and are closely intermingled on lake plains. They are in low areas at the fringe of deltas and in remnant glacial streambeds. They are also adjacent to mucky areas.

This map unit makes up about 2 percent of the county. About 45 percent of the unit is Minoa soils, and 40 percent is Lamson soils. The remaining 15 percent is minor soils.

Minoa and Lamson soils formed in similar deltaic and glacial lake deposits dominated by fine sand and very fine sand.

Minoa soils are deep, somewhat poorly drained, and medium textured. Permeability is moderate in the subsoil. They are subject to a fluctuating seasonal high water table. These soils are nearly level to gently sloping. They are in moderately low areas and are slightly higher on the landscape than Lamson soils.

Lamson soils are deep, poorly drained and very poorly drained, and medium textured. Permeability is moderately rapid. These soils have a seasonal high water table at or near the surface for long periods. Lamson soils are in drainageways, depressions, and wet spots and are lower on the landscape than Minoa soils.

Minor soils are Canandaigua, Elmwood, Palms, Raynham, and Swanton soils and the Minoa variant soils. The Canandaigua and Raynham soils are closely intermingled in areas where the deposits are silty. The Minoa variant soils are on slightly elevated knolls on the lake plain. The sandy Elmwood and Swanton soils are on deltas and beaches and are underlain by clayey material. Palms soils are in depressions. The minor soils are very poorly drained to moderately well drained.

Artificially drained areas of these soils are used for field crops and vegetable crops. Undrained areas are used for water-tolerant forage crops and pasture plants and for trees. A few areas are idle and are reverting to brush. Wetness, poor stability, and high potential frost action are the main management concerns.

16. Madalin-Fonda, level

Deep, poorly drained and very poorly drained soils that have a moderately fine textured and fine textured subsoil; on lake plains

These soils are nearly level and level and are on lake plains. They are on low, broad flats and in depressions.

This map unit makes up about 1 percent of the county. About 50 percent of the unit is Madalin soils, and 25 percent is Fonda soils. The remaining 25 percent is minor soils.

Madalin and Fonda soils formed in similar lacustrine deposits dominated by clay and silt.

Madalin soils are deep and are poorly drained and very poorly drained. They have a perched high water table above the subsoil for long periods. Permeability is slow in the subsoil. These soils are in low, nearly level areas. They commonly are adjacent to Fonda soils and are slightly higher on the landscape than those soils.

Fonda soils are deep and very poorly drained. They have a high water table that is closer to the surface for longer periods than that of the Madalin soils. They have a mucky surface layer. Permeability in the subsoil is slow or very slow. These soils are in nearly level, basinlike depressions.

Minor soils are mainly in the Canandaigua, Granby, Lamson, Palms, Raynham, and Rhinebeck series. The silty Canandaigua and sandy Granby and Lamson soils are in nearly level and depressional areas similar to those in which the major soils occur. These soils are poorly drained and very poorly drained. The Palms soils are in the wettest areas, where moderately thick organic deposits have accumulated. The silty Raynham soils and the clayey Rhinebeck soils are on slightly elevated parts of the landscape. The Raynham soils are somewhat poorly drained and poorly drained, and the Rhinebeck soils are somewhat poorly drained.

Partially drained areas of this map unit are used for crops, mainly hay crops. Many areas are in native pasture or second-growth woodland. A few areas are idle and are reverting to brush. If adequate outlets are available and drainage systems can be installed, these soils have potential for growing a wide variety of cultivated crops. Prolonged wetness, slow or very slow permeability, and low strength are the main management concerns.

17. Rhinebeck-Madalin, nearly level

Deep, somewhat poorly drained to very poorly drained soils that have a moderately fine textured and fine textured subsoil; on lake plains

These soils are nearly level to gently sloping and are on lake plains. They are on broad, moderately low flats and in slight depressions and low, undulating areas.

This map unit makes up about 1 percent of the county. About 45 percent of the unit is Rhinebeck soils, and 35 percent is Madalin soils. The remaining 20 percent is minor soils.

Rhinebeck and Madalin soils formed in similar lacustrine sediment dominated by clay and silt.

Rhinebeck soils are deep and are somewhat poorly drained. They have a moderately fine textured and fine textured subsoil. A seasonal high water table is perched above the slowly permeable subsoil. Rhinebeck soils are in low, gently sloping areas and on broad flats. Runoff is slow. These soils receive runoff from higher soils.

Madalin soils are deep and are poorly drained and very poorly drained. A seasonal high water table commonly is perched above the slowly permeable subsoil for long periods. These soils are nearly level and are on low flats and in slight depressions. They are slightly lower on the landscape than the adjacent Rhinebeck soils.

Minor soils are in the Canandaigua, Hudson, Minoa, Palms, Raynham, Scriba, Swanton, and Williamson series. The Canandaigua, Minoa, Palms, and Swanton soils are closely intermingled with the Rhinebeck and Madalin soils and are on similar landscapes. The Hudson, Raynham, and Williamson soils formed in lacustrine deposits similar to those in which Rhinebeck and Madalin soils formed, but they are in slightly higher positions on the landscape than those soils. The Scriba soils are on glacial till landforms that protrude above the lake plain. The minor soils are well drained to very poorly drained.

Cleared areas are used mainly for pasture. Some cleared areas are idle. A few partially drained areas are used for crops, mainly water-tolerant forage crops. Seasonal or prolonged wetness, slow permeability, and low strength are the main limitations for farm and nonfarm uses. Some areas have potential for pond sites.

18. Rhinebeck-Hudson, gently sloping

Deep, somewhat poorly drained to well drained soils that have a moderately fine textured and fine textured subsoil; on lake plains

These soils are nearly level to rolling and are on lake plains. They are on low ridges and knolls and on moderately low flats.

This map unit makes up about 2.5 percent of the county. About 60 percent of the unit is Rhinebeck soils, and 10 percent is Hudson soils. The remaining 30 percent is minor soils.

Rhinebeck and Hudson soils formed in lacustrine deposits dominated by clay and silt.

Rhinebeck soils are deep and somewhat poorly drained. They have a fine textured and moderately fine textured subsoil. They have a perched seasonal high water table over the slowly permeable subsoil. These nearly level to gently sloping soils are on moderately low flats and low ridges that receive runoff from higher soils. Runoff is slow.

Hudson soils are deep and moderately well drained and well drained. These soils have a fine textured and moderately fine textured subsoil. They have a perched water table early in spring because of the slowly permeable subsoil. These soils are gently sloping and sloping and are on convex ridges and knolls. They are on a slightly higher part of the landscape than the adjacent, wetter Rhinebeck soils.

Minor soils are mainly in the Amboy, Brockport, Ira, Madalin, Sodus, and Williamson series. The well drained

Amboy and moderately well drained Williamson soils are closely intermingled on landscapes similar to those of the major soils. The Brockport soils are in areas where shale bedrock is at a depth of less than 40 inches. The Madalin soils are in drainageways and wet spots. Brockport soils are somewhat poorly drained, and Madalin soils are poorly drained and very poorly drained. The moderately well drained Ira soils and well drained Sodus soils are on glacial till ridges that protrude above the lake plain.

Most areas have been cleared and are used for crops. Some areas in the southern part of the county are idle. Most areas of these soils need to be artificially drained to maximize crop yields. These soils respond well to good management and are suited to a wide variety of cultivated crops. Erosion is a hazard in cultivated areas. Seasonal wetness, slow permeability, and low strength are the main management concerns.

Deep soils that formed in glaciofluvial deposits

The 8 map units in this group are on outwash plains, valley terraces, and lake plains. They make up about 22.8 percent of the county. The soils formed mainly in glacial stream-deposited sand and gravel on terraces, alluvial fans, eskers, kames, remnant beaches, deltas, and plains In few dune-shaped areas the soils formed in windblown, or eolian, deposits. The soils are excessively drained to very poorly drained and are mainly coarse textured to medium textured. Most of the soils have a coarse textured substratum. Slopes are nearly level to sloping and rolling. Many areas are used intensively for farming, but some of the soils are droughty. Fruit and vegetable crops are grown in a few areas, but irrigation is often required. Some areas are in pasture or water-tolerant forage crops or are idle. Many of the better drained soils have good potential for community development. Some areas are mined for sand and gravel.

19. Oakville-Deerfield, gently sloping

Deep, well drained and moderately well drained, coarse textured soils; on lake plains

These are nearly level and gently sloping soils on deltas, remnant beaches, and offshore bars of outwash plains and lake plains. They are on slightly convex ridges, knolls, and benches.

This map unit makes up about 1.6 percent of the county. About 60 percent of the unit is Oakville soils, and about 30 percent is Deerfield soils. The remaining 10 percent is minor soils.

Oakville and Deerfield soils formed in fluvial or lacustrine deposits dominated by sand. Oakville soils are deep, well drained, and coarse textured. Permeability is very rapid. These soils are on convex ridges and knolls and on nearly level benches.

Deerfield soils are deep, moderately well drained, and coarse textured. Permeability is rapid in the subsoil. A seasonal high water table rises into the subsoil for brief periods in spring. Deerfield soils are intermingled with Oakville soils and commonly are slightly lower on the landscape than those soils.

Minor soils are mainly in the Alton, Hinckley, Lamson, and Minoa series. Well drained to somewhat excessively drained Alton soils and excessively drained Hinckley soils are gravelly and are on deltas, remnant beach ridges, and outwash terraces. Lamson and Minoa soils are in drainageways and wet spots. They are finer textured and wetter than the other minor soils.

Cleared areas are used for a variety of crops. A few productive dairy farms are in areas of this map unit. The soils are low in natural fertility. Oakville soils are droughty at times, and Deerfield soils are excessively wet early in spring. The soils in this map unit respond well to applications of fertilizer, manure, and irrigation water for some high value crops. Truck crops and fruits grow well if the soils are protected from erosion. Some areas are idle. Soil blowing, the high content of sand, and the tendency of cutbanks to cave are the main management concerns.

20. Windsor, undulating

Deep, excessively drained to well drained, coarse textured soils; on lake plains

These soils are undulating and rolling and are on sandy deltas, remnant beaches, dunelike knolls, and bars on outwash plains and lake plains. The landscape is a series of convex ridges and knolls.

This map unit makes up about 1.4 percent of the county. About 70 percent of the unit is Windsor soils. The remaining 30 percent is minor soils.

Windsor soils are deep, excessively drained, and coarse textured. They formed in fluvial and eolian deposits that are dominantly fine sand. Permeability is rapid, and the seasonal high water table is at a depth of more than 6 feet. These soils are on landscapes that have complex slopes.

Minor soils are mainly in the Adams, Alton, Deerfield, Granby, Hinckley, and Naumburg series. The excessively drained Adams soils are in the highest areas of the county, where temperatures are colder. The Alton and Hinckley soils are gravelly and are on deltas, remnant beaches, and terraces. The moderately well drained Deerfield soils are closely intermingled with Windsor and Adams soils and are slightly lower on the landscape than those soils. They commonly receive runoff from higher soils. The Granby and Naumburg soils are in depressions, wet spots, and drainageways. They receive a considerable amount of runoff from higher soils.

This map unit is used mostly for crops, woodland, and wildlife habitat. Some of the areas that were once farmed have been reforested with coniferous trees. A few areas are idle and are overgrown with shrubs and brambles that provide habitat for wildlife. These soils have low natural fertility and are droughty at times. Soil blowing and erosion are hazards if these soils are cultivated and are not protected. These soils are suited to deep-rooted, drought-tolerant hay and pasture crops. Truck crops and fruit crops grow well, especially if supplementary irrigation is used.

The high sand content, droughtiness, hazard of erosion, and the tendency of cutbanks to cave are the main limitations to the use of these soils.

21. Windsor-Adams, rolling

Deep, excessively drained to well drained, coarse textured soils; on lake plains

These soils are undulating and rolling and are on deltas, remnant beach ridges, and dunelike hills on outwash plains and lake plains mostly in the eastern half of the county. The landscape consists mainly of low hills that have complex slopes.

This map unit makes up about 2.2 percent of the county. About 50 percent of the unit is Windsor soils, and 30 percent is Adams soils. The remaining 20 percent is minor soils.

Windsor soils are deep, excessively drained, and coarse textured. Permeability is rapid. These soils are undulating to rolling and are on low, convex hills.

Adams soils are deep, well drained to excessively drained, and coarse textured. Permeability is rapid in the subsoil and very rapid in the substratum. Because these soils have a higher organic-matter content than Windsor soils, they have slightly higher available water capacity than those soils. Adams soils are on low, convex hills at a slightly higher elevation than the Windsor soils.

Minor soils are mainly in the Alton, Colton, Deerfield, Granby, Hinckley, and Naumburg series. A few migrating sand dunes and blowouts are also in this map unit. The Alton, Colton, and Hinckley soils are on similar, gravelly landforms on the lake plain. The Deerfield soils are closely intermingled with Windsor and Adams soils and commonly are at a slightly lower elevation than those soils. They receive runoff from higher soils and are moderately well drained. The wetter Granby and Naumburg soils are in depressions, wet spots, and drainageways in places where a considerable amount of runoff accumulates.

A few cleared areas are farmed. Because of the remote location, however, most areas are in second-growth woodland. A few areas are idle and are in shrubs and brambles. Most areas are suited to deep-rooted, drought-tolerant hay and pasture crops. Truck crops and fruit crops grow well on these soils, especially in areas where air drainage is good, but the soils generally require irrigation. These soils have low natural fertility, but they respond well to applications of fertilizer and irrigation water. They are subject to soil blowing if the plant cover is removed. Early in the history of the county, these soils were used as a source of sand for the manufacture of glass. They now are used as a source of sand that is applied to roads in winter. Slope, droughtiness, the hazard of erosion, and the tendency of cutbanks to cave are the main management concerns.

22. Naumburg-Granby, gently sloping

Deep, somewhat poorly drained to very poorly drained, coarse textured soils; on lake plains

These soils are nearly level and gently sloping and are on lake plains. They are on the lower end of deltas, the lower side of remnant beach ridges, and broad flats.

This map unit makes up about 3.2 percent of the county. About 50 percent of the unit is Naumburg soils, and 25 percent is Granby soils. The remaining 25 percent is minor soils.

Naumburg and Granby soils formed in fluvial and lacustrine deposits dominated by fine sand.

The Naumburg soils are deep, poorly drained and somewhat poorly drained, and coarse textured. Permeability is rapid. A seasonal high water table is within the upper part of the subsoil in spring. These soils are nearly level and gently sloping, and are on flats and on the concave, lower side of ridges and knolls.

The Granby soils are deep, poorly drained and very poorly drained, and coarse textured. Permeability is rapid. A seasonal high water table is at or near the surface for long periods. These soils are on flats and in depressions. They are lower on the landscape than the better drained Naumburg soils. They commonly receive runoff from the Naumburg soils.

Minor soils are in the Adams, Colton, Duane, Fredon, Halsey, Rifle, and Windsor series. The moderately well drained Duane soils are closely associated on slightly raised benches. The Adams, Colton, Hinckley, and Windsor soils are better drained and are generally on the higher part of deltas, remnant beaches, and bars. Fredon and Halsey soils are closely intermingled on similar landforms that contain gravel. Very poorly drained Rifle soils are in deep depressions that contain organic material.

Most of the soils in this map unit are not farmed, because of wetness and the accumulation of runoff from adjacent higher soils. Drainage outlets are difficult or impossible to locate in some places, because of the position of the soils on the landscape. Where suitable outlets are available, however, a combination of surface and subsurface drains will improve drainage of these soils. Undrained areas of these soils are suited to water-tolerant hay and pasture plants and to trees. Seasonal and prolonged wetness and the tendency of cutbanks to cave are the main management concerns.

23. Fredon-Halsey, nearly level

Deep, somewhat poorly drained to very poorly drained, medium textured and moderately coarse textured soils; on islandlike areas on lake plains and in valleys

These soils are nearly level and are on islandlike areas on lake plains and in valley bottoms. They are on low outwash flats and on foot slopes of remnant beach ridges and deltas.

This map unit makes up about 0.2 percent of the county. About 40 percent of the unit is Fredon soils, and 30 percent is Halsey soils. The remaining 30 percent is minor soils.

Fredon soils are deep, somewhat poorly drained and poorly drained, and moderately coarse textured and medium textured. They formed in gravelly outwash deposits. These soils have a coarse textured substratum. Permeability is moderate in the subsoil and moderately rapid to rapid in the substratum. A seasonal high water table is within the upper part of the subsoil early in spring. These soils are on low benches, foot slopes, and flats adjacent to the wetter Halsey soils in depressions.

Halsey soils are deep, very poorly drained, and medium textured and moderately coarse textured. They formed in sandy and gravelly outwash deposits. Permeability is moderate to moderately rapid in the subsoil and rapid in the substratum. A seasonal high water table is near the surface for long periods. Halsey soils are in depressions and on very low flats. They receive seepage and runoff from higher, adjacent soils.

Minor soils are in the Alton, Carlisle, Granby, Lamson, Minoa, Palms, and Scriba series. Alton soils are on broad outwash plains and terrace deposits and are better drained than the major soils. The Carlisle and Palms soils are in bogs and formed in accumulations of organic matter. Granby, Lamson, and Minoa soils formed in sandy deltaic or stream channel deposits. Scriba soils are somewhat poorly drained and are on glacial till landforms that protrude above the lake plains.

Very few of the cleared areas are used for cultivated crops, because of excessive wetness. In undrained areas, the soils are suited to water-tolerant forage crops and pasture plants and to trees. A few areas are idle and are in shrubs and brush that provide habitat for wetland wildlife. Some areas have potential for cultivated crops if the soils are properly drained. Seasonal and prolonged wetness are the main limitations to the use of these soils.

24. Alton-Hinckley, gently sloping

Deep, well drained to excessively drained, coarse textured to moderately coarse textured, gravelly soils; in valleys

These soils are nearly level to sloping and rolling and are on plains and terraces in valley bottoms. They formed mainly in material deposited by glacial streams that flowed from the Tug Hill Plateau.

This map unit makes up 5 percent of the county. About 50 percent of the unit is Alton soils, and 20 percent is Hinckley soils. The remaining 30 percent is minor soils.

Alton soils are deep, well drained and somewhat excessively drained, and moderately coarse textured and coarse textured. They formed in gravelly glacial outwash deposits. These deposits are dominated by gray and red sandstone and have a smaller amount of shale, granite, and limestone. Permeability is moderately rapid in the subsoil and rapid in the substratum. These soils are nearly level to rolling and are on benches, terraces, and broad flats in valley bottoms.

Hinckley soils are deep, excessively drained, and coarse textured. They formed in sandy and gravelly outwash deposits. Permeability is rapid and very rapid. These soils are slightly coarser textured and have lower available water capacity than Alton soils. They are gently sloping and sloping and are on terraces and benches on lower valley sides and on eskers in valley bottoms.

Minor soils are mainly in the Colton, Fredon, Halsey, Herkimer, Sodus, and Worth series. Areas of Fluvaquents and Udifluvents, frequently flooded, are also in this map unit. Excessively drained Colton soils are commonly intermingled with Alton and Hinckley soils on kame terraces and eskers. Fredon and Halsey soils are in wet spots, seeps, and drainageways. The well drained Sodus and Worth soils are in upland till areas. Fluvaquents and Udifluvents, frequently flooded, are on narrow flood plains of creeks and streams. Herkimer soils are on old alluvial fans in places where side streams enter the main part of valleys; they are well drained.

Most cleared areas are farmed. These soils can be tilled early in spring. They are especially well suited to alfalfa and to other deep-rooted crops that require good drainage. These soils are also well suited to fruit trees, field crops, and vegetables that are planted early in the growing season. If the soils are used for some high value crops, they require irrigation. The glacial outwash in which the soils formed is a source of aquifers that provide abundant supplies of water. The major soils are a potential source of gravel. Droughtiness and high gravel content are the main management concerns for some uses of these soils.

25. Hinckley-Alton, sloping

Deep, excessively drained to well drained, moderately coarse textured to coarse textured, gravelly soils; in valleys and in islandlike areas on lake plains

These soils are gently sloping, are sloping and rolling, and are in valleys, on outwash plains, and in islandlike areas on the lake plain. They are on glacial outwash kames, terraces, remnant beach ridges and eskers.

This map unit makes up about 3.2 percent of the county. About 50 percent of the unit is Hinckley soils, and 15 percent is Alton soils. The remaining 35 percent is minor soils.

Hinckley soils are deep, excessively drained, and coarse textured. They formed in sandy and gravelly outwash deposits. Permeability is rapid or very rapid. These soils are on kames, eskers, and remnant beach ridges that have short complex slopes and along terrace fronts.

Alton soils are deep, well drained and somewhat excessively drained, and moderately coarse textured to coarse textured. They formed in glacial outwash deposits. These deposits are mainly gray and red sandstone and have a smaller amount of shale, granite, and limestone. These soils are slightly less coarse textured and have higher available water capacity than the Hinckley soils. Permeability is moderately rapid in the subsoil and rapid in the substratum. These soils are on kames, eskers, and ridges that have short, complex slopes and on the front of terraces.

Minor soils are mainly in the Adams, Colton, Fredon, Halsey, Naumburg, and Windsor series. Areas of Adams, Naumburg, and Windsor soils are on deltas and glaciolacustrine plains. These soils are not gravelly. The excessively drained Colton soils are closely intermingled with Alton and Hinckley soils on kames, terraces, and eskers. The Fredon and Halsey soils are in seeps and drainageways and receive runoff from higher soils. A few areas of hilly and steep soils are also in this map unit.

Cleared areas are used mainly for deep-rooted hay and pasture crops that tolerate droughtiness. A few areas are idle. Some areas have been reforested with conifers. Truck crops and fruit crops are grown in places where the soils are protected from erosion and where irrigation is used. The major soils warm rapidly and can be tilled early in spring. They have low natural fertility, but they respond well to applications of fertilizer and manure. The glacial outwash in which these soils formed is a source of aquifers that provide a dependable supply of water. Droughtiness, slope, and excessive gravel content are the main management concerns. The major soils have good potential as a source of gravel and sand.

26. Colton-Hinckley, rolling

Deep, excessively drained, coarse textured soils; in valleys

These soils are gently sloping, rolling, and sloping and are on outwash plains, eskers, kames, and terraces in valleys.

This map unit makes up about 6 percent of the county. About 45 percent of the unit is Colton soils, and 20 percent is Hinckley soils. The remaining 35 percent is minor soils.

Colton and Hinckley soils formed in similar, coarse textured, gravelly outwash deposits.

Colton soils are deep, excessively drained, and coarse textured. Permeability is rapid or very rapid. These soils have a slightly higher organic-matter content in the upper part of the subsoil and higher available water capacity than Hinckley soils. They are rolling and are on hills, kames, and ridges that have complex slopes.

Hinckley soils are deep, excessively drained, and coarse textured. Permeability is rapid or very rapid. These soils are gently sloping, rolling and sloping and are on outwash plains, eskers, and the front of terraces.

Minor soils are mainly in the Adams, Empeyville, Fredon, Halsey, Naumburg, Windsor, and Worth series. The Fredon soils are on low benches, and the Halsey soils are in wet spots and drainageways on outwash plains. Fredon soils are somewhat poorly drained and poorly drained, and Halsey soils are very poorly drained. The Adams, Naumburg, and Windsor soils are on sandy deltas and glaciolacustrine plains. They are not gravelly. The well drained Worth and moderately well drained Empeyville soils are on elevated, glacial till landforms.

These soils are used mostly for woodland. Most of the cleared areas that were once farmed have been reforested. Some cleared areas are idle and are in shrubs and brambles. Some areas are used for deep-rooted hay and pasture crops that can tolerate droughtiness. Complex slopes, droughtiness, and a short growing season are limitations if these soils are used for cultivated crops, truck crops, and fruit crops. These soils are underlain by outwash deposits that are a source of aquifers that yield abundant supplies of water. Droughtiness, slope, and the excessive gravel content are the main limitations to most uses. The soils in this map unit have good potential as a source of gravel and sand.

Deep soils that formed in recent alluvium

The 2 map units in this group are on flood plains. They make up 0.8 percent of the county. The soils formed in recent alluvial deposits and are adjacent to streams. They are subject to flooding. They are mainly moderately well drained to poorly drained and are mainly medium textured and moderately coarse textured. They are nearly level. Some areas of the better drained soils are used for crops, mainly field crops and vegetable crops. Many areas are used for pasture or woodland. Some areas are idle. The potential for community development is poor because of the hazard of flooding.

27. Rumney-Middlebury, level

Deep, moderately well drained to poorly drained, medium textured alluvial soils; on valley bottoms

These soils are nearly level and level and are on flood plains along the major streams in the county.

This map unit makes up about 0.4 percent of the county. About 55 percent of the unit is Rumney soils, and 30 percent is Middlebury soils. The remaining 15 percent is minor soils.

Rumney and Middlebury soils formed in similar deposits of recent alluvium on flood plains.

The Rumney soils are deep, somewhat poorly drained and poorly drained, and medium textured. Permeability is moderately rapid in the subsoil. The depth to the seasonal high water table depends somewhat on the water level in adjacent streams. These soils are on low flood plains and slack water areas adjacent to low-gradient streams. They are subject to flooding.

Middlebury soils are deep, moderately well drained, and medium textured. Permeability is moderate. Middlebury soils are on flood plains in slightly higher areas than the Rumney soils and are less subject to flooding than those soils.

Minor soils are mainly in the Carlisle, Herkimer, Palms, and Wallkill series. Areas of Fluvaquents and Udifluvents, frequently flooded, are also in this map unit. Carlisle, Palms, and Wallkill soils are in slack water areas where organic material accumulates. Herkimer soils are on old alluvial fans in places where tributary streams flow into valleys. Carlisle, Palms, and Wallkill soils are very poorly drained, and Herkimer soils are well drained.

Most areas of these soils are in native pasture or woodland. A very small acreage of the better drained areas is used for cultivated crops. Some areas are idle and are reverting to brush and weeds that provide wildlife habitat. The soils in this map unit have potential as a source of topsoil. Periodic flooding and seasonal wetness are important management concerns.

28. Fluvaquents-Udifluvents, nearly level

Deep, alluvial soils that have a wide range of texture and drainage characteristics within a short distance; in valley bottoms

These soils are nearly level to level and are on flood plains along narrow, winding streams.

This map unit makes up 0.4 percent of the county. About 65 percent of the unit is Fluvaquents and Udifluvents, nearly level. Minor soils make up 35 percent. The major soils are not classified as soil series, because the soil properties vary greatly within a short distance.

The major soils are deep, but they have little or no profile development. They have a wide range of texture and drainage characteristics within a short distance. These soils have been recently deposited by streams during periods of flooding. They have a high water table.

Minor soils are in the Canandaigua, Halsey, Middlebury, and Rumney series. The silty Canandaigua soils and gravelly Halsey soils are in a few depressions. Canandaigua soils are poorly drained to very poorly drained, and Halsey soils are very poorly drained. The Middlebury and Rumney soils are in a few areas and are subject to flooding. Middlebury soils are moderately well drained, and Rumney soils are somewhat poorly drained to poorly drained.

Most of this map unit is in permanent pasture or woodland. Because of the high water table, most areas are not a suitable source of topsoil. Periodic flooding and prolonged wetness are limitations to the use of these soils.

Deep soils that formed in organic deposits

The 2 map units in this group are on low flats and in depressions on lake plains and in uplands. They make up about 8.2 percent of the county. The soils formed in organic material. They are level and are very poorly drained. Undrained areas have a cover of swamp vegetation and trees and provide excellent habitat for wetland wildlife. Some areas are drained and are used intensively for specialized crops, for example, onions and lettuce.

29. Rifle-Carlisle, level

Deep, very poorly drained soils that formed in well decomposed and moderately well decomposed organic material; on lake plains, upland till plains, and valley bottoms

These soils are level and are in depressional bogs and swamps of lake plains, upland till plains, and valley bottoms and in kettles on outwash plains.

This map unit makes up about 7.2 percent of the county. About 50 percent of the unit is Rifle soils, and 30 percent is Carlisle soils. The remaining 20 percent is minor soils.

Rifle and Carlisle soils are deep, very poorly drained muck soils that formed in accumulations of well decomposed to partially decomposed organic matter in bogs and swamps. The organic matter is derived from woody and herbaceous plants. Rifle and Carlisle soils have organic deposits more than 51 inches thick. The organic matter in Carlisle soils is more thoroughly decomposed than that in the Rifle soils. Permeability is rapid in both soils. In undrained areas, these soils have a high water table at or near the surface most of the year. They are in level, very low depressions and are subject to flooding. Runoff is ponded.

Minor soils are in the Canandaigua, Fonda, Granby, Madalin, Dannemora, Scriba, Sun, Westbury, Wallkill, and Halsey series. The Canandaigua, Fonda, Granby and Madalin soils are on lake plains. The Dannemora, Scriba, Sun, and Westbury soils are in islandlike areas of till and on the fringe of till plains. The Wallkill soils are on flood plains. The Halsey soils are on outwash plains. A few areas of coprogenous earth (sedimentary peat) that has very slow permeability are also in this map unit. The minor soils are somewhat poorly drained to very poorly drained.

This map unit is one of the county's greatest potential resources for agriculture, but only a fracion of the acreage has been developed. The soils are mainly in swamp-type trees and in reeds, sedges, cattails, and other water-tolerant plants. A small acreage has been cleared and drained. The drained areas are well suited to specialized crops, for example, onions and lettuce (fig.4). These muck soils are also suited to potatoes, but yields are low. Because the areas of this map unit are small in extent, the soils are difficult to develop. To obtain maximum yields, the depth of the water table should be controlled by a combination of open ditches, subsurface drains, and pump drainage. Frost pockets and soil blowing are hazards. Prolonged wetness, subsidence after the soil is drained, and very poor stability are the main limitations for most uses. Bogs in some places are used as a source of water for towns and villages.

30. Humaquepts-Fibrists, level

Deep, fresh water marshes that consist of a mixture of organic and mineral material; bordering lakes, ponds, streams, and drainageways

This map unit is in level areas and depressions adjacent to lakes, ponds, streams, and drainageways. It is not classified as a member of any soil series, because it consists mostly of a mixture of organic and mineral material that is suspended in water.

This map unit makes up about 1 percent of the county. The areas are scattered throughout the county. About 35 percent of the unit is Humaquepts, and 30 percent is Fibrists. The remaining 35 percent is soils of minor extent.

Most of these areas are natural, and they commonly resulted from the damming of water courses by beavers. A few areas are manmade. The areas are covered with water most of the year. They support a growth of grasses, sedges, reeds, and cattails and other herbaceous plants. Trees generally do not grow in these areas except along the edges where the water is shallow. Most areas cannot be economically drained, because the water table is controlled by adjacent areas of open water.

This map unit is used mainly as habitat for wetland wildlife (fig. 5).

Descriptions of the soils

In this section, each soil series and map unit recognized in the survey area is described. Each soil series is described in detail, and then briefly, each map unit in that series. The descriptions are arranged in alphabetic order by series name.

Characteristics of the soil and the material in which it formed are discussed for each series. Then a profile, a small three-dimensional area of soil that is typical of the soil series in the survey area, is described. The detailed descriptions of each soil horizon follow standards in the Soil Survey Manual (*8*). Unless otherwise noted, colors described are for moist soil.

Following the profile description, the range of important characteristics of the soil series in this survey area is given and the soil is compared to similar soils and to nearby soils of other series. Then, the map units in the soil series are described.

These map units are shown on the detailed soil maps at the back of this publication. They represent the kinds of soil in the survey area. The descriptions of the map units together with the soil maps can be useful in determining the potential of a soil and in managing it for food and fiber production; in planning land use and developing soil resources; and in enhancing, protecting, and preserving the environment. More information for each map unit, or soil, is given in the section "Use and management of the soils."

Preceding the name of each map unit is the symbol that identifies the soil on the detailed soil maps. Each soil description includes general facts about the soil. In each description, the principal hazards and limitations are indicated, and the management concerns and practices needed are discussed.

The map units on the detailed soil maps represent an area on the landscape made up mostly of the soil or soils for which the unit is named. Most of the delineations shown on the detailed soil map are phases of soil series.

Soils that have a profile that is almost alike make up a *soil series*. Except for allowable differences in texture of the surface layer or of the underlying substratum, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement in the profile. A soil series commonly is named for a town or geographic feature near the place where a soil of that series was first observed and mapped. The Scriba series, for example, was named for the town of Scriba in Oswego County.

Soils of one series can differ in texture of the surface layer or in the underlying substratum and in slope, erosion, stoniness, salinity, wetness, or other characteristics that affect their use. On the basis of such differences, a soil series is divided into phases. The name of a *soil phase* commonly indicates a feature that affects use or management. For example, Scriba gravelly fine sandy loam, 0 to 8 percent slopes, is one of several phases within the Scriba series.

Some map units are made up of two or more dominant kinds of soil. Such map units are called soil complexes, soil associations, and undifferentiated groups.

A *soil complex* consists of areas of two or more soils that are so intricately mixed or so small in size that they cannot be shown separately on the soil map. Each area includes some of each of the two or more dominant soils, and the pattern and proportion are somewhat similar in all areas. Naumburg-Duane complex, gently sloping, is an example.

A *soil association* is made up of soils that are geographically associated and are shown as one unit on the map because it is not practical to separate them. A soil association has considerable regularity in geographic pattern and in the kinds of soil that are a part of it. The extent of the soils can differ appreciably from one delineation to another; nevertheless, interpretations can be made for use and management of the soils. Canaan-Rock outcrop association, gently sloping, is an example.

An *undifferentiated group* is made up of two or more soils that could be mapped individually but are mapped as one unit because there is little value in separating them. The pattern and proportion of the soils are not uniform. An area shown on the map has at least one of the dominant (named) soils or may have all of them. Worth and Empeyville very stony soils, sloping, is an undifferentiated group in this survey area.

Most map units include small, scattered areas of soils other than those that appear in the name of the map unit. Some of these soils have properties that differ substantially from those of the dominant soil or soils and thus could significantly affect use and management of the map unit. These soils are described in the description of each map unit. Some of the more unusual or strongly contrasting soils that are included are identified by a special symbol on the soil map.

Most mapped areas include places that have little or no soil material and support little or no vegetation. Such places are called *miscellaneous areas*; they are delineated on the soil map and given descriptive names. Urban land is an example. Some of these areas are too small to be delineated and are identified by a special symbol on the soil map.

The acreage and proportionate extent of each map unit are given in table 1, and additional information on properties, limitations, capabilities, and potentials for many soil uses is given for each kind of soil in other tables in this survey. (See "Summary of tables.") Many of the terms used in describing soils are defined in the Glossary.

Adams series

The Adams series consists of deep, excessively drained, coarse textured soils. These soils formed in glaciofluvial and eolian sand deposits. They are rolling or moderately steep. They are on deltas, outwash plains, terraces, beach ridges, and low, dunelike hills.

In a representative profile, the surface layer is dark brown loamy fine sand 9 inches thick. The subsurface layer is pinkish gray loamy fine sand 2 inches thick. The subsoil extends to a depth of 23 inches. The upper part of the subsoil is dark reddish brown and strong brown, very friable loamy fine sand 5 inches thick and the lower part is yellowish brown, loose loamy fine sand 7 inches thick. The substratum, to a depth of 60 inches, is loose sand that grades in color from pale brown to grayish brown.

The seasonal high water table is generally at a depth of more than 6 feet. Permeability is rapid in the subsoil and very rapid in the substratum. Available water capacity is low to very low. The natural supply of available nitrogen, phosphorus, and potassium is low. Unless the soil is limed, the surface layer and subsoil are very strongly acid or strongly acid.

Most areas are not farmed because of droughtiness and a short growing season. Some areas are reforested to pine. Others are idle and support young stands of birch, aspen, sumac, fern, and bramble.

Representative profile of Adams loamy fine sand, in an area of Adams-Windsor complex, rolling, in the town of Sandy Creek, 800 feet south of Castor Road and 3,000 feet west of U.S. Highway 11:

Ap—0 to 9 inches; dark brown (10YR 4/3) loamy fine sand; weak medium granular structure; very friable; many roots; strongly acid; abrupt smooth boundary.

A2—9 to 11 inches; pinkish gray (7.5YR 6/2) loamy fine sand; single grain; loose; many roots; strongly acid; abrupt wavy boundary.

B21h—11 to 12 inches; dark reddish brown (5YR 3/3) loamy fine sand; weak medium granular structure; very friable; many roots; strongly acid; clear wavy boundary.

B22ir—12 to 16 inches; strong brown (7.5YR 5/6) loamy fine sand; weak fine granular structure; very friable; common roots; strongly acid; gradual wavy boundary.

B23—16 to 23 inches; yellowish brown (10YR 5/6) loamy fine sand; single grain; loose; common roots; 5 percent pea-sized gravel fragments; strongly acid; gradual wavy boundary.

C1—23 to 35 inches; pale brown (10YR 6/3) sand; single grain; loose; few roots; 5 percent coarse fragments; strongly acid; clear wavy boundary.

C2—35 to 60 inches; grayish brown (10YR 5/2) sand; single grain; loose; few roots; strongly acid; few horizontal yellowish brown (10YR 5/4) 1/8-inch thick bands of loamy sand at a depth of 40 inches or more.

The thickness of the solum ranges from 20 to 30 inches. Depth to bedrock is more than 5 feet. Coarse fragments are generally absent, but some profiles contain gravel. Gravel makes up as much as 5 percent of the soil material, by volume, in the solum. Contrasting gravelly deposits are below a depth of 50 inches in some places. Sand size is dominantly medium and fine. Unless limed, the solum is strongly acid or very strongly acid; reaction is medium acid in the substratum in some places.

In the Ap horizon, hue is 10YR, value is 3 to 5, and chroma is 2. In undisturbed areas an O2 horizon is present and is darker than the Ap horizon.

In the A2 horizon, hue is 7.5YR or 10YR, value is 5 or 6, and chroma is 2, if not disturbed by cultivation.

In the Bh horizon, hue is 5YR or 7.5YR or is neutral, value is 2 or 3, and chroma is 2 or 3. Texture is loamy sand or loamy fine sand. Structure is absent or granular. Firm, slightly cemented lenses are in some profiles.

In the Bir horizon, hue is 7.5YR or 5YR, value is 5, and chroma is 4 to 6. Texture is sand to loamy fine sand. Consistence is friable to loose. A few firm to very firm cemented nodules are in the B horizon of some profiles.

In the lower part of the B horizon, hue is 5YR to 10YR, value is 4 or 5, and chroma is 3 to 6. Texture is sand to loamy fine sand. Consistence is very friable or loose.

In the C horizon, hue is 10YR, value is 5 or 6, and chroma is 2 or 3. Texture is dominantly sand.

Adams soils are near the Deerfield and Naumburg soils. Deerfield soils are moderately well drained, and Naumburg soils are poorly drained to somewhat poorly drained. The Adams soils are similar to Windsor soils, but they have more organic matter in the upper part of the subsoil than Windsor soils.

AAC—Adams-Windsor complex, rolling. The Adams soil in this complex has the profile described as representative for its series. The soils in this complex are so intermingled that it was not practical to map them separately. The Adams soil makes up 50 percent of the unit, and the Windsor soil makes up 40 percent. The soils are rolling and are on glacial outwash terraces, plains, and low dunelike hills. Slopes range from 6 to 12 percent. Individual areas are irregular in shape and are mainly 10 to 50 acres in size.

Included with these soils in mapping are small areas of well drained Oakville soils, a few areas of moderately well drained Deerfield soils and poorly drained to somewhat poorly drained Naumburg soils in slightly lower positions on the landscape, and very poorly drained Granby soils in small depressions. Also included are a few small areas of gravelly Colton and Hinckley soils and a few small sand dunes and blowouts. Soils that are nearly level and gently sloping are included in some areas.

These soils are suited to deep rooted, drought-tolerant hay and pasture crops, but yields are generally low. They are poorly suited to shallow-rooted row crops because of the severe hazard of erosion and droughtiness. Cultivated crops, if grown, should be infrequent and should be included in a cropping system that has a high proportion of sod crops. Contouring helps to conserve moisture and minimize erosion, but it is not practical in many areas because of the complex slopes. The use of cover crops, minimum tillage, returning all crop residue to the soil, and planting of windbreaks are measures that can be used to minimize soil blowing and erosion (fig. 6). These soils are difficult to irrigate because of the complex slopes and the hazard of erosion.

Slope and droughtiness are the main limitations for nonfarm uses. Most areas provide good sources of sand. Capability subclass IVs.

AAD—Adams-Windsor complex, moderately steep. These soils are so intermingled that it was not practical to map them separately. The Adams soil makes up about 50 percent of the unit, and the Windsor soil makes up 40 percent. The soils are on dissected terrace fronts, dunelike hills, and the sides of deltas. Slopes range from 12 to 20 percent. Individual areas are narrow, are rectangular to irregular in shape, and are mainly 4 to 30 acres in size.

Included with these soils in mapping are small areas of the gravelly, well drained to excessively drained Colton and Hinckley soils. A few sand dunes and blowouts and areas of steep soils are also included.

These sandy soils are not suited to cultivation, because they are too droughty and are too steep for the safe operation of machinery. If the native plant cover is removed, these soils have a severe hazard of soil blowing and erosion. Pasture generally is poor in quality. Slope makes irrigation impractical. These soils are better suited to woodland or to wildlife habitat than to other uses.

Slope and droughtiness are the main limitations for most uses. Capability subclass VIs.

Alton series

The Alton series consists of deep, well drained to somewhat excessively drained, moderately coarse textured soils. These soils formed in glaciofluvial sand and gravel deposits derived mainly from red and gray sandstone. They are nearly level to rolling. They are on terraces, plains, remnant beach ridges, eskers, and kames.

In a representative profile, the surface layer is dark brown gravelly fine sandy loam 8 inches thick. The subsoil extends to a depth of 48 inches. The upper part of the subsoil is brown gravelly sandy loam 8 inches thick. The middle part is strong brown very gravelly sandy loam 20 inches thick, and the lower part is strong brown, loose very gravelly loamy sand 12 inches thick. The substratum, to a depth of 62 inches, is stratified sand and gravel.

Depth to the seasonal high water table is more than 6 feet. Permeability is moderately rapid in the surface layer and subsoil and rapid in the substratum. Available water capacity is low to moderate. Root penetration is excellent. The supply of available nitrogen and potassium is low, and that of available phosphorus is medium. The surface layer and subsoil are medium acid to neutral. These soils respond well to applications of fertilizer and lime if adequate moisture is present.

Most areas of Alton soils are in crops or pasture.

Representative profile of Alton gravelly fine sandy loam, 0 to 3 percent slopes, in a cultivated field in the town of Sandy Creek, one-fourth mile east of County Route 22 and one-half mile south of Jefferson County Line:

Ap—0 to 8 inches; dark brown (10YR 4/3) gravelly fine sandy loam; weak medium granular structure; very friable; many roots; 20 percent coarse fragments; medium acid; abrupt smooth boundary.

B21—8 to 16 inches; brown (7.5YR 5/4) gravelly sandy loam; weak medium granular structure; very friable; common roots; common pores; 25 percent coarse fragments; medium acid; clear wavy boundary.

B22—16 to 36 inches; strong brown (7.5YR 5/6) very gravelly sandy loam; weak coarse subangular blocky structure parting to weak medium granular; very friable; common roots; common pores; 45 percent coarse fragments; medium acid; diffuse wavy boundary.

IIB23—36 to 48 inches; strong brown (7.5YR 5/6) very gravelly loamy sand; single grain; loose; few roots; many pores; weakly stratified; 50 percent coarse fragments; slightly acid; clear wavy boundary.

IIIC—48 to 62 inches; brown (10YR 5/3) stratified sand and gravel; single grain; loose; few roots in upper part; many pores; 50 percent coarse fragments; weakly calcareous at a depth of 60 inches.

The thickness of the solum ranges from 30 to 60 inches. Depth to carbonates is 50 to 72 inches, and depth to bedrock is more than 5 feet. Coarse fragments are mainly pebbles and cobblestones. They make up 20 to 50 percent of the soil material, by volume, in the upper part of the solum and 40 to 60 percent in the lower part of the solum and in the substratum. Reaction in the solum is medium acid to neutral; reaction in the substratum is slightly acid to mildly alkaline.

In the Ap horizon, hue is 10YR or 7.5YR, value is 3 or 4, and chroma is 2 through 4. Texture is gravelly fine sandy loam, cobbly silt loam, and gravelly silt loam.

In the B horizon, hue is 10YR through 5YR, value is 4 or 5, and chroma is 3 to 6. Texture is sandy loam to loam and includes gravelly, cobbly, or very gravelly analogs. Texture in the lower part of the B horizon is very gravelly sandy loam or very gravelly loamy sand. A few, thin, discontinuous patches of clay films are on the sides and tops of some pebbles.

In the C horizon, hue is 10YR or 7.5YR, value is 4 or 5, and chroma is 2 through 4. Texture is very gravelly loamy sand, very gravelly sand, or stratified sand and gravel. Coarse fragments are mostly sandstone, but they include a small quantity of limestone and shale.

Alton soils form a drainage sequence with the Fredon and Halsey soils. Fredon soils are somewhat poorly drained and poorly drained, and Halsey soils are very poorly drained. Alton soils have a higher gravel content than the nearby sandy Windsor and Oakville soils.

AgA—Alton gravelly fine sandy loam, 0 to 3 percent slopes. This nearly level soil has the profile described as representative for the series. It is on outwash plains and terraces. Individual areas are broad and are mainly from 20 to 50 acres in size.

Included with this soil in mapping are a few areas of the excessively drained, gravelly Colton and Hinckley soils in similar positions on the landscape. Where this soil is associated with drumlinlike hills, a few areas of the more steeply sloping Ira and Sodus soils are included. Also included are a few small areas of a soil that is similar to this Alton soil but is in areas of sandier deltaic deposits.

This soil is productive and is suited to most of the crops commonly grown in the county. It responds well to good management, is easy to work, and can be tilled early in spring. This soil is especially well suited to alfalfa and to other deep-rooted crops that require good drainage. It is also well suited to fruit trees, field crops, and vegetables planted early in the growing season. Long-season, shallow-rooted crops commonly suffer from a lack of moisture. Row crops can be grown almost continuously if farming practices include minimum tillage, return of crop residue to the soil, and the use of winter cover crops. These practices help to maintain organic-matter content and favorable tilth. Irrigation is beneficial if this soil is used for some high value crops. Infiltration is rapid, and there is little or no hazard of crusting or sealing.

This soil has few limitations for nonfarm uses that require good drainage. Many areas have high potential for homesites. Aquifers in this soil generally are good sources of water. Capability subclass IIs.

AgB—Alton gravelly fine sandy loam, 3 to 8 percent slopes. This soil is commonly undulating and is on outwash plains and terraces. Individual areas are mainly 3 to 40 acres or more in size.

Included with this soil in mapping are a few areas of the wetter Fredon and Halsey soils in small drainageways. Also included are small areas of the excessively drained Colton and Hinckley soils on outwash plains and terraces. Small areas of Sodus and Ira soils in drumlin fields are also included.

This soil is productive and is suited to most crops commonly grown in the county. It responds well to good management, is easy to work, and can be tilled early in spring. Droughtiness is a problem in some years. This soil is especially well suited to alfalfa and to other deep-rooted crops that require good drainage and that can obtain moisture from the lower part of the subsoil. It is also well suited to field crops and vegetable crops that are planted early in the growing season. Row crops can be grown almost continuously if farming practices include minimum tillage, contouring, return of crop residue to the soil, and use of winter cover crops. Erosion is a hazard, particularly on long slopes. Long-season, shallow-rooted crops generally need to be irrigated to obtain optimum yields. Infiltration is rapid, and there is little or no hazard of crusting or sealing.

This soil has few limitations for nonfarm uses that require good drainage. Droughtiness and the hazard of polluting ground water are limitations for some uses. Capability subclass IIs.

AgC—Alton gravelly fine sandy loam, rolling. This soil has a profile similar to the one described as representative for the series, except the surface layer is slightly thinner. Slopes are mostly complex and range from 8 to 15 percent. This soil is on complex hills; elongated, discontinuous, remnant beach ridges; and eskers. Some large areas on terraces are narrow and elongated in shape. Most areas are 3 to 4 acres in size. A few areas are 5 to 10 acres in size, and some range to as much as 20 acres.

Included with this soil in mapping are a few areas of the well drained Sodus soils and small areas of the gravelly Colton and Hinckley soils in similar positions on the landscape. Small spots of the wetter Fredon and Halsey soils in seeps and drainageways are also included.

This soil is suited to some field crops, but slope limits the intensity of its use. This soil is especially well suited to deep-rooted crops, for example, alfalfa and fruit trees, that require good drainage and that can derive moisture from the lower part of the subsoil. This soil warms early in spring and is suited to some early, short-season fruits and vegetables if erosion is controlled. Row crops, if grown, should be included in a cropping system that includes sod crops in some years. Additional conservation practices include stripcropping or contouring on the longer slopes, minimum tillage, use of winter cover crops, and return of crop residue to the soil. This soil is not well suited to irrigation because of slope and the hazard of erosion.

Slope is the main limitation for most nonfarm uses. Some areas are a good source of sand and gravel. Capability subclass IIIe.

AkC—Alton cobbly silt loam, rolling. This soil has a profile similar to the one described as representative for the series, except the surface layer is cobbly silt loam. Slopes range from 8 to 15 percent. This soil is on low hills that have complex slopes and on long, narrow ridges. Individual areas are irregular in shape and are 8 to 100 acres in size.

Included with this soil in mapping are small areas of the well drained Herkimer soils on alluvial fans. Also included are areas of the wetter Fredon and Halsey soils in small seeps and depressions and along narrow drainageways. Many of these areas are indicated on the map by the symbol for a wet spot.

This soil is suited to some field crops, but slope and the quantity of cobbles limit the intensity of its use. It is especially suited to deep-rooted crops, for example, alfalfa and fruit trees, that require good drainage and that can obtain moisture from the lower part of the subsoil. It warms early in spring, and it is suited to early short-season crops if erosion is controlled. Row crops should be grown in a cropping system that includes sod crops in some years. Minimum tillage, stripcropping, contouring where the slope is suitable, use of winter cover crops, and return of crop residue to the soil are other effective conservation practices. This soil tends to be less droughty than Alton soils that have a surface layer of gravelly fine sandy loam, but the higher content of cobbles makes tillage operations more difficult than on those soils.

Slope and the presence of cobbles are the main limitations for nonfarm uses that require good drainage. Capability subclass IIIe.

AoB—Alton gravelly silt loam, 3 to 8 percent slopes. This gently sloping soil has a profile similar to the one described as representative for the series, except the surface layer has less sand and more silt. It is on terraces and outwash plains. Individual areas are roughly oval in shape and are broad and uniform. They are 5 to more than 200 acres in size.

Included with this soil in mapping are small areas of the wetter Fredon and Halsey soils in wet spots and along drainageways. Also included are Fluvaquents and Udifluvents, frequently flooded, along some streams that cross areas of this soil.

This soil is well suited to most crops commonly grown in the county. It responds well to good management, is easy to work, and can be tilled early in spring. This soil is especially well suited to alfalfa and to other deep-rooted crops that require good drainage. It is also suited to fruit trees, field crops, and vegetable crops that are planted early in the growing season. Droughtiness is a problem in some years, but this soil is less droughty than Alton soils that have a surface layer of gravelly fine sandy loam. Row crops can be grown almost continuously if farming practices include minimum tillage, contouring, return of crop residue to the soil, and the use of winter cover crops. These practices help to maintain organic-matter content and favorable tilth and to control the hazard of erosion.

This soil has few limitations for most nonfarm uses that require good drainage. Some areas have high potential for homesites. Pollution of ground water by seepage from septic effluent fields is a hazard. Capability subclass IIs.

Amboy series

The Amboy series consists of deep, well drained, medium textured soils that have a fragipan. These soils formed in glaciolacustrine and eolian deposits that are dominantly silt and very fine sand. They are gently sloping to hilly.

In a representative profile, the surface layer is very dark gray, very fine sandy loam 4 inches thick. The subsoil extends to a depth of 51 inches. The upper part of the subsoil is yellowish brown, friable very fine sandy loam 17 inches thick, and the lower part is a firm, brittle fragipan of brown very fine sandy loam 30 inches thick. The substratum, to a depth of 60 inches, is pale brown, loose loamy fine sand.

The water table generally is several feet below the surface, but it is perched above the dense fragipan for brief periods in spring. Permeability is moderate above the fragipan, moderately slow in the fragipan, and rapid in the substratum. Root penetration is restricted by the fragipan. Available water capacity is moderate. The natural supply of available phosphorus and potassium is medium to low, and that of available nitrogen is medium. Unless the soil is limed, the surface layer is very strongly acid to medium acid. These soils respond well to the application of fertilizer and lime.

Most areas are in crops except where slope is a restriction. Some areas are in pasture or woodland or are idle.

Representative profile of Amboy very fine sandy loam, 2 to 6 percent slopes, in a pasture in the town of Palermo, 500 feet north of County Route 35A midway between its junction with N.Y. Route 3 and the village of Clifford:

Ap—0 to 4 inches; very dark gray (10YR 3/1) very fine sandy loam; moderate medium and fine granular structure; friable; many fine roots; medium acid; abrupt smooth boundary.

B2—4 to 13 inches; yellowish brown (10YR 5/6) very fine sandy loam; high content of coarse silt; weak medium subangular blocky structure; friable; many fine roots; many fine pores; medium acid; clear wavy boundary.

A'2—13 to 21 inches; yellowish brown (10YR 5/4) very fine sandy loam; weak medium platy structure; clean sand grains on faces of peds; friable; common fine roots; common fine pores; medium acid; gradual wavy boundary.

B'x—21 to 51 inches; brown (10YR 5/3) very fine sandy loam; high content of coarse silt; moderate very coarse prismatic structure parting to weak medium platy in the upper part; firm; brittle; few roots between prisms; prism faces coated with pale brown (10YR 6/3) very fine sand in upper part; common fine pores; thin clay linings in pores; medium acid; diffuse wavy boundary.

IIC—51 to 60 inches; pale brown (10YR 6/3) loamy fine sand; single grain; loose; medium acid grading to slightly acid with increasing depth.

The thickness of the solum ranges from 40 to 55 inches. Depth to the fragipan ranges from 20 to 30 inches, and depth to bedrock is more than 5 feet. Coarse fragments are generally absent but make up as much as 5 percent of the soil material, by volume, in some profiles. Reaction is very strongly acid to medium acid in the surface layer, very strongly acid to slightly acid in the subsoil, and strongly acid to neutral in the substratum.

In the Ap horizon, hue is 10YR, value is 3 to 5, and chroma is 1 or 2. In undisturbed areas there is an A1 horizon 4 to 5 inches thick. Texture of the A horizon is very fine sandy loam or silt loam.

In the B2 horizon, hue is 10YR or 7.5YR, value is 4 or 5, and chroma is 3 through 6. Texture is very fine sandy loam or silt loam. Consistence is friable or very friable.

In the A'2 horizon, hue is 10YR or 7.5YR, value is 5 or 6, and chroma is 3 or 4. Texture is silt loam or very fine sandy loam. Structure is weak platy, or the soil material is massive.

In the B'x horizon, hue is 10YR or 7.5YR, value is 4 or 5, and chroma is 3 or 4. Texture is silt loam or very fine sandy loam. Consistence is firm or very firm and varies in brittleness.

In the C horizon, color is the same or is slightly lighter than that in the B'x horizon. Texture ranges from thinly stratified silt loam to loamy fine sand. In some profiles, contrasting gravelly layers are below a depth of 40 inches.

AvB—Amboy very fine sandy loam, 2 to 6 percent slopes. This gently sloping soil has the profile described as representative for the series. It is on convex ridges and knolls and in some undulating areas. Individual areas are irregular in shape and are 10 to more than 30 acres in size.

Included with this soil in mapping are areas of the moderately well drained, silty Williamson soils. Also included are spots of the well drained to excessively drained, sandy Windsor, Adams, and Oakville soils.

This soil is suited to most crops commonly grown in the county. It is also well suited to some vegetables. It is free of stones and is generally easy to till. Careful management is needed to minimize surface crusting and to prevent the formation of plowpans. The hazard of erosion is severe. Use of cover crops, return of crop residue to the soil, minimum tillage, and including sod crops in the cropping system help to maintain good soil tilth. These practices and contour tillage or terracing help to reduce erosion. Irrigation is hindered by moderately slow permeability in the fragipan and surface crusting.

The moderately slow permeability in the fragipan and the hazard of erosion are the main concerns for most nonfarm uses of this soil. Capability subclass IIe.

AvC3—Amboy very fine sandy loam, 6 to 12 percent slopes, severely eroded. This sloping soil has a profile similar to the one described as representative for the series, except the subsoil is thinner because of erosion. This soil is on convex side slopes of elongated hills, ridges, and knolls. In some areas it is rolling. Shallow gullies that cut into the subsoil are common. Most individual areas are about 5 to 15 acres in size.

Included with this soil in mapping are areas of the moderately well drained, silty Williamson soils. Also included are spots of gravelly outwash soils, for example, the well drained and somewhat excessively drained Alton soils and the excessively drained Hinckley soils. Fluvaquents and Udifluvents, flooded, are included along narrow drainageways crossing this soil. Some areas of very severely eroded soils are also included.

Much of the original surface layer has been lost through erosion, and the subsoil is exposed in places. The hazard of further erosion is severe if this soil is cultivated. This soil is suited to only limited use for row crops. If row crops are grown, erosion can be controlled by using contour strips, minimum tillage, and returning crop residue to the soil. Slope hinders the operation of some farm equipment. This soil is better suited to long term hay and pasture crops than to row crops.

Slope, the severe hazard of erosion, and moderately slow permeability in the fragipan are the principal limitations for most nonfarm uses of this soil. Capability subclass IVe.

AwC3—Amboy-Williamson complex, rolling, severely eroded. These soils have profiles similar to the ones described as representative for their respective series, except the surface layers are slightly lighter in color because of erosion. Shallow gullies and rills are common in some areas. These soils are so closely intermingled that it was not practical to map them separately. The Amboy soil makes up about 50 percent of the unit, and the Williamson soil makes up about 40 percent. These soils are rolling and are on low hills, knolls, and ridges. Amboy soils are well drained, and Williamson soils are moderately well drained. Slopes are complex and range from 6 to 12 percent. Individual areas are irregular in shape and are mainly 5 to 100 acres in size.

Included with these soils in mapping are somewhat poorly drained, silty Raynham soils in low, concave areas and small areas of well drained and somewhat excessively drained, gravelly Alton soils and excessively drained Hinckley soils. Also included in places are sandy Adams, Windsor, and Oakville soils and some areas of very severely eroded soils.

Much of the original surface layer has been lost through erosion. This complex is suited to only very limited use for row crops. Because of the complex, gullied slopes, the operation of farm implements is hazardous. The hazard of erosion is severe. If these soils are planted to row crops, erosion can be controlled by using contour strips where practical, minimum tillage, and returning crop residue to the soil. In some years tillage is slightly delayed in spring by temporary wetness in some areas. This complex is better suited to long term hay or pasture crops than to row crops. Additions of lime and fertilizer are needed as topdressing to maintain or improve yields of forage.

Slope, the severe hazard of erosion, and moderately slow permeability in the fragipan are limitations to most nonfarm uses of these soils. Capability subclass IVe.

AyD3—Amboy soils, hilly, severely eroded. These soils have a profile similar to the one described as representative for the series, except the surface layer is thinner because of erosion and is more variable in texture. The surface layer is very fine sandy loam or silt loam. Slopes are complex and range from 12 to 20 percent. Shallow gullies and rills dissect many areas. Most individual areas are 5 to 15 acres in size.

Included with these soils in mapping are moderately well drained, silty Williamson soils and a few very severely eroded, deeply gullied spots. A few areas of gravelly outwash soils, for example, the well drained and somewhat excessively drained Alton soils and the excessively drained Hinckley soils, are also included. Small areas of Fluvaquents and Udifluvents, frequently flooded, are included along narrow drainageways that dissect this map unit.

Nearly all of the original surface layer has been lost through erosion. Steep slopes and the severe hazard of erosion limit the use of these soils. Runoff is very rapid. Because these soils are too steep for cultivation, most of the acreage remains in grass and trees. In areas where lime and fertilizer can be spread and mowers operated, long term pasture grasses and legumes can be grown.

Slope and the severe hazard of erosion are the main limitations for most nonfarm uses. Capability subclass VIe.

AyE3—Amboy soils, steep, severely eroded. These soils have a profile similar to the one described as representative for the series, except the surface layer is thinner because of erosion and is more variable in texture. The surface layer is very fine sandy loam or silt loam. Slopes range from 20 to 40 percent. These soils are on the sides of dissected gullies and on side slopes of hills. Most areas are 3 to 15 acres in size.

Included with these soils in mapping are areas of moderately well drained, silty Williamson soils and areas of gravelly glacial till soils, for example, well drained Sodus soils and moderately well drained Ira soils. Small areas of Fluvaquents and Udifluvents, frequently flooded, are included along narrow drainageways that dissect this map unit.

Slope is the chief limitation to the use of these soils. Because of steep slopes, the use of farm machinery generally is not feasible. In some places the soils are suited to early pasture of native grasses. If the pasture is overgrazed, however, undesirable plants invade and the hazard of erosion is severe. These soils are better suited to woodland or wildlife habitat than to other uses.

Slope is the main limitation to nonfarm uses of this soil. Slumping or sloughing can occur where toeslopes are undercut. Capability subclass VIIe.

Beaches

BC—Beaches. This map unit consists of mixed sand, gravel, cobbles, and boulders that have been deposited by waves, wind, and ice. Deposition is still taking place. The areas are on hummocky or dunelike ridges in narrow strips along the shores of Lake Ontario and the Salmon River Reservoir. They are commonly less than one-eighth mile wide and are as much as 40 feet higher than the lake level. Most beaches are better suited to recreation or wildlife habitat than to other uses. Not placed in a capability subclass.

Brockport series

The Brockport series consists of moderately deep, somewhat poorly drained soils that have a moderately fine textured surface layer and a fine textured subsoil. These soils formed in residuum derived from calcareous gray shale or from mixed glacial till and shale. They are nearly level and gently sloping.

In a representative profile, the surface layer is dark grayish brown silty clay loam 8 inches thick. The subsoil is mottled, light brownish gray, firm silty clay 22 inches thick. Slightly weathered, gray, soft shale bedrock is at a depth of 30 inches.

The seasonal high water table is commonly perched above the slowly permeable subsoil or above the shale bedrock early in spring and in other periods of excessive wet use. Bedrock is at a depth of 20 to 40 inches. Permeability is moderately slow in the surface layer. The root zone is limited by seasonal wetness, clayey texture, and bedrock at a moderate depth. Available water capacity is moderate. The ability of these soils to supply available nitrogen and phosphorus is medium, and the ability to supply available potassium is high. These soils are medium acid to mildly alkaline.

Most areas of Brockport soils are in pasture, hay, or woodland. Some areas are idle, and a few are in crops.

Representative profile of Brockport silty clay loam, 0 to 6 percent slopes, in an idle field in the town of Hannibal, near the intersection of N.Y. Route 34 and Martville Road:

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silty clay loam; moderate medium to fine subangular blocky structure; friable; many fine roots; medium acid; abrupt smooth boundary.

B21t—8 to 16 inches; light brownish gray (2.5Y 6/2) silty clay; many medium distinct strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; continuous clay films on peds; firm; common roots and pores; 10 percent shale fragments; medium acid; clear wavy boundary.

B22t—16 to 30 inches; light brownish gray (2.5Y 6/2) silty clay; many medium faint light olive brown (2.5Y 5/4) mottles; moderate medium and coarse subangular blocky structure; firm; common roots; common pores; clay films on some ped faces; 10 percent shale fragments; medium acid; abrupt wavy boundary.

R—30 to 50 inches; gray (N 5/0) slightly weathered soft shale bedrock; brownish yellow (10YR 6/6) mottles that are residues from mineral decomposition; shale is in thin plates; neutral in upper 10 inches grading to mildly alkaline in lower 10 inches.

The thickness of the solum and depth to bedrock range from 20 to 40 inches. Coarse fragments are mainly soft shale. They make up 0 to 15 percent of the soil material, by volume, in the solum. Some profiles have a few limestone or sandstone pebbles. Reaction in the solum is medium acid to mildly alkaline.

In the Ap horizon, hue is 10YR or 2.5Y, value is 3 to 5, and chroma is 1 or 2. In forested areas an A1 horizon and a thin A2g horizon are present.

In the Bt horizon, hue is 2.5Y or 10YR, value is 5 or 6, and chroma is 1 to 3. Texture ranges from heavy silty clay loam to clay. Clay content ranges from 35 to 60 percent. Structure is blocky or prismatic. Consistence is firm or very firm.

A thin B3 horizon or a platy C horizon is present in some profiles. These horizons, if present, have a higher content of shale fragments than the Bt horizon.

The R horizon consists of neutral or weakly calcareous shale bedrock that is commonly interbedded with thin layers of sandstone.

The Brockport soils are not so deep to bedrock as the associated Rhinebeck, Raynham, and Canandaigua soils, and they are coarser textured than the Raynham and Canandaigua soils.

BrB—Brockport silty clay loam, 0 to 6 percent slopes. This nearly level and gently sloping, bedrock-controlled soil is on foot slopes of elongated hills, in areas of low relief on glacial till plains, and on lake plains. Individual areas are mainly oblong in shape and are mainly 3 to 10 acres in size.

Included with this soil in mapping are small areas of the well drained, medium textured, sloping Herkimer soils; somewhat poorly drained Rhinebeck and Raynham soils where there are deep lacustrine deposits; and poorly drained and very poorly drained Madalin soils and very poorly drained Fonda soils in depressions and drainageways. Also included are small areas of soils that have shale bedrock at a depth of more than 40 inches or at a depth of less than 20 inches.

If properly drained, this soil is suited to many of the field crops commonly grown in the county. Interceptor ditches or sod waterways are needed to divert excess runoff. Subsurface drainage is needed in places to lower the seasonal high water table, but drains should be closely spaced. Excavating the underlying bedrock commonly is difficult. Land smoothing can be used to fill in wet spots and to eliminate surface irregularities. Because this soil is moderately fine textured, working it when wet destroys soil structure and causes a traffic pan to form. Management practices should include minimum tillage, return of crop residue to the soil, use of winter cover crops, and cross slope tillage where practical. In undrained areas this soil is best suited to pasture, water-tolerant hay crops, and woodland.

Seasonal wetness, slow permeability in the subsoil, moderate depth to soft shale bedrock, and clayey texture are limitations for many nonfarm uses. Capability subclass IIIw.

Canaan series

The Canaan series consists of shallow, somewhat excessively drained, moderately coarse textured soils. These soils formed in a mantle of glacial till 10 to 20 inches thick that overlies sandstone bedrock. They are gently sloping and are on bedrock-controlled till plains.

In a representative profile, a thin organic mat 2 inches thick is on the surface. The surface layer is dark brown channery fine sandy loam 3 inches thick. The subsurface layer is leached, reddish gray very channery fine sandy loam 2 inches thick. The subsoil is friable very channery fine sandy loam 4 inches thick. It is dark reddish brown in the upper part and grades to strong brown in the lower part. The substratum is dark reddish brown, loose very gravelly sandy loam. Light gray to greenish gray and red, thin-bedded sandstone bedrock is at a depth of 19 inches.

The seasonal high water table is generally at a depth of more than 6 feet. Permeability is moderately rapid to rapid. Because bedrock is at a shallow depth, available water capacity is very low and root penetration is restricted. The ability of these soils to supply potassium and phosphorus is low. Their ability to supply available nitrogen is medium in newly cleared areas. These soils are very strongly acid to medium acid.

Most of the Canaan soils are in woodland or poor quality pasture.

Representative profile of Canaan channery fine sandy loam in an area of Canaan-Rock outcrop association, gently sloping, in an idle field in the town of Redfield, 100 feet south of County Route 39 and 300 feet southwest of its intersection with Fox Road:

O1—2 inches to 0; dark grayish brown (10YR 4/2) twigs, stems, and leaf remains of mosses, ground pine, and bracken; many roots; very strongly acid; abrupt smooth boundary.

A1—0 to 3 inches, dark brown (10YR 3/3) channery fine sandy loam; strong fine granular structure; very friable; many roots; many pores; 30 percent coarse fragments; very strongly acid; abrupt wavy boundary.

A2—3 to 5 inches; reddish gray (5YR 5/2) very channery fine sandy loam; moderate fine granular structure; friable; many roots; many pores; 40 percent coarse fragments; strongly acid; abrupt wavy boundary.

Bh—5 to 6 inches; dark reddish brown (5YR 3/2) very channery fine sandy loam; strong medium granular structure; friable; many roots; many pores; 40 percent coarse fragments; strongly acid; abrupt wavy boundary.

Bir—6 to 9 inches; strong brown (7.5YR 5/6) very channery fine sandy loam; weak medium subangular blocky structure; friable; many roots; many pores; 50 percent coarse fragments that consist of channery fragments, flagstones, and gravel; strongly acid; clear wavy boundary.

IIC—9 to 19 inches; dark reddish brown (5YR 3/3) very gravelly sandy loam; single grain; loose; many roots; many pores; 70 percent coarse fragments; medium acid; abrupt wavy boundary.

R—19 inches; mixed light gray to greenish gray and red thinly bedded sandstone bedrock; few fine roots following joints in upper part.

The thickness of the solum and depth to bedrock range from 10 to 20 inches. Coarse fragments are mostly channery fragments and flagstones. They make up 40 to 70 percent of the soil material, by volume, in the subsoil and substratum. Some profiles have gravel or stones. Reaction is very strongly acid to medium acid.

In the A1 horizon, hue is 10YR or 7.5YR, value is 2 or 3, and chroma is 2 or 3. The O horizon of decomposed litter is not present in some places. An Ap horizon is present in a few cultivated areas.

In the A2 horizon, hue is 5YR to 10YR, value is 5 and 6, and chroma is 1 or 2. Texture is fine sandy loam or sandy loam and their very gravelly, very channery, gravelly, or channery analogs.

In the Bh horizon, hue is 5YR or 7.5YR, value is 2 or 3, and chroma is 2 or 3. Texture is similar to that of the A2 horizon. In some places, the A2 and Bh horizons have been mixed with the plow layer.

In the Bir horizon, hue is 7.5YR or 5YR, value is 4 or 5, and chroma is 3 to 6. Texture is similar to that of the A2 horizon.

The IIC horizon is absent in some profiles. Texture is similar to that of the A2 horizon.

The R horizon is mainly thinly bedded, jointed bedrock. The R horizon consists mainly of sandstone bedrock rather than the igneous rock that is typical of the R horizon of these soils in other survey areas.

The Canaan soils are associated on glacial till plains with the deep Worth, Empeyville, Westbury, and Dannemora soils. Worth soils are well drained, Empeyville soils are moderately well drained, Westbury soils are somewhat poorly drained, and Dannemora soils are poorly drained. Canaan soils are shallower than the nearby excessively drained Colton and Hinckley soils that formed in glacial outwash deposits.

CAB—Canaan-Rock outcrop association, gently sloping. This map unit is 60 percent Canaan soil and 15 percent Rock outcrop. The Canaan soil and Rock outcrop are so closely intermingled that it was not feasible to map them separately. Slopes range from 3 to 8 percent. This map unit is on bedrock-controlled till plains at the higher elevations in the county.

Included in mapping are somewhat poorly drained to very poorly drained soils in wet spots. Some of these soils have a mucky surface layer. Bedrock escarpments that have short, steep slopes and some nearly level soils are also included.

This map unit is not suited to tilled crops because of droughtiness and the presence of Rock outcrop. Tillage is extremely difficult. The soil in this unit is poorly suited to hay and pasture because of droughtiness and low fertility.

Shallow depth to bedrock, presence of rock outcrop, and droughtiness are severe limitations for most nonfarm uses of this map unit. Most areas are best suited to woodland or wildlife habitat. Capability subclass VIs.

Canandaigua series

The Canandaigua series consists of deep, poorly drained and very poorly drained soils. These soils formed in silty glaciolacustrine deposits. They are nearly level and are in depressional basins on lake plains.

In a representative profile, the surface layer is very dark grayish brown silt loam 7 inches thick. The friable and mottled subsoil extends to a depth of 33 inches. The upper part of the subsoil is gray silt loam 9 inches thick, the middle part is grayish brown silt loam 9 inches thick, and the lower part is light gray light silty clay loam 8 inches thick. The substratum to a depth of 50 inches is gray, varved silt and very fine sand.

These soils are subject to seasonal ponding in some years. The seasonal high water table is at or near the surface for long periods of the year and restricts the root zone. Available water capacity is high. Permeability is moderately slow. The natural ability of these soils to supply phosphorus and potassium is medium. The content of organic matter and total nitrogen is high, but in undrained areas the nitrogen is slowly available to plants. The surface layer and subsoil are slightly acid to mildly alkaline.

Most areas are undrained; these areas are in woodland or water-tolerant pasture plants or are idle. Only a few areas are drained.

Representative profile of Canandaigua silt loam, in a pasture in the town of Palermo, one-half mile east of East Palermo and 75 feet north of Jackson Road:

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) silt loam, dark grayish brown (10YR 4/2) when dry; weak fine granular structure; friable; many fine roots; neutral; abrupt smooth boundary.

B21g—7 to 16 inches; gray (10YR 6/1) silt loam; common medium distinct yellowish brown (10YR 5/6) mottles; moderate coarse subangular blocky structure; friable; common roots; many pores; neutral; clear wavy boundary.

B22g—16 to 25 inches; grayish brown (10YR 5/2) silt loam; few fine distinct strong brown (7.5YR 5/6) and common medium distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable; common roots; common pores; neutral; gradual wavy boundary.

B3—25 to 33 inches; light gray (10YR 6/1) light silty clay loam; common coarse distinct yellowish brown (10YR 5/6) mottles; moderate medium prismatic structure parting to subangular blocky; friable; common pores; neutral; gradual irregular boundary.

C—33 to 50 inches; gray (10YR 5/1) varved silt and very fine sand; common medium distinct brownish yellow (10YR 6/6) mottles; weak thin to medium platy structure; nonsticky; mildly alkaline; weakly calcareous.

The thickness of the solum ranges from 30 to 36 inches. Depth to carbonates ranges from 30 to 60 inches, and depth to bedrock is more than 5 feet. Coarse fragments are few or absent. Reaction in the solum ranges from slightly acid to mildly alkaline.

In the A horizon, hue is mainly 10YR but is 2.5Y in places, value is 2 or 3, and chroma is 0 to 2. The A1 horizon in undisturbed areas is 4 to 7 inches thick.

In the B horizon, hue is mainly 10YR but is 7.5YR in places, value is 5 or 6, and chroma is 1 or 2. Texture is dominantly silt loam, but in places it ranges from very fine sandy loam to light silty clay loam. In some profiles a few thin, discontinuous clay films are on vertical ped faces or in pores. Structure is weak to moderate subangular blocky or prismatic, or both.

A few profiles have a neutral C1 horizon between the B3 horizon and a calcareous C2 horizon. The C horizon is commonly thinly stratified layers that are high in content of silt, but in places there is a small amount of very fine sand and clay.

The Canandaigua soils have a finer textured subsoil than the similar, nearby Lamson soils and a coarser textured subsoil than the nearby Madalin and Fonda soils. They lack coarse fragments, which the commonly nearby, very poorly drained Halsey soils have.

Cd—Canandaigua silt loam. This nearly level soil is mainly on flats and in depressions that have lacustrine sediment. It is also along narrow drainageways. Slopes range from 0 to 3 percent but are mostly less than 2 percent. Most areas are irregular in shape and are 5 to over 100 acres in size.

Included with this soil in mapping are small areas of the finer textured Madalin, Rhinebeck, and Fonda soils. Also included are the sandier Lamson soils and the better drained Raynham soils. A few areas of the organic Palms and Carlisle soils and some areas of soils that have a surface layer of mucky silt loam are also included.

If properly drained with surface and subsurface drains, this soil is well suited to a wide variety of field and vegetable crops. This soil is free of coarse fragments. Because this soil is in low positions on the landscape, drainage outlets are difficult to locate in some places. If tile drains are installed, suitable filters are needed in places to prevent very fine sand and silt from plugging the drains. The return of crop residue to the soil, use of cover crops, and minimum tillage are important practices if this soil is cropped intensively. A sod crop or a green-manure crop grown in rotation with other crops helps to maintain the organic-matter content and to preserve soil tilth. In undrained areas this soil is better suited to woodland or to water-tolerant pasture grasses than to other crops.

Prolonged wetness and moderately slow permeability are the main limitations for nonfarm uses that require good drainage. Some areas have potential for development of wetland wildlife habitat. Capability subclass IIIw.

Carlisle series

The Carlisle series consists of deep, very poorly drained soils. These soils formed in deposits of decomposed organic material more than 51 inches thick. They are level and are in bogs and very low depressions.

In a representative profile, the surface layer is black, well decomposed muck (sapric material) 10 inches thick. The subsurface layer is black to very dark brown, friable, well decomposed muck (sapric material) 25 inches thick. Below this, to a depth of 56 inches, the material is black, very dark brown, and dark reddish brown, very friable, well decomposed muck (sapric material). This layer has more woody fibers than the layers above it.

In undrained areas the seasonal high water table is at or near the surface for long periods of the year. Ponding is common in spring. Permeability is rapid. Available water capacity is high. In drained areas root penetration is excellent. The total nitrogen content is high, but nitrogen is slowly available to plants when the soil is damp and cold. Natural content of organic phosphorus and potassium is medium. The surface layer and subsurface layer are medium acid to neutral.

In undrained areas these soils are in water-tolerant brush or trees or are idle. In drained areas they are used for high value crops.

Representative profile of Carlisle muck, in a cultivated field in the town of Oswego, 1 3/4 miles south of the southwest part of Oswego and one-half mile east of U.S. Route 104:

Oap—0 to 10 inches; black (N 2/0) sapric material (muck), black (N 2/0) when broken and rubbed; 15 percent fibers, 5 percent rubbed; moderate fine granular structure; friable; sodium pyrophosphate test brown (10YR 5/3); fibers are woody; slightly acid; abrupt smooth boundary.

Oa2—10 to 35 inches; black (N 2/0) sapric material (muck), very dark brown (10YR 2/2) when rubbed; 10 percent fibers, 5 percent rubbed; massive parting to weak medium granular structure; friable; sodium pyrophosphate test pale brown (10YR 6/3); fibers are woody and herbaceous; slightly acid; clear smooth boundary.

Oa3—35 to 56 inches; black (N 2/0), very dark brown (10YR 2/2) and dark reddish brown (5YR 3/3) sapric material (muck); 30 percent fibers, less than 10 percent rubbed; massive; very friable; sodium pyrophosphate test brown (10YR 4/3); fibers are mostly woody; slightly acid.

The organic material is more that 51 inches thick but is generally less than 144 inches thick. Depth to bedrock is more than 6 feet. Woody and herbaceous fragments are in some layers of some profiles. Silt makes up as much as 40 percent of the surface and subsurface layers in some profiles. Reaction is medium acid to neutral.

In the surface layer, hue is 5YR or is neutral, value is mainly 2, and chroma is 0 or 1. Structure is weak or moderate fine to coarse granular.

In the subsurface layer, hue is 10YR to 5YR, value is mainly 2, and chroma is 0 to 2. The material is mainly sapric (muck), but thin layers of hemic material (mucky peat) are in some profiles. Generally, structure is granular or the material is massive, but structure is blocky in some profiles. A firm, platy layer commonly is in the upper subsurface layer in areas that have been intensely cultivated by heavy equipment.

The bottom layer commonly has more fibers than the layers above it, and the material is mostly massive. Colors are similar to those of the subsurface layer.

Carlisle soils formed in thicker organic deposits than the commonly nearby Palms soils. They developed in a warmer temperature than the Rifle soils.

Ce—Carlisle muck. This very poorly drained soil formed in organic deposits derived from well decomposed woody and herbaceous plant material. It is mostly in low bogs that are between drumlinlike hills or kames. It is mainly in the western half of the county. The areas commonly are elongated in shape and are mostly oriented in a northwesterly direction. Some areas are 2 or 3 acres in size, and some range to as much as 300 acres in size.

Included with this soil in mapping are a few areas of the shallower Palms muck and small islandlike areas of mineral soils, for example, Phelps and Ira soils. Also included are small areas of sedimentary peat (coprogenous earth).

If properly drained, this soil is well suited to row crops, particularly high value vegetable crops, for example, lettuce and onions. It is also well suited to potatoes, and tuber water content is high. Drainage outlets commonly are difficult to establish. Adequate drainage generally requires a combination of open ditches and subsurface drains. If gravity drainage is not feasible, a pumping system may be required. Excessive tillage should be avoided, because it accelerates the rate at which organic matter is lost through oxidation and causes the formation of traffic pans. Soil blowing is a hazard in drained areas, but it can be controlled by planting windbreaks around field borders and by growing cover crops.

Prolonged wetness, hazard of ponding, and instability of the organic material are severe limitations to the use of this soil for most nonfarm purposes. In some areas this soil has potential for development of habitat for wetland wildlife. Capability subclass IIIw.

Colton series

The Colton series consists of deep, excessively drained, coarse textured soils. These soils formed in glaciofluvial deposits that are dominantly sand and gravel derived mainly from sandstone. They are rolling to steep. They are on outwash plains, eskers, terraces, and low, rounded hills.

In a representative profile, the surface layer is dark brown to dark reddish brown gravelly loamy sand 8 inches thick. The subsurface layer is leached, pinkish gray gravelly loamy fine sand 4 inches thick. The subsoil extends to a depth of 34 inches. The upper part of the subsoil is dark reddish brown, friable very gravelly loamy sand 1 inch thick, the middle part is yellowish red, firm very gravelly loamy sand 6 inches thick, and the lower part is strong brown, loose very gravelly loamy sand 15 inches thick. The substratum, to a depth of 60 inches, is brownish yellow, loose very gravelly loamy sand.

Depth to the seasonal high water table is more than 6 feet. Permeability is rapid to very rapid in the subsoil and very rapid in the substratum. Available water capacity is very low. Natural supply of available nitrogen, phosphorus, and potassium is low. Unless limed, these soils are strongly acid to very strongly acid.

Droughtiness is the main limitation to the use of these soils for crops. In some areas these soils are idle or have been reforested.

Representative profile of Colton gravelly loamy sand, in an area of Colton-Hinckley complex, rolling, in a woodlot in the town of Parish, 300 feet west of Allen Road at the northern edge of a gravel pit:

Ap1—0 to 3 inches; dark brown (7.5YR 3/2) gravelly loamy sand; moderate medium granular structure; very friable; many roots; 30 percent coarse fragments; strongly acid; gradual smooth boundary.

Ap2—3 to 8 inches; dark reddish brown (5YR 3/3) gravelly loamy sand; weak fine granular structure; very friable; many roots; 30 percent coarse fragments; strongly acid; abrupt wavy boundary.

A2—8 to 12 inches; pinkish gray (7.5YR 6/2) gravelly loamy fine sand; single grain; loose; many roots; many pores; 30 percent coarse fragments; strongly acid; abrupt wavy discontinuous boundary.

B21h—12 to 13 inches; dark reddish brown (5YR 3/3) very gravelly loamy sand; moderate medium granular structure; friable; many roots; many pores; 35 percent coarse fragments; strongly acid; abrupt irregular boundary.

B22ir—13 to 19 inches; yellowish red (5YR 5/8) very gravelly loamy sand; moderate medium subangular blocky structure; firm; weakly cemented; common roots; common pores; 40 percent coarse fragments; strongly acid; gradual wavy boundary.

B3—19 to 34 inches; strong brown (7.5YR 5/8) very gravelly loamy sand; single grain; loose; few roots; common pores; 40 percent coarse fragments; strongly acid; gradual wavy boundary.

C—34 to 60 inches; brownish yellow (10YR 6/6) very gravelly loamy sand; single grain; loose; few roots; common pores; 35 percent coarse fragments; medium acid.

The thickness of the solum ranges from 20 to 34 inches. Depth to bedrock is more than 6 feet. Coarse fragments are mainly gravel and cobbles and make up 15 to 55 percent of the soil material, by volume, in the solum. The percentage of coarse fragments increases with increasing depth in the substratum. Reaction in the solum is strongly acid to very strongly acid; reaction in the substratum is very strongly acid to medium acid.

In undisturbed areas there is a black O horizon 2 to 8 inches thick. In cultivated areas the Ap horizon has hue of 5YR or 10YR, value of 3 to 5, and chroma of 2 or 3. Structure in the Ap horizon is granular, or the material is massive. Consistence is friable or very friable.

In the A2 horizon, hue is 10YR or 7.5YR, value is 5 or 6, and chroma is 1 or 2.

In the Bh horizon, hue is 5YR, value is 2 or 3, and chroma is 1 to 3. Texture is sand and loamy sand and their gravelly, very gravelly, and cobbly analogs. Cemented masses are in some profiles.

In the Bir horizon, hue is 5YR or 7.5YR, value is 5 or 6, and chroma is 4 to 8. Texture is sand and loamy sand and their gravelly, very gravelly, and cobbly analogs. Structure is subangular blocky, or the material is massive or single grained. Consistence is friable or firm. Cemented nodules or zones of cemented material are in some profiles.

The B3 horizon has colors similar to those of the Bir horizon. Texture is sand and loamy sand and their very gravelly and cobbly analogs. Consistence is very friable or loose.

The C horizon is a mixture of sand, loamy sand, gravel, cobbles, or stones and has variable stratification.

Colton soils are similar to Alton soils but they have a subsoil that is coarser textured and contains more iron and humus than Alton soils. Colton soils have texture similar to that of Duane soils, but the Colton soils are better drained. Colton soils are similar to Hinckley soils, but they have a higher content of organic matter in the upper part of the subsoil and are at a higher elevation than Hinckley soils.

CHC—Colton-Hinckley complex, rolling. The Colton soil in this complex has the profile described as representative for the series. The soils are so intermingled that it was not practical to map them separately. The Colton soil makes up 60 percent of the complex, and the Hinckley soil makes up 30 percent. These rolling soils are on low hills that have complex slopes, or kettle-kames, on outwash plains (fig. 7). Slopes range from 8 to 15 percent. Individual areas are irregular in shape and are mainly 5 to 50 acres in size.

Included with this unit in mapping are small areas of moderately coarse textured, gravelly Alton soils and coarse textured, moderately well drained Duane soils. Also included are Fredon, Halsey, and Naumburg soils along drainageways and in wet spots. Small areas of the excessively drained, sandy Adams and Windsor soils and some large areas of undulating soils are also included.

These soils are better suited to deep-rooted, drought-tolerant hay and pasture crops than to other crops. They are suited to cultivated crops, but the cropping system should include a high proportion of sod crops. The hazard of erosion is severe. Contouring helps to conserve moisture and to reduce erosion, but it is impractical in many areas because of the complex slopes. Using winter cover crops, minimum tillage, and returning crop residue to the soil also help to reduce erosion. These soils can be tilled early in spring. The growing season is relatively short, however, because these soils are in colder parts of the county.

Slope and droughtiness are the main limitations for most nonfarm uses. In some areas these soils are an excellent source of gravel. Capability subclass IVs.

CHD—Colton-Hinckley complex, moderately steep. The Colton and Hinckley soils in this complex have a profile similar to the one described as representative for their respective series, except the surface layer is thinner. These soils are so intermingled that it was not practical to map them separately. The Colton soil makes up about 65 percent of this unit, and the Hinckley soil makes up about 25 percent. These moderately steep soils are on the sides of terraces, elongated eskers, remnant beach ridges, and kamelike hills that have complex slopes. Slopes range from 15 to 25 percent. Individual areas vary in shape and are mainly 5 to 20 acres in size.

Included with these soils in mapping are small areas of the well drained to excessively drained Alton soils. Also included are small areas of the excessively drained, sandy Adams and Windsor soils. Moderately well drained Duane soils are included in a few low parts of the landscape.

These soils are generally not suited to cultivated crops because of droughtiness and moderately steep slopes. Soil blowing and water erosion are severe hazards if the plant cover is removed. These soils are suited to deep-rooted hay and pasture crops in some areas, but production is low, especially in dry years.

Slope and droughtiness are the main limitations for most nonfarm uses. In some areas these soils are an excellent source of sand and gravel, but in other areas they are better suited to woodland or wildlife habitat than to other uses. Capability subclass VIs.

CHE—Colton-Hinckley complex, steep. The Colton and Hinckley soils in this complex have a profile similar to the one described as representative for the series, except the surface layer is thinner. These soils are so closely intermingled that it was not practical to map them separately. The Colton soil makes up about 70 percent of the complex, and the Hinckley soil makes up 25 percent. These steep soils are on the sides of terraces and elongated ridges and on kamelike hills that have complex slopes. Slopes range from 25 to 35 percent. Individual areas are irregular in shape and are mainly 5 to 25 acres in size.

Included with these soils in mapping are small areas of the excessively drained, sandy Windsor soils and the moderately well drained Duane soils. Also included are areas of the moderately well drained Empeyville soils and the well drained Worth soils in glacial till deposits.

These soils are not suited to tilled crops because of steep slopes. The slopes are too steep for the use of most types of farm equipment. These soils are poorly suited to pasture because of droughtiness and low fertility. The hazard of erosion is very severe if the plant cover is removed.

Slope is the principal limitation for most nonfarm uses. These soils are an excellent source of sand and gravel in some areas. Woodland vegetation protects these soils from erosion, but timber production generally is low. In some areas these soils are better suited to wildlife habitat than to other uses. Capability subclass VIIs.

Dannemora series

The Dannemora series consists of deep, poorly drained, moderately coarse textured soils that have a fragipan. These soils formed in glacial till derived mainly from sandstone. They are nearly level and are in low areas on till plains.

In a representative profile, the surface layer is very dark brown gravelly fine sandy loam 9 inches thick. The subsurface layer is leached, mottled, grayish brown, gravelly fine sandy loam 4 inches thick. The subsoil extends to a depth of 40 inches. The upper part of the subsoil is mottled, dark grayish brown, friable gravelly sandy loam 4 inches thick, and the lower part is grayish brown, firm, brittle gravelly fine sandy loam 23 inches thick. The substratum, to a depth of 60 inches, is grayish brown, firm gravelly fine sandy loam.

The water table is at or near the surface for extended periods in spring and for other excessively wet periods. It is commonly perched above the slowly permeable fragipan. Permeability is moderate or moderately rapid in the surface layer and in the part of the subsoil above the fragipan. Root penetration is restricted by the seasonal high water table and the fragipan. Available water capacity is moderate above the fragipan. The ability of these soils to supply phosphorus and potassium to plants is low. The natural content of nitrogen is moderate to high, but nitrogen is slowly available to plants because the soils are poorly drained. Unless limed, these soils are very strongly acid to medium acid.

Dannemora soils generally are too wet for crop production unless drained, and the growing season is short. Most areas of these soils are in woodland, and a few areas are in pasture.

Representative profile of Dannemora gravelly fine sandy loam, in an area of Westbury-Dannemora complex, very stony, gently sloping, in an idle field in the town of Redfield, 400 feet south of Little John Road:

Ap—0 to 9 inches; very dark brown (10YR 2/2) gravelly fine sandy loam; weak fine granular structure; very friable; many roots; 25 percent coarse fragments; medium acid; abrupt wavy boundary.

A2g—9 to 13 inches; grayish brown (10YR 5/2) gravelly fine sandy loam; common medium distinct yellowish brown (10YR 5/6) and few fine faint light brownish gray (10YR 6/2) mottles; weak medium subangular blocky structure; friable; common roots; few medium pores; 20 percent coarse fragments; strongly acid; clear wavy boundary.

B2g—13 to 17 inches; dark grayish brown (10YR 4/2) gravelly sandy loam; few faint brown (10YR 5/3) mottles; weak medium subangular blocky structure; friable; few roots; few fine pores; 25 percent coarse fragments; medium acid; clear wavy boundary.

Bx1—17 to 27 inches; grayish brown (10YR 5/2) gravelly fine sandy loam; massive; firm and brittle; few pores; 25 percent coarse fragments, mainly gravel and a few stones; medium acid; gradual wavy boundary.

Bx2—27 to 40 inches; grayish brown (10YR 5/2) gravelly fine sandy loam; massive; firm and brittle; 30 percent coarse fragments, mainly gravel and a few stones; slightly acid; diffuse wavy boundary.

C—40 to 60 inches; grayish brown (2.5Y 5/2) gravelly fine sandy loam; massive; firm; 30 percent coarse fragments, mainly gravel and stones; neutral.

The thickness of the solum ranges from 30 to 60 inches. The depth to the fragipan is 13 to 18 inches, and depth to bedrock is more than 6 feet. The coarse fragments are mainly gravel and cobblestones. They make up 15 to 30 percent of the soil material, by volume, above the fragipan and 20 to 45 percent in the fragipan and substratum. Some stones are commonly present. The solum is very strongly acid to medium acid. The substratum is slightly acid to neutral and is less acid with increasing depth.

In the Ap horizon, hue is 10YR to 2.5Y, value is 2 or 3, and chroma is 1 or 2. An A2g horizon that has higher value than the Ap horizon is in some profiles.

In the Bg horizon hue is 10YR to 2.5Y, value is 4 to 6, and chroma is 1 or 2. It has few to many faint or distinct mottles. Texture ranges from silt loam to sandy loam or fine sandy loam and includes their gravelly analogs. Structure is subangular blocky, or the material is massive.

In the Bx horizon, hue is 10YR to 2.5Y, value is 4 or 5, and chroma is 1 or 2. Texture of the fine earth fraction ranges from loam to sandy loam. Structure is coarse prismatic, or the material is massive. Consistence is firm or very firm.

In the C horizon, color and texture are similar to those of the Bx horizon. Structure is thick platy, or the material is massive.

The Dannemora soils form a drainage sequence with the Worth, Empeyville, and Westbury soils. Worth soils are well drained, Empeyville soils are moderately well drained, and Westbury soils are somewhat poorly drained. The Dannemora soils are near the sandy Naumburg soils and the gravelly Duane soils. Unlike those soils, Dannemora soils have a fragipan.

Deerfield series

The Deerfield series consists of deep, moderately well drained, coarse textured soils. These soils formed in sandy glaciofluvial deposits. They are nearly level to gently sloping. They are on deltas and plains.

In a representative profile, the surface layer is dark brown loamy fine sand 9 inches thick. The subsoil extends to a depth of 35 inches. The upper part of the subsoil is strong brown, friable loamy sand 7 inches thick, and the lower part is mottled, yellowish brown, friable loamy sand 19 inches thick. The substratum is brown, friable loamy sand to a depth of 50 inches and is mottled, light brownish gray, loose fine sand to a depth of 72 inches.

A seasonal high water table rises into the subsoil for brief periods early in spring. Permeability is moderately rapid or rapid in the surface layer and in the upper part of the subsoil, rapid in the lower part of the subsoil, and very rapid in the substratum. Available water capacity is low to moderate. The natural supply of available nitrogen, phosphorus, and potassium is low. Unless limed, these soils are medium acid to very strongly acid.

Some areas of the Deerfield soils are in cultivated crops and vegetable crops. Some areas are forested, and a few areas are idle.

Representative profile of Deerfield loamy fine sand, 0 to 6 percent slopes, in a cultivated field in the town of Williamstown, 25 feet west of County Route 17 and 1/4 mile south of Beaver Dam Brook:

Ap—0 to 9 inches; dark brown (10YR 3/3) loamy fine sand; moderate medium granular structure; friable; many roots; slightly acid; abrupt smooth boundary.

B21—9 to 16 inches; strong brown (7.5YR 5/6) loamy sand; massive; friable; many roots; common pores; medium acid; abrupt smooth boundary.

B22—16 to 35 inches; yellowish brown (10YR 5/4) loamy sand; common fine distinct brown (7.5YR 5/4) and grayish brown (10YR 5/2) mottles; massive; friable; few roots; common pores; medium acid; clear wavy boundary.

C1—35 to 50 inches; brown (10YR 5/3) loamy sand; yellowish brown (10YR 5/6) laminae that are 1/2- to 1/4-inch thick; massive; friable; few roots and pores; medium acid; clear wavy boundary.

C2—50 to 72 inches; light brownish gray (10YR 6/2) fine sand; few fine faint grayish brown (10YR 5/2) mottles; single grain; loose; medium acid.

The thickness of the solum ranges from 26 to 36 inches. Depth to bedrock is more than 5 feet. The solum is typically nearly free of coarse fragments, but in some profiles it is as much as 10 percent gravel, by volume. Unless the soil is limed, reaction is medium acid to very strongly acid.

In undisturbed areas there is an O, A2, and Bh horizon. Where present, the O horizon is 2 to 5 inches thick, the A2 horizon is 1 to 5 inches thick, and the Bh horizon is 2 to 4 inches thick. In the O horizon, hue is 10YR, value is 2, and chroma is 1 or 2. In the A2 horizon, hue is 7.5YR or 5YR, value is 5 to 7, and chroma is 2. In the Bh horizon, hue is 5YR, value is 3, and chroma is 2 to 4.

In the Ap horizon, hue is 10YR, value is 3, and chroma is 2 or 3.

In the upper part of the B horizon, hue is 10YR to 5YR, value is 3 to 5, and chroma is 4 or 6. Texture is sand, loamy sand, or fine sandy loam.

Texture of the lower part of the C horizon ranges from fine sand to coarse sand.

Deerfield soils form a drainage sequence with Adams and Naumburg soils and formed in material similar to that in which those soils formed.

Adams soils are excessively drained, and Naumburg soils are somewhat poorly drained and poorly drained. Deerfield soils are similar to Duane soils, but they have fewer coarse fragments than Duane soils.

DeB—Deerfield loamy fine sand, 0 to 6 percent slopes. This nearly level to gently sloping soil is on sandy plains and deltas. Individual areas are variable in shape and are mainly 5 to 100 acres in size.

Included with this soil in mapping are small areas of the better drained sandy Windsor and Adams soils on knolls; small areas of the wetter, sandy Minoa and Naumburg soils in slightly lower positions on the landscape than this Deerfield soil; and small areas of the gravelly, well drained Alton soils and excessively drained Hinckley soils.

This soil is suited to most crops commonly grown in the county. Because of the seasonal high water table, sandy texture, and low fertility, however, it is better suited to deep-rooted hay and pasture crops than to other crops. It has potential for fruit trees in areas that have adequate air drainage. This soil is moderately well suited to truck crops if a drainage system to lower the seasonal high water table can be installed and if fertility can be improved. Regardless of the cropping system to be used, management practices should include the use of cover crops, minimum tillage, and the return of crop residue to the soil to prevent soil blowing and erosion and to maintain an adequate supply of organic matter. In some years droughtiness is a problem in midsummer and late in summer. High value, long-season, shallow-rooted crops require irrigation to obtain optimum yields in dry years.

Temporary seasonal wetness and instability of the sandy material are the main limitations for nonfarm uses. Capability subclass IIIw.

Duane series

The Duane series consists of deep, moderately well drained, coarse textured soils. These soils formed in glaciofluvial deposits of gravel and sand that derived mainly from sandstone. They are gently sloping and are on outwash terraces.

In a representative profile, a thin mat of decomposed organic material 1 inch thick is on the surface. The surface layer is black very gravelly loamy sand 1 inch thick. The subsurface layer extends to a depth of 17 inches. The upper part of the subsurface layer is reddish gray, very friable very gravelly sand 13 inches thick, and the lower part is dark reddish gray, very friable very gravelly sand 3 inches thick. The subsoil extends to a depth of 38 inches. The upper part of the subsoil is dark reddish brown, very firm very gravelly sand 8 inches thick, and the lower part is dark reddish brown, mottled, firm very gravelly sand 13 inches thick. The substratum, to a depth of 52 inches, is grayish brown, loose very gravelly sand.

The seasonal high water table rises into the subsoil for brief periods in spring, and it drops below the root zone as the growing season progresses. Permeability is rapid. Available water capacity is very low. The natural ability of these soils to supply phosphorus, potassium, and nitrogen to plants is low. Unless limed, these soils are extremely acid to medium acid.

Some areas of these soils are farmed, but droughtiness and low fertility are limitations. Some areas are wooded or are idle.

Representative profile of Duane very gravelly sand, in an area of Naumburg-Duane complex, gently sloping, in a forested area in the town of Constantia, 1.7 miles north of Bernhard's Bay and 150 feet east of County Route 17:

O2—1 inch to 0; black (10YR 2/1) decomposed organic material; many fine roots; extremely acid; abrupt smooth boundary.

A1—0 to 1 inch; black (5YR 2/1) very gravelly loamy sand; moderate fine granular structure; very friable; many fine and medium roots; porous; 40 percent coarse fragments; extremely acid; abrupt wavy boundary.

A21—1 to 14 inches; reddish gray (5YR 5/2) very gravelly sand; moderate fine granular structure; very friable; common fine and medium roots; porous; 45 percent coarse fragments; extremely acid; clear wavy boundary.

A22—14 to 17 inches; dark reddish gray (5YR 4/2) very gravelly sand; weak medium granular structure; very friable; common fine and medium roots; porous; 45 percent coarse fragments; extremely acid; clear broken boundary.

B21h—17 to 25 inches; dark reddish brown (5YR 3/2) very gravelly sand; massive; friable between very firm cemented bodies; common medium and large pores; dominantly weakly cemented; 65 percent coarse fragments; strongly acid; clear wavy boundary.

B22ir—25 to 38 inches; dark reddish brown (5YR 3/4) very gravelly sand; common medium faint dark reddish brown (2.5YR 3/4) mottles; massive; firm; common medium and large pores; 65 percent coarse fragments; strongly acid; abrupt wavy boundary.

C—38 to 52 inches; grayish brown (2.5Y 5/2) very gravelly sand; single grain; loose; 60 percent coarse fragments; strongly acid.

The thickness of the solum ranges from 20 to 40 inches. Depth to bedrock is more than 5 feet. Coarse fragments make up 0 to 50 percent, by volume, of the upper part of the solum and 40 to 70 percent of the lower part of the solum and the substratum. Reaction ranges from extremely acid to medium acid.

In the A1 horizon, hue is 5YR to 10YR or is neutral, value is 2 or 3, and chroma is 0 to 2. An Ap horizon is in some cultivated areas. Where present, the Ap horizon has hue of 10YR to 5YR, value of 2 to 4, and chroma of 2.

In the A2 horizon, hue is 10YR to 5YR, value is 4 to 7, and chroma is 1 or 2. Texture ranges from loamy sand to sand and includes their gravelly or very gravelly analogs in some places. Structure generally is granular, but the material is single grained in places.

In the Bh horizon, hue is 10YR to 5YR, value is 2 or 3, and chroma is 2 or 3. Texture is similar to that of the A2 horizon.

In the Bir horizon, hue is 10YR to 5YR, value is 3 to 5, and chroma is 4 to 6. Texture ranges from loamy fine sand to very coarse sand and their gravelly, very gravelly, or very cobbly analogs. Structure ranges from granular to subangular blocky, or the material is massive.

In the C horizon, hue is 2.5 to 7.5YR, value is 4 or 5, and chroma is 2 to 4. Texture is very gravelly sand or very cobbly sand or is stratified gravel, cobbles, and very coarse sand.

Duane soils form a drainage sequence with the Colton soils. They formed in material similar to that in which Colton soils formed. Colton soils are excessively drained. Duane soils are near Worth, Adams, and Deerfield soils. They are coarser textured than the Worth soils and have more coarse fragments than the Adams and Deerfield soils.

Elmwood series

The Elmwood series consists of deep, moderately well drained soils. These soils formed in a 20- to 40-inch thick mantle of sandy lacustrine material and in underlying, heavier textured clayey deposits. Elmwood soils are gently sloping. They are on deltas and remnant beaches on lake plains.

In a representative profile, the surface layer is dark grayish brown fine sandy loam 8 inches thick. The upper part of the subsoil is yellowish brown fine sandy loam 5 inches thick. The middle part of the subsoil is light yellowish brown, mottled fine sandy loam 8 inches thick. Below this is a layer of leached, pale brown, mottled fine sandy loam 3 inches thick. The lower part of the subsoil is yellowish brown, mottled, firm silty clay 7 inches thick. The substratum, to a depth of 50 inches, is brown, firm silty clay.

The seasonal high water table commonly is perched above the very slowly permeable, fine textured substratum and lower part of the subsoil early in spring. Permeability is moderate to moderately rapid in the surface layer and moderately rapid in the subsoil. Rooting depth is somewhat restricted in places by underlying clayey deposits. Available water capacity is moderate to high. The natural ability of these soils to supply phosphorus, potassium, and nitrogen to plants is low. Unless the soil is limed, the surface layer and the upper part of the subsoil are strongly acid to slightly acid.

Some areas of these soils are in cropland or woodland, and some areas are idle.

Representative profile of Elmwood fine sandy loam, 2 to 6 percent slopes, in a meadow in the town of Schroeppel, 700 feet southwest of junction of abandoned railroad and County Route 10:

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak medium granular structure; very friable; many fine roots; medium acid; gradual irregular boundary.

B21—8 to 13 inches; yellowish brown (10Yr 5/4) fine sandy loam; weak medium granular structure; friable; common fine roots; medium acid; clear wavy boundary.

B22—13 to 21 inches; light yellowish brown (10YR 6/4) fine sandy loam; many medium distinct yellowish red (5YR 5/6) and strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; friable; common fine roots; medium acid; abrupt wavy boundary.

A'2—21 to 24 inches; pale brown (10YR 6/3) fine sandy loam; common medium distinct yellowish brown (10YR 5/6) mottles; weak fine subangular blocky structure; friable; few fine roots; medium acid; abrupt irregular boundary.

IIB'2—24 to 31 inches; yellowish brown (10YR 5/4) silty clay; many fine faint yellowish brown (10YR 5/8) mottles; moderate coarse angular blocky structure; firm; few fine roots; few thin light brownish gray (10YR 6/2) coatings on vertical ped faces; medium acid; clear wavy boundary.

IIC—31 to 50 inches; brown (10YR 5/3) silty clay; many medium distinct brown (7.5YR 5/4) mottles; weak thick platy structure; firm; few fine roots in upper part; few black coatings; neutral.

The depth to fine textured material is 20 to 40 inches. Depth to bedrock is more than 6 feet. These soils generally are free of coarse fragments. Reaction is strongly acid to slightly acid in the solum and slightly acid to neutral in the substratum.

In the Ap horizon, hue is dominantly 10YR, value is 3 or 4, and chroma is 2 or 3.

In the B horizon, hue is 10YR or 7.5YR, value is 4 to 6, and chroma is 4 to 6. Distinct or prominent mottles are in the lower part of the B horizon. Texture is fine sandy loam or sandy loam.

In some areas there is no A'2 horizon.

In the IIB'2 horizon, hue is dominantly 10YR but is 2.5Y and 5Y in places. In some profiles, thin gray coatings are on vertical ped faces or in pores. Texture ranges from clay loam to silty clay.

In the IIC horizon, hue is 10YR or 2.5Y, value is 4 or 5, and chroma is 2 to 4. Structure is platy, or the material is massive.

Elmwood soils form a drainage sequence with Swanton soils. Swanton soils are somewhat poorly drained and poorly drained. Elmwood soils are near the Minoa and Lamson soils and are better drained than those soils. Elmwood soils have a sandy mantle, which the clayey Rhinebeck soils do not have.

EmB—Elmwood fine sandy loam, 2 to 6 percent slopes. This gently sloping soil is on deltas and remnant beaches that have a sandy lacustrine mantle overlying clayey deposits. Individual areas are irregular in shape and are mostly less than 20 acres in size.

Included with this soil in mapping are small areas of the wetter Swanton soils, which formed in material similar to that in which this Elmwood soil formed. Also included are spots of the wetter Granby, Minoa, and Rhinebeck soils and a few areas of nearly level soils.

This soil is moderately well suited to most crops commonly grown in the county. Seasonal wetness slightly delays tillage operations early in spring in some years. Because of the lack of stones and coarse fragments, this soil is relatively easy to till and is suited to some midseason vegetable crops. Row crops can be grown each year, if winter cover crops are included in the cropping system and if management practices include returning crop residue to the soil and using minimum tillage. Planting a sod crop every 4 or 5 years helps to maintain the organic-matter content and good soil tilth. Randomly placed surface and subsurface drains help to lower the water table and eliminate wet spots. The hazard of erosion is moderate. Cross slope tillage and use of cover crops help to reduce erosion.

Seasonal wetness, very slow permeability in the lower part of the subsoil and in the substratum, and instability of the soil material are the main limitations for nonfarm uses. Capability subclass IIe.

Empeyville series

The Empeyville series consists of deep, moderately well drained, moderately coarse textured soils that have a fragipan. These soils formed in glacial till derived mainly from acid sandstone. They are gently sloping to moderately steep. They are on upland till plains at the higher elevations in the county.

In a representative profile, the surface layer is dark brown gravelly fine sandy loam 9 inches thick. Below this, the material is yellowish brown, very friable to friable gravelly fine sandy loam 8 inches thick; mottles are in the lower 4 inches of this layer. Below this, the material consists of a fragipan that extends to a depth of 44 inches. The upper part of the fragipan is leached, light gray, firm gravelly fine sandy loam 10 inches thick and has distinct mottles. The lower part of the fragipan is brown, very firm gravelly fine sandy loam 17 inches thick. The substratum, to a depth of 60 inches, is brown gravelly sandy loam.

A seasonal high water table is perched above the fragipan in spring and in other excessively wet periods. Permeability is slow in the fragipan and moderate above it. Rooting depth is restricted by the fragipan. The available water capacity is moderate to very low. The natural ability of these soils to supply nitrogen, phosphorus, and potassium to plants is low. Unless limed, these soils are slightly acid to very strongly acid.

Because of a short growing season, seasonal wetness, low fertility, and stoniness, some areas of these soils that were previously cultivated are now idle and are reverting to brush and trees. Many areas are in woodland.

Representative profile of Empeyville gravelly fine sandy loam, 3 to 8 percent slopes, in an idle field in the town of Boylston, 830 feet east of town limits of Sandy Creek and 200 feet north of Center Road:

Ap—0 to 9 inches; dark brown (10YR 3/3) gravelly fine sandy loam; moderate medium granular structure; very friable; many roots; 25 percent coarse fragments; very strongly acid; abrupt smooth boundary.

B21ir—9 to 13 inches; yellowish brown (10YR 5/4) gravelly fine sandy loam; moderate fine granular structure; very friable; many roots; many pores; 25 percent coarse fragments; very strongly acid; clear wavy boundary.

B22ir—13 to 17 inches; yellowish brown (10YR 5/6) gravelly fine sandy loam; many fine distinct strong brown (7.5YR 5/8) mottles; weak fine granular structure; friable; common roots; common pores; 25 percent coarse fragments; strongly acid; abrupt wavy boundary.

A'2x—17 to 27 inches; light gray (10YR 7/2) gravelly fine sandy loam; common medium distinct strong brown (7.5YR 5/6) mottles; weak thin and medium platy structure; firm; brittle; few roots; common pores; 30 percent coarse fragments; very strongly acid; abrupt irregular boundary.

B'x—27 to 44 inches; brown (10YR 5/3) gravelly fine sandy loam; weak very coarse prismatic structure; very firm; brittle; few pores; thin gray (10YR 6/1) silt and clay linings in some pores; 30 percent coarse fragments; strongly acid; diffuse wavy boundary.

C—44 to 60 inches; brown (7.5YR 5/4) gravelly sandy loam; weak thick platy structure; firm; 30 percent coarse fragments; strongly acid.

The thickness of the solum ranges from 40 to 55 inches. The depth to the fragipan ranges from 16 to 21 inches. Coarse fragments make up 10 to 35 percent of the soil material above the fragipan and 20 to 50 percent of the fragipan and substratum.

In uncultivated areas, these soils commonly have O2, A2, and Bh horizons that are 1 to 3 inches thick.

In the Ap horizon, hue is dominantly 10YR, value is 3 or 4, and chroma is 2 or 3. Texture is dominantly gravelly fine sandy loam but ranges to loam in some profiles. Structure is weak or moderate granular.

In the B2ir horizon, hue is 10YR to 7.5YR, value is 4 or 5, and chroma is 4 to 6. In some profiles mottles are in the lower part of the B2ir horizon. Texture ranges from sandy loam or fine sandy loam to light loam and includes their gravelly analogs in some places. Structure is weak granular to weak subangular blocky.

The A'2 horizon is firm and brittle or is friable. Texture ranges from sandy loam or fine sandy loam to light loam and includes their gravelly analogs.

In the B'x horizon, hue is 10YR to 2.5YR, value is 4 or 5, and chroma is 2 or 3. Texture ranges from sandy loam to loam and includes their gravelly and very gravelly analogs.

In the C horizon, hue is 7.5YR to 10YR, value is 4 or 5, and chroma is 2 to 4. Texture ranges from sandy loam to loam and includes their gravelly and very gravelly analogs.

The Empeyville soils form a drainage sequence with the Worth, Westbury, and Dannemora soils and formed in material similar to that in which those soils formed. Worth soils are well drained, Westbury soils are somewhat poorly drained, and Dannemora soils are poorly drained. The Empeyville soils commonly are near the coarse textured, excessively drained Colton soils and the coarse textured, moderately well drained Duane soils but have fewer coarse fragments than those soils and are moderately coarse textured.

EpB—Empeyville gravelly fine sandy loam, 3 to 8 percent slopes. This gently sloping soil has the profile described as representative for the series. It is in slightly convex areas on the upland till plain. Individual areas are oval to irregular in shape and are mainly 3 to 40 acres in size.

Included with this soil in mapping are small areas of the better drained Worth soils on slightly elevated knolls and ridges and the wetter Westbury and Dannemora soils on the lower part of foot slopes and along drainageways. Also included are some areas of soils that have a thin, silty mantle overlying glacial till.

This soil is suited to some of the field crops commonly grown in the county. Because of the relatively short growing season, however, it is suited to only certain varieties of field crops. The fragipan restricts root development of some crops. Many areas are better suited to hay or pasture crops than to other crops. In some years spring planting is delayed by wetness in some places. The wet spots can be drained, but the effectiveness of subsurface drains generally is poor. If row crops are grown, erosion control practices should include contour tillage, stripcropping, and the use of cover crops, particularly on long slopes. Surface coarse fragments interfere with tillage equipment in some places.

Slow permeability in the fragipan and coarse fragments in the surface layer are the main limitations for nonfarm uses. Capability subclass IIe.

EpC—Empeyville gravelly fine sandy loam, 8 to 15 percent slopes. This sloping soil has a profile similar to the one described as representative for the series, except the subsoil is thinner in most places. It is in slightly convex areas on the glacial till plain and receives runoff from higher soils. Individual areas are oval to rectangular in shape and are mainly 2 to 20 acres in size.

Included with this soil in mapping are small areas of the better drained Worth soils on ridges and the wetter Westbury and Dannemora soils on foot slopes and in depressions. Also included are a few areas of soils that have a thin, silty mantle overlying glacial till.

This soil is suited to some of the crops commonly grown in the county. Slope, presence of a fragipan, and a relatively short growing season limit the selection of crops that can be grown. In many areas this soil is better suited to hay and pasture crops than to other crops. If row crops are grown, erosion is a severe hazard. Some practices that can control erosion are contour stripcropping, cross slope tillage, and use of diversions and grassed waterways. Minimum tillage, use of cover crops, and return of crop residue to the soil also help to reduce erosion and to promote good soil tilth. Coarse fragments interfere with the operation of precision tillage equipment in some places. The use of subsurface drains in wet spots and of interceptor drains to divert runoff improves many areas.

Slope and slow permeability in the fragipan are the main limitations for nonfarm use. Capability subclass IIIe.

Fluvaquents and Udifluvents

Fa—Fluvaquents and Udifluvents, frequently flooded. These soils vary considerably in texture and drainage within a short distance. They consist mainly of recent alluvial deposits on flood plains. Annual flooding is common. These soils are along small streams throughout the county. The mapped areas are long, narrow, and winding and are nearly level to depressional. Slopes are mostly less than 3 percent. These soils are deep, but they have very little soil profile development. The soil characteristics vary so greatly within a short distance that these soils cannot be classified as members of a soil series.

In some areas these soils consist of very gravelly or stony deposits; in other areas they are nearly free of coarse fragments. These soils are moderately well drained to very poorly drained, but they are mainly somewhat poorly drained to very poorly drained. Variations in the surface topography result from stream scour and the presence of remnant channels.

These soils generally are not suited to cultivated crops, but in some areas they are suited to permanent pasture. Many cleared areas are reverting to brush and weeds. Some areas are wooded. In a few areas the plants can be mowed and the soil reseeded. Stream gouging and deposition are concerns along some of the streams.

In some areas these soils have potential for ponds and for development of habitat for wetland wildlife. Careful onsite investigation is particularly important, however, before the soils are used for these purposes. Capability subclass Vw.

Fonda series

The Fonda series consists of deep, very poorly drained soils that have a medium textured surface layer and a fine textured subsoil. These soils formed in glaciolacustrine deposits that are high in content of clay and silt. These soils are nearly level and are in low areas and depressions, mainly on lake plains.

In a representative profile, the surface layer is black mucky silt loam 6 inches thick. The subsoil extends to a depth of 36 inches. The upper part of the subsoil is gray, mottled silty clay 10 inches thick, and the lower part is gray, mottled, plastic silty clay 20 inches thick. The substratum, to a depth of 50 inches, is gray silty clay that has olive brown and light gray mottles.

These soils have a high water table that is at or near the surface most of the year. Runoff is very slow and is intermittently ponded. Permeability is moderate in the surface layer and slow or very slow in the subsoil and substratum. Roots are mostly in the surface layer and in the upper part of the subsoil above the level of the water table. Available water capacity is moderate to high. The content of organic matter and total nitrogen is high. In undrained areas nitrogen is slowly available to plants. Natural content of phosphorus and potassium is medium. The surface layer is commonly slightly acid, and the subsoil is commonly neutral.

A few areas of these soils have been drained and are used for cultivated crops. Many areas are undrained; these areas are idle or are in water-tolerant woodland species.

Representative profile of Fonda mucky silt loam, in a brushy area in the town of West Monroe, 1,500 feet east of the end of O'Mara Road:

A1—0 to 6 inches; black (10YR 2/1) mucky silt loam, very dark gray (10YR 3/1) when crushed, dark gray (10YR 4/1) when dry; strong coarse granular structure; friable; many roots; slightly acid; abrupt wavy boundary.

B21g—6 to 16 inches; gray (N 6/0) silty clay; common medium distinct strong brown (7.5YR 5/8) mottles; moderate medium prismatic structure; plastic; common fine roots; few fine pores; neutral; gradual wavy boundary.

B22g—16 to 36 inches; gray (10YR 6/1) silty clay; common medium distinct dark grayish brown (2.5Y 4/2) mottles; strong coarse prismatic structure parting to strong coarse subangular blocky; plastic; few fine roots; few fine pores; few thin clay films lining old root channels and in pores; neutral; clear wavy boundary.

Cg—36 to 50 inches; gray (10YR 6/1) silty clay; common medium distinct olive brown (2.5Y 4/4) mottles and light gray (2.5Y 7/2) accumulations of lime; massive; plastic; calcareous in spots at a depth of 36 inches and grading to calcareous throughout with increasing depth; mildly alkaline.

The thickness of the solum and depth to carbonates range from 24 to 40 inches. Depth to bedrock is more than 5 feet. The soil generally is free of coarse fragments, but some profiles have a few. Reaction is slightly acid to neutral in the surface layer and neutral to mildly alkaline in the subsoil.

In undisturbed areas, there is an O2 horizon of black muck that is 3 to 4 inches thick overlying an A1 horizon that is 4 to 6 inches thick.

In some places there is an Ap horizon. In the A1 or Ap horizon, value is 1 to 3, and chroma is 1 or 2.

In the Bg horizon, hue is 5Y to 7.5YR or is neutral, value is 5 or 6, and chroma is 0 to 2. In some profiles, mottles that have chroma of more than 2 make up less than 20 percent of the soil material. Texture ranges from silty clay loam to clay. Structure is moderate to strong prismatic and parts to angular or subangular blocky in some profiles. Consistence is plastic or very plastic.

The C horizon commonly is stratified or massive silty clay or clay. Reaction is mildly to moderately alkaline.

The Fonda soils form a drainage sequence with the Hudson, Rhinebeck, and Madalin soils and formed in material similar to that in which those soils formed. Hudson soils are moderately well drained and well drained, Rhinebeck soils are somewhat poorly drained, and Madalin soils are poorly drained and very poorly drained. Fonda soils are commonly near Canandaigua and Palms soils. They have a higher clay content than the Canandaigua soils, and they do not have thick deposits of organic material which Palms soils have. Fonda soils have more organic matter in the surface layer than the Madalin soils.

Fn—Fonda mucky silt loam. This nearly level soil formed in clayey and silty glacial lake deposits. It is free of coarse fragments. It is in low, depressional, basinlike areas. Slopes range from 0 to 3 percent but are mostly less than 1 percent. Individual areas are circular or elongated in shape and are mainly 5 to 50 acres in size.

Included with this soil in mapping are small areas of soils that have a mantle of muck (sapric material) more than 10 inches thick. Also included are a few small areas of the poorly drained Madalin and Canandaigua soils in slightly higher positions on the landscape. Areas of the coarser textured Lamson and Granby soils and a few areas of soils that are underlain by loamy sand at a depth of 18 to 24 inches are also included.

Excessive wetness restricts the use of this soil. In undrained areas the soil is too wet to be used for cultivated crops. In some places adequate drainage requires use of a combination of surface and subsurface drains. Lateral drains should be closely spaced, because water moves slowly or very slowly through the subsoil. Drainage outlets are not readily available in many areas. In some places, bedding improves surface drainage enough so that pasture can be quite productive. The high organic-matter content in the surface layer promotes good soil tilth, and the soil is naturally high in nutrients. Fall plowing, returning all crop residue to the soil, keeping livestock from wet areas, and minimum tillage help to maintain good soil tilth. Tilling this soil when wet can cause clodding and crusting.

Prolonged wetness and slow or very slow permeability are severe limitations to most nonfarm uses of this soil. Some areas are excellent sites for development of marshes for wetland wildlife. Capability subclass IVw.

Fredon series

The Fredon series consists of deep, somewhat poorly drained to poorly drained soils. These soils have a moderately coarse textured surface layer, a medium textured subsoil, and a coarse textured substratum. They formed in glaciofluvial deposits that contain sand and gravel. Fredon soils are nearly level. They are on low valley terraces, beach ridges, and outwash plains.

In a representative profile, the surface layer is dark grayish brown gravelly fine sandy loam 9 inches thick. The subsurface layer is light brownish gray, mottled, friable gravelly fine sandy loam 3 inches thick. The subsoil extends to a depth of 30 inches. The upper part of the subsoil is gray, mottled, friable gravelly loam 8 inches thick, and the lower part is light brownish gray, mottled, slightly sticky gravelly loam 10 inches thick. The substratum, to a depth of 50 inches, is dark gray, stratified very gravelly sand.

A seasonal high water table is in the upper part of the subsoil in spring and in other excessively wet periods. These soils receive runoff and seepage from higher, adjacent soils. Permeability is moderate in the surface layer and subsoil and moderately rapid to rapid in the substratum. Roots are somewhat restricted by the fluctuating water table in undrained areas. Available water capacity is moderate to high. The natural content of nitrogen is medium to high, but nitrogen is slowly available to plants when the soil is damp and cold. The natural content of available phosphorus and potassium is medium to low. Unless the soil is limed, the surface layer and subsoil are strongly acid to neutral.

Most areas of these soils are in pasture or woodland because of the seasonal wetness. Some areas are idle and are reverting to brush. A few areas are drained and used for farming.

Representative profile of Fredon gravelly fine sandy loam, in a hayfield of clover and timothy in the town of Albion, 300 feet south of N.Y. Route 13 and 1,000 feet east of Albion Cross Road:

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) gravelly fine sandy loam; moderate fine granular structure; very friable; many roots; 15 percent coarse fragments; strongly acid; clear smooth boundary.

A2g—9 to 12 inches; light brownish gray (10YR 6/2) gravelly fine sandy loam; many medium faint brown (10YR 5/3) mottles; weak fine granular structure; friable; few roots; many pores; 20 percent coarse fragments; strongly acid; clear smooth boundary.

B21g—12 to 20 inches; gray (10YR 6/1) gravelly loam; many medium distinct strong brown (7.5YR 5/6) and few fine distinct light olive brown (2.5Y 5/4) mottles; weak coarse subangular blocky structure; friable; few roots; common pores; 15 percent coarse fragments; medium acid; clear wavy boundary.

B22g—20 to 30 inches; light brownish gray (2.5Y 6/2) gravelly loam; many medium faint dark gray (N 4/0) mottles; weak coarse subangular blocky structure; slightly sticky; few roots; common pores; 30 percent coarse fragments; medium acid; abrupt smooth boundary.

IICg—30 to 50 inches; dark gray (N 4/0) very gravelly sand; single grain; loose; stratified; 50 percent coarse fragments; slightly acid.

The thickness of the solum ranges from 22 to 35 inches. Depth to carbonates ranges from 40 to more than 60 inches, and depth to bedrock is more than 5 feet. Coarse fragments are mainly gravel. They make up 10 to 35 percent, by volume, of the solum and 35 to 60 percent of the substratum. Reaction in the solum is strongly acid to neutral and is generally less acid with increasing depth.

In the Ap horizon, hue is 10YR, value is 3 or 4, and chroma is 1 or 2. Uncultivated areas have an A1 horizon that is 2 to 4 inches thick.

In the A2 horizon, hue is 10YR, value is 5 or 6, and chroma is 2 or 3. In some places the A2 horizon has pockets of sand and gravel that are coated and weakly cemented with black oxides. In some places there is no A2 horizon.

In the B horizon, hue is 10YR to 5Y, value is 4 to 6, and chroma is 1 to 3. Mottles have value of 4 or 5 and chroma of 0 to 6. Texture of the B horizon is sandy loam, fine sandy loam, and loam and includes gravelly analogs of these textures in places.

In the C horizon, hue is 10YR or is neutral, value is 4 or 5, and chroma is 0 to 3. Texture is mainly sand or loamy sand and is sandy loam in some places. Very gravelly analogs of these textures are also included. This horizon is commonly stratified.

Fredon soils formed in deposits similar to those in which Alton and Halsey soils formed. Alton soils are well drained to somewhat excessively drained, and Halsey soils are very poorly drained. Fredon soils are also associated with the somewhat poorly drained Minoa soils and the poorly drained and very poorly drained Lamson soils. They have more coarse fragments than Minoa and Lamson soils.

Fr—Fredon gravelly fine sandy loam. This is a nearly level soil that formed in glaciofluvial deposists on low benches, terraces, and flats underlain by sand and gravel. It is along valley bottoms, on outwash plains, and in islandlike areas on the lake plain. Slopes are mainly 0 to 3 percent. Most areas are elongated, but some are irregular in shape. Individual areas are mainly 4 to more than 40 acres in size.

Included with this soil in mapping are the drier Alton soils in higher positions and the wetter Halsey soils in lower positions. Also included are small areas of the sandy Minoa and Lamson soils, a few small areas of soils that have a substratum of glacial till that is finer textured than the gravel and sand underlying this Fredon soil, and areas of soils that have a very high content of cobbles in the subsoil.

If properly drained, this soil is suited to most field crops commonly grown in the county. It generally needs artificial drainage to be intensively cultivated. It responds well to surface and subsurface drainage because of the moderate permeability of the subsoil. Interceptor drains commonly are effective in diverting seepage and runoff from higher, adjacent soils. If this soil is drained, it is easily tilled; coarse fragments, however, hinder the operation of some tillage equipment. Good soil tilth can be easily maintained if management practices include minimum tillage, use of cover crops, and return of crop residue to the soil. If adequate outlets are not available and drainage is not feasible, water-tolerant forage crops and pasture grasses can be grown.

Seasonal wetness is the main limitation for nonfarm uses. Capability subclass IIIw.

Granby series

The Granby series consists of deep, poorly drained and very poorly drained, coarse textured soils. These soils formed in sandy, glaciolacustrine and glaciofluvial deposits. They are nearly level and are in low areas and depressions on lake plains and outwash plains and in remnant glacial drainageways.

In a representative profile, the surface layer is very dark gray loamy fine sand 7 inches thick and gray loamy fine sand 4 inches thick that has lenses of very dark gray fine sandy loam. The subsoil is gray, mottled, friable fine sand 14 inches thick. The substratum, to a depth of 60 inches, is reddish brown loose sand.

In undrained areas, these soils are seasonally ponded for brief periods in some places. The seasonal high water table is at or near the surface for long periods in spring and in other excessively wet periods. Permeability is rapid. The root zone generally is shallow because of the seasonal high water table. Available water capacity in drained areas is low. These soils are high in content of nitrogen, but nitrogen is released slowly to plants when the soils are cold or excessively wet. The natural ability of the soils to supply available phosphorus and potassium to plants is low. The surface layer and upper part of the subsoil are medium acid to neutral.

Many areas are undrained and are in water-tolerant trees and brush. A few areas are drained and are farmed. Some areas are partially drained and are in pasture.

Representative profile of Granby loamy fine sand, in meadow in the town of Constantia, 400 feet north of Gale Road and 830 feet west of Martin Road:

Ap1—0 to 7 inches; very dark gray (10YR 3/1) loamy fine sand; moderate medium subangular blocky structure parting to moderate coarse granular; very friable; many roots; neutral; gradual wavy boundary.

Ap2—7 to 11 inches; gray (10YR 5/1) loamy fine sand; very dark gray (10YR 3/1) lenses of fine sandy loam; moderate medium subangular blocky structure parting to moderate coarse granular; very friable; many roots; neutral; abrupt smooth boundary.

IIB2g—11 to 25 inches; gray (10YR 5/1) fine sand; many medium distinct yellowish brown (10YR 5/6) and brownish yellow (10YR 6/6) mottles; weak medium platy structure; friable; few roots in upper part; common pores; firm, irregularly shaped zones of sandy loam material make up 15 percent of horizon; neutral; clear wavy boundary.

IIC—25 to 60 inches; reddish brown (5YR 5/3) sand; single grained; loose; light brownish gray (10YR 6/2) to brown (7.5YR 5/4) bands of loamy fine sand 1/2 to 2 inches thick in upper 30 inches; neutral.

The thickness of the solum ranges from 22 to 36 inches. Depth to carbonates ranges from 35 to 60 inches, and depth to bedrock is more than 5 feet. Coarse fragments generally are absent or are very few in number. Reaction is medium acid to neutral in the upper 2 feet and neutral to moderately alkaline in the lower part of the subsoil and in the substratum.

In the Ap or A1 horizon, hue is mainly 10YR, value is 2 or 3, and chroma is 1 or 2. Some profiles have an A2g horizon 1 to 2 inches thick that contain mottles of higher chroma than the matrix.

In the B horizon, hue is 10YR or 2.5Y, value is 4 or 5, and chroma is 2 or lower. Texture is commonly fine or medium sand but is loamy sand in places. Some profiles have thin lenses or strata of sandy loam or sandy clay loam. This horizon has weak platy or weak subangular blocky structure, or the material is massive or single grained.

In the C horizon, hue is 10YR to 5YR, value of 5 or 6, and chroma is 1 to 3. In some profiles, the C horizon is mottled or has bands of loamy fine sand 1/2 to 2 inches thick in the upper 3 feet of the substratum. Texture of the matrix is dominantly medium sand but ranges from fine sand to loamy fine sand.

Granby soils in this survey area have redder hue and higher chroma in the substratum than Granby soils mapped in other survey areas. These differences, however, do not alter their use or behavior.

Granby soils are associated with the poorly drained to somewhat poorly drained Naumburg soils. They commonly are near the poorly drained and very poorly drained Lamson soils and the very poorly drained Halsey soils, but they have more sand and less clay than the Lamson soils and fewer coarse fragments than the Halsey soils.

Gr—Granby loamy fine sand. This nearly level soil has the profile described as representative for the series. It is on low flats and in depressions that consist of water-deposited sand. Slopes range from 0 to 3 percent but are mostly less than 2 percent. The areas are mostly circular or crescent shaped and generally are 3 to 80 acres in size.

Included with this soil in mapping are small areas of the somewhat poorly drained Naumburg soils on slightly elevated benches. A few areas of Raynham, Minoa, and Lamson soils, which are slightly finer textured than this Granby soil, are also included. Soils that have a mucky surface layer and small areas of soils that have a mantle of organic material more than 10 inches thick are also included.

If undrained, this soil is suited to water-tolerant pasture plants but generally is too wet for cultivated crops. If properly drained, however, it is suited to most field crops and to some vegetable crops commonly grown in the county. For drainage to be effective in some places, a combination of open drains and underground drains is needed. Sloughing and piping of this sandy soil is a problem in maintaining open ditches. Special practices, for example, use of wrapped joints or filters, are needed in places to prevent sand from plugging underground drains. Drainage outlets are difficult to locate in some places because of the low position of this soil on the landscape. If drained, this soil is fairly easy to till; it is free of coarse fragments. Good soil tilth can be maintained by minimum tillage, return of crop residue to the soil, and use of cover crops. Crusting and clodding are generally not a problem. If drained, this soil responds very well to applications of fertilizer and the availability of natural nitrogen increases.

Prolonged wetness is the main limitation for most nonfarm uses. Underground utilities should be carefully installed because the water-saturated sand makes sidewalls of excavations unstable. Capability subclass IVw.

Halsey series

The Halsey series consists of deep, very poorly drained soils. These soils have a medium textured surface layer and a moderately coarse textured subsoil. They formed in poorly sorted glaciofluvial deposits that contain sand and gravel. Halsey soils are nearly level. They are on low flats in depressions and in seep areas.

In a representative profile, the surface layer is very dark gray gravelly loam 9 inches thick. The subsurface layer is gray, mottled, friable gravelly fine sandy loam 5 inches thick. The subsoil is gray, mottled, friable gravelly fine sandy loam 17 inches thick. The substratum, to a depth of 50 inches, is dark grayish brown, stratified very gravelly sand.

A seasonal high water table is at or near the surface for long periods of the year, and the depth to the water table generally corresponds to the fluctuating level of ground water. Permeability is moderate or moderately rapid in the surface layer and subsoil, and rapid in the substratum. Unless these soils are artifically drained, roots are mainly confined to the surface layer. In drained areas roots extend into the substratum and available water capacity is moderate to high. Organic-matter content and total nitrogen are high, but nitrogen is slowly available to plants when the soils are damp and cold. The natural content of available phosphorus and potassium is low to medium. Unless the soil is limed, the surface layer and subsoil commonly are medium acid to slightly acid.

Most areas of these soils are in water-tolerant trees and brush or are idle. A few areas are drained and are farmed. Some areas are in pasture.

Representative profile of Halsey gravelly loam, in a cornfield in the town of Scriba, one-fourth mile north of Hammonds Corners:

Ap—0 to 9 inches; very dark gray (10YR 3/1) gravelly loam moist, gray (10YR 5/1) when dry and crushed; weak medium subangular blocky structure; very friable; many roots; 30 percent coarse fragments; neutral; abrupt smooth boundary.

A2g—9 to 14 inches; gray (10YR 5/1) gravelly fine sandy loam; many medium distinct light olive brown (2.5Y 5/4) mottles; weak fine granular structure; friable; few roots; 25 percent coarse fragments, slightly acid; clear wavy boundary.

B2g—14 to 31 inches; gray (5Y 6/1) gravelly fine sandy loam; few medium distinct brownish yellow (10YR 6/6) mottles; weak fine granular structure; friable; few roots; 30 percent coarse fragments; slightly acid; gradual wavy boundary.

IIC—31 to 50 inches; dark grayish brown (10YR 4/2) very gravelly sand; single grain; very friable; stratified; 60 percent coarse fragments; neutral.

The thickness of the solum ranges from 22 to 34 inches. The depth to carbonates ranges from 42 to 60 inches, and depth to bedrock is more than 5 feet. Coarse fragments are mainly gravel and cobbles. They make up 5 to 35 percent, by volume, of the solum and 25 to 70 percent of the substratum. Unless limed, the solum is medium acid to slightly acid. The substratum is neutral to mildly alkaline.

In the Ap horizon, hue is mainly 10YR, value of 2 or 3, and chroma is 1 or 2.

In the A2g horizon, hue is mainly 10YR, value is 5 or 6, and chroma is 1 or 2. Mottles range from few to many. Texture ranges from fine sandy loam to loam and their gravelly analogs in some places.

In the B2g horizon, hue is 5Y to 10YR, value is 5 or 6, and chroma is 1 or 2. Mottles are absent, or they range to common, and the number of mottles generally decreases with increasing depth. Texture ranges from loam to fine sandy loam and includes their gravelly analogs.

The IIC horizon is made up of sand and gravel that commonly is stratified.

Halsey soils form a drainage sequence with the Alton and Fredon soils and formed in parent material similar to that in which those soils formed. Alton soils are well drained and somewhat excessively drained, and Fredon soils are somewhat poorly drained and poorly drained. Halsey soils commonly are near the poorly drained and very poorly drained Lamson and Granby soils. Halsey soils have more coarse fragments than those soils.

Ha—Halsey gravelly loam. This is a nearly level soil in low areas and depressions. It is underlain by glaciofluvial deposits of sand and gravel. Most areas are circular or elongated in shape, and areas along drainageways are long and narrow. Individual areas are mainly 3 to 35 acres in size.

Included with this soil in mapping are some areas of soils that have a mucky surface layer and a few areas of soils that are underlain by silty deposits at a depth of more than 6 feet. Areas of the somewhat poorly drained and poorly drained Fredon soils on a few small slightly elevated benches are also included.

If undrained, this soil is too wet for intensive cultivation. If properly drained, however, it is suited to most field crops commonly grown in the county. If drainage is not feasible, it can be used for pasture in some areas. Surface and subsurface drains function well if adequate outlets are available. Interceptor drains that divert runoff from higher areas are also beneficial in places. In drained areas this soil is easy to work and to keep in good tilth if management practices are used that include growing cover crops, returning crop residue to the soil, and minimum tillage. Pasture is generally of poor quality in undrained areas.

Prolonged wetness is the main limitation for most nonfarm uses. Some areas have potential for development of wildlife marshes. Capability subclass IIIw.

Herkimer series

The Herkimer series consists of deep, well drained, medium textured soils. These gently sloping to sloping soils formed in alluvium that has a moderate content of fragments of dark shale. They are on alluvial fans that consist of material deposited by high gradient side streams in places where they flowed onto less sloping plains or where they joined major valleys.

In a representative profile, the surface layer is very dark grayish brown shaly silt loam 9 inches thick. The subsoil is dark brown, friable shaly silt loam 19 inches thick. The substratum, to a depth of 64 inches, is dark brown, friable shaly loam.

A seasonal high water table rises into the substratum for brief periods in spring. Permeability is moderate. The available water capacity is moderate to high. Root penetration and distribution are generally not restricted. The natural supply of nitrogen, available phosphorus, and available potassium is medium. These soils are strongly acid to neutral in the surface layer and subsoil.

Herkimer soils are used extensively for farming. In a few areas they are idle or in woodland.

Representative profile of Herkimer shaly silt loam, 2 to 8 percent slopes, in a hayfield in the town of Sandy Creek, one-fourth mile east of County Route 22 and 150 feet south of Center Road:

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) shaly silt loam, gray (10YR 6/1) when dry; strong medium granular structure; very friable; many fine roots; 25 percent coarse fragments, mainly shale and gravel; slightly acid; clear smooth boundary.

B2—9 to 28 inches; dark brown (10YR 4/3) shaly silt loam; weak fine subangular blocky structure; friable; many fine roots in upper part, few fine roots in lower part; common to few pores; thin clay linings in some pores; 25 percent coarse fragments, mainly shale and gravel; neutral; gradual smooth boundary.

C—28 to 64 inches; dark brown (10YR 3/3) shaly loam; massive; friable; few roots; 30 percent coarse fragments, dominantly shale and some gravel; neutral; gradual smooth boundary.

The thickness of the solum ranges from 24 to 40 inches. The depth to carbonates ranges from 48 to 75 inches, and depth to bedrock is more than 5 feet. Coarse fragments are dark shale and gravel. They make up 15 to 35 percent, by volume, of the solum and 20 to 50 percent of the substratum. Reaction is strongly acid to neutral in the solum and neutral to mildly alkaline in the substratum.

In uncultivated areas there is an A1 horizon 2 to 3 inches thick. In the Ap horizon, hue is 10YR, value is 2 or 3, and chroma is 1 or 2.

In the B horizon, hue is 10YR, value is 3 or 4, and chroma is 2 to 4. Texture is loam, silt loam, and fine sandy loam and their shaly and gravelly analogs.

In the C horizon, hue is dominantly 10YR, value is 3 or 4, and chroma is 2 or 3. Texture ranges from loam to silt loam and includes shaly, gravelly, and very shaly analogs of these textures.

Herkimer soils have less gravel and are not so coarse textured as the nearby Alton soils on remnant beach ridges and terraces. They are commmonly near the well drained Sodus and Worth soils, which formed in glacial till deposits. Herkimer soils are commonly near Fredon and Halsey soils. They are better drained than the Fredon or Halsey soils and are commonly in adjacent areas that are higher on the landscape than those soils.

HeB—Herkimer shaly silt loam, 2 to 8 percent slopes. This gently sloping soil has the profile described as representative for the series. Slopes are slightly convex. Individual areas are fan shaped and are mainly about 10 to 50 acres in size. Most areas are crossed by intermittent streams.

Included with this soil in mapping are small areas of the wetter Fredon, Halsey, Rumney, and Canandaigua soils in depressions, along lower fringes of this Herkimer soil, and in drainageways. A few small areas of Sodus, Ira, and Worth soils in glacial till deposits and a few areas of nearly level soils are also included.

This soil is well suited to field crops commonly grown in the county and is especially well suited to deep-rooted crops, for example, alfalfa. It is also suited to some fruit trees. Vegetable crops grow well on this soil, but shale fragments and gravel may interfere with the operation of precision planting and tillage equipment. In most years this soil can be tilled fairly early in spring. Crusting and clodding generally are not problems. Row crops can be grown almost continuously if management practices are used that include minimum tillage, contouring, return of crop residue to the soil, and growing winter cover crops. These practices help to maintain organic-matter content and favorable soil tilth and reduce the hazard of erosion. Cross slopes tillage may be difficult because of the shape of some areas.

This soil has few limitations for nonfarm uses that require good drainage. Capability subclass IIe.

HeC—Herkimer shaly silt loam, 8 to 15 percent slopes. This sloping soil has a profile similar to the one described as representative for the series, except the subsoil is slightly thinner. Some areas are fan shaped, and the areas along the sides of drainageways are elongated. Most areas are 4 to 25 acres in size.

Included with this soil in mapping are small areas of the wetter, gravelly Fredon and Halsey soils in depressions and low areas adjacent to drainageways. The larger areas of these included soils are identified on the maps by the symbols for wet spots. A few small areas of Middlebury soils are included on the flood plains at the lower fringe of some areas of the Herkimer soil.

This soil is suited to some field crops and to hay and pasture. It is especially well suited to deep-rooted crops, for example, alfalfa. Erosion is a hazard in places where cultivated crops are grown. Cross slope tillage, use of cover crops, and including a high proportion of sod crops in the cropping system help to reduce the hazard of erosion and help to maintain an adequate content of organic matter. Cross slope tillage many be difficult in some places because of the shape of individual fields. This soil generally can be tilled early in spring. Good soil tilth is easy to maintain, and crusting and clodding are generally not problems. Shale fragments, however, may cause excessive wear to some kinds of tillage equipment.

Slope is the main limitation for nonfarm uses. Capability subclass IIIe.

Hinckley series

The Hinckley series consists of deep, excessively drained, coarse textured soils. These soils formed in glaciofluvial deposits that are dominantly sand and gravel. Hinckley soils are gently sloping to steep. They are on terraces, remnant beach ridges, kame moraines, eskers, and outwash plains.

In a representative profile, the surface layer is dark grayish brown gravelly loamy sand 7 inches thick. The subsoil extends to a depth of 33 inches. The upper part of the subsoil is dark brown, friable gravelly loamy sand 14 inches thick, and the lower part is dark yellowish brown, loose very gravelly loamy sand 12 inches thick. The substratum, to a depth of 62 inches, is dark gray, loose very gravelly loamy sand.

The seasonal high water table is generally at a depth of more than 6 feet. Permeability is rapid or very rapid. Root penetration is good provided there is sufficient moisture to sustain plant growth. Available water capacity is very low to low. The natural ability of these soils to supply nitrogen, phosphorus, and potassium to plants is low. Unless limed, these soils are extremely acid to medium acid.

Many areas are not farmed, because of droughtiness and low natural fertility of these soils. Some areas are in woodland or are idle.

Representative profile of Hinckley gravelly loamy sand, 3 to 8 percent slopes, in an idle field in the town of Mexico, 2,000 feet west of Valley Road and 100 feet south of the town limits of the towns of Mexico and Richland:

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) gravelly loamy sand; weak to moderate medium granular structure; friable; many roots; 25 percent coarse fragments; medium acid; abrupt smooth boundary.

B21—7 to 21 inches; dark brown (7.5YR 4/4) gravelly loamy sand; weak fine granular structure; friable; many roots; common pores; 30 percent coarse fragments; strongly acid; clear wavy boundary.

B22—21 to 33 inches; dark yellowish brown (10YR 4/4) very gravelly loamy sand; weak medium subangular blocky structure; loose; common roots; many pores; 40 percent coarse fragments; medium acid; gradual wavy boundary.

C—33 to 62 inches; dark gray (10YR 4/1) very gravelly loamy sand; single grain; loose; few roots; many pores; 40 percent coarse fragments; medium acid.

The thickness of the solum ranges from 18 to 36 inches. Depth to bedrock is more than 6 feet. Coarse fragments are mainly gravel and cobbles and a few stones. They make up 15 to 50 percent of the solum and 40 to 70 percent of the substratum. Unless the soil is limed, reaction is extremely acid to medium acid.

In the Ap horizon, hue is mainly 10YR, value is 3 or 4, and chroma is 2 or 3. Consistence is very friable or friable.

In some areas there is an A1 horizon. If present, the A1 horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2.

In the B horizon, hue is 7.5YR or 10YR, value is 4 or 5, and chroma is 4 to 6. Texture is mainly loamy sand, but it is loamy fine sand and loamy coarse sand and their gravelly and very gravelly analogs in some places. The content of coarse fragments and coarse sand commonly increases with increasing depth. Consistence is friable to loose.

In the C horizon, hue is 7.5YR or 10YR, value is 4 to 6, and chroma is 1 to 4. The texture of the C horizon varies greatly. It ranges from stratified gravel, cobbles, and coarse sand to very gravelly loamy fine sand. Secondary accumulations of carbonates on coarse fragments are common at a depth of 10 to more than 14 feet.

Hinckley soils are associated with Alton, Colton, Windsor, and Fredon soils. They are coarser textured in the subsoil than Alton soils and have a lower organic-matter content in the upper part of the subosil than Colton soils. They have more gravel than the Windsor soils and are better drained than the gravelly Fredon soils.

HkB—Hinckley gravelly loamy sand, 3 or 8 percent slopes. This gently sloping soil has the profile described as representative of the series. It is on terraces, remnant beach ridges, and undulating outwash plains. Individual areas are irregular in shape and are mainly 3 to 40 acres in size.

Included with this soil in mapping are small areas of the moderately coarse textured, gravelly Alton soil. Also included are wetter, gravelly Fredon and Halsey soils in a few small depressions and seep areas and excessively drained Adams and Windsor soils in areas of mainly sandy deposits. Also included are wetter, sandier Naumburg soils in a few small depressions. Most areas of these wetter included soils are identified on the soil map by the symbol for a wet spot.

This soil is better suited to deep-rooted, drought-tolerant hay and pasture crops than to shallow-rooted crops. It is suited to cultivated crops, but supplemental irrigation is generally needed to obtain optimum yields. Cross slope tillage, where practical, reduces erosion and helps to conserve moisture. Minimum tillage, use of cover crops, and return of manure and crop residue to the soil also help to reduce soil losses from erosion; these practices also add organic matter to the soil, thereby improving the water-holding capacity. Coarse fragments slightly hinder operation of some tillage equipment. In some areas soil blowing is a hazard, but it can be controlled by the use of windbreaks and other conservation practices. Sprinkler systems are effective in irrigating this soil, and they are needed particularly to irrigate high value crops that are heavily fertilized.

Except for droughtiness and the presence of coarse fragments, this soil has few limitations for nonfarm uses that require good drainage. Some areas have potential as a source of sand and gravel (fig. 8). Capability unit IIIs.

HkC—Hinckley gravelly loamy sand, 8 to 15 percent slopes. This sloping soil has a profile similar to the one described as representative for the series, except the subsoil is slightly thinner. It is on eskers, sides of terraces, and rolling outwash plains. Individual areas are irregular in shape and are mainly 2 to 20 acres in size.

Included with this soil in mapping are small areas of the well drained and somewhat excessively drained, moderately coarse textured Alton soils. Adams and Windsor soils in a few small, deep, sandy deposits are also included. Areas of the somewhat poorly drained and poorly drained Fredon soils and the very poorly drained Halsey soils in depresssions are also included and are identified on the soil map by a wet spot symbol.

This soil is suited to deep-rooted, drought-tolerant hay and pasture crops. It generally is poorly suited to cultivated crops unless supplemental irrigation water is provided. Soil blowing and erosion are moderate hazards.

Cross slope tillage, minimum tillage, use of winter cover crops, returning manure and crop residue to the soil, and stripcropping where practical are important conservation practices that control erosion. These practices also help to conserve moisture and add organic matter to the soil, thereby improving the water-holding capacity. Coarse fragments slightly hinder the operation of some tillage equipment. If a large amount of fertilizer is applied, sprinkler irrigation should be provided to prevent waste. Irrigation is difficult because of slope and the hazard of erosion. Pasture generally is poor in quality because of droughtiness.

Slope, droughtiness, and the presence of coarse fragments are the main limitations for nonfarm uses that require good drainage. Capability subclass IVs.

Hudson series

The Hudson series consists of deep, well drained and moderately drained soils that have a medium textured surface layer and dominantly fine textured subsoil. These soils formed in glaciolacustrine deposits that are mainly clay and silt. They are gently sloping, sloping, and rolling and are on lake plains.

In a representative profile, the surface layer is brown silt loam 6 inches thick. The subsoil extends to a depth of 38 inches. The upper part of the subsoil is brown silty clay loam 8 inches thick that has thin leached layers of pale brown material, and the middle and lower parts are brown, firm silty clay 24 inches thick. The middle part of the subsoil is mottled. The substratum, to a depth of 50 inches, is dark brown and brown varved silty clay.

The seasonal high water table is perched above the substratum or subsoil for brief periods in spring. Permeability is moderately slow in the surface layer and slow in the subsoil and substratum. Root penetration is somewhat restricted by the clayey subsoil. Available water capacity is moderate to high. Because the infiltration rate is slow, surface runoff is medium to rapid. The natural supply of nitrogen and available phosphorus is medium, and the content of available potassium is high. Unless the soil is limed, the surface layer and subsoil are medium acid to neutral.

Many areas of the Hudson soils are used for farming. The more sloping areas are commonly in pasture or woodland or are idle.

Representative profile of Hudson silt loam, 6 to 12 percent slopes, in a hayfield of clover and timothy in the town of Schroeppel, 100 feet west of N.Y. Route 264 and 30 feet north of east-west hedgerow:

Ap—0 to 6 inches; brown (10YR 5/3) silt loam; weak medium to coarse subangular blocky structure; friable; many roots; slightly acid; abrupt smooth boundary.

B&A—6 to 14 inches; brown (10YR 5/3) silty clay loam; weak medium subangular blocky structure; friable; many roots; many fine pores that have clay linings; pale brown (10YR 6/3) ped surfaces 2 millimeters thick; slightly acid; wavy diffuse boundary.

B21t—14 to 27 inches; brown (10YR 5/3) silty clay; common medium distinct pinkish gray (7.5YR 6/2) mottles in lower part; strong coarse subangular blocky structure; firm; common fine roots; common pores; thin clay films in root channels and on ped faces; neutral; clear smooth boundary.

B22t—27 to 38 inches; brown (10YR 5/3) silty clay; strong medium subangular blocky structure; firm; thick clay films in root channels and on ped faces; gray (10YR 6/1) zones of lime accumulation along coarse root channels and on faces of plates; neutral in the matrix; clear wavy boundary.

C—38 to 50 inches; dark brown (10YR 4/3) and brown (7.5YR 5/2) varved silty clay; firm; weakly calcareous, mildly alkaline.

The thickness of the solum ranges from 29 to 40 inches. The depth to carbonates ranges from 27 to 48 inches, and depth to bedrock is more than 5 feet. Coarse fragments are absent or are very few in number. Reaction is medium acid to neutral in the upper part of the solum and neutral to mildly alkaline in the lower part of the solum and in the substratum.

In the Ap horizon, hue is mainly 10YR, value is 4 or 5, and chroma is 2 or 3. In some profiles there is an A2 horizon above the B&A horizon. The A2 horizon, where present, is faintly mottled or has no mottles.

In the B horizon, hue is 10YR to 7.5YR, value is 4 or 5, and chroma is 3 or 4. Texture ranges from heavy silty clay loam to clay and is silty clay in places. Structure ranges from prismatic that parts to subangular blocky to thick platy.

Texture of the C horizon is silty clay, clay, or silt loam, and this horizon commonly has lenses and coatings of silt and very fine sand.

Hudson soils form a drainage sequence with the Rhinebeck, Madalin, and Fonda soils and formed in material similar to that in which those soils formed. Rhinebeck soils are somewhat poorly drained, Madalin soils are poorly drained and very poorly drained, and Fonda soils are very poorly drained. Hudson soils are commonly near the well drained Amboy soils and the moderately well drained Williamson soils. Hudson soils are similar to those soils but contain more clay in the subsoil.

HuB—Hudson silt loam, 2 to 6 percent slopes. This gently sloping soil has a profile similar to the one described as representative for the series, except it has mottles closer to the surface. It is on convex knolls and ridges. Some areas are undulating, and a few areas are dissected. This soil is mainly moderately well drained. Individual areas vary from oblong to nearly circular in shape and are mainly about 5 to about 60 acres in size.

Included with this soil in mapping are areas of similar but wetter Rhinebeck and Madalin soils in small drainageways and depressions and the wetter and siltier Raynham soils in a few lower areas. Silty Amboy and Williamson soils, which have a fragipan, and a few areas of eroded soils that have a surface layer of silty clay loam are also included.

This soil is suited to many of the field crops commonly grown in the county. In some areas it is suited to vegetable crops. It is free of coarse fragments. Permeability is slow, and wetness is a slight problem in spring. This soil should be tilled at the proper moisture content to prevent surface crusting and to maintain good soil tilth. Installing drains in wet spots is beneficial in some areas. Erosion is a hazard, especially on long slopes. Minimum tillage, use of cross slope tillage where practical, return of crop residue to the soil, and use of cover crops are important practices for control of erosion. These practices also reduce the hazard of surface crusting and clodding. A cropping system that includes sod crops about half of the time is desirable.

Slow permeability, temporary seasonal wetness, and the instability of the clayey subsoil and substratum are severe soil limitations for many nonfarm uses. Capability subclass IIe.

HuC—Hudson silt loam, 6 to 12 percent slopes. This sloping soil has the profile described as representative for the series. It is on the sides of convex ridges and on low hills. Drainageways dissect many areas. Individual areas commonly range from elongated to oblong in shape and are mainly 3 to 45 acres in size.

Included with this soil in mapping are areas of the similar but wetter Rhinebeck soils and the wetter, coarser textured Raynham soils in depressions and along drainageways. Also included are a few small areas of siltier Amboy and Williamson soils, a few large areas of soils that have a surface layer of silty clay loam that has been partly removed by erosion, and some areas of rolling soils.

This soil is suited to some of the field crops commonly grown in the county. Because of the low content of coarse fragments, it has some potential for vegetable crops. Erosion is a severe hazard. Where slopes are not complex, cross slope tillage, contour stripcropping, and diversion ditches are important practices for control of erosion. Sod crops should make up the major part of the cropping system. Minimum tillage, return of crop residue to the soil, and use of cover crops help to control erosion and to maintain good soil tilth. Plowing this sod at the proper moisture content reduces the hazards of surface crusting and clodding. Temporary seasonal wetness is of less concern on this soil than on the gently sloping Hudson soil. Randomly placed drains for wet spots and interceptor drains to divert runoff are beneficial in many areas.

Slow permeability, slope, temporary seasonal wetness, and the instability of the clayey deposits are the main limitations for most nonfarm uses of this soil. Undercutting of foot slopes can cause slumps and slides. Capability subclass IIIe.

HuCK—Hudson silt loam, rolling. This rolling soil is on convex knolls and ridges that have complex slopes. Slopes range from 6 to 12 percent. This soil is mainly well drained. Individual areas vary in shape and are mainly 5 to 50 acres in size.

Included with this soil in mapping are areas of the similar but wetter Rhinebeck soils and the wetter and coarser textured Raynham soils on toeslopes and along drainageways. Small areas of the siltier, well drained Amboy soils and moderately well drained Williamson soils and some areas of eroded soils that have a surface layer of silty clay loam are also included.

This soil is suited to some field crops and to hay and pasture. If it is used for cultivated crops, the complex slopes cause difficulty in tillage and in controlling the severe hazard of erosion. Contour tillage, stripcropping, and diversion ditches generally are not so practical as they are on the Hudson soils that have simple slopes. Minimum tillage, return of crop residue to the soil, and use of cover crops are management practices that can be used to control erosion and to maintain good soil tilth. The cropping system should include sod crops much of the time. Careful management that includes tillage at the optimum moisture content is needed to control surface crusting and clodding. Randomly placed subsurface drains for wet spots and along natural field drainageways permit tillage of some fields earlier in spring than would otherwise be feasible.

Complex slopes, slow permeability, temporary seasonal wetness, and the instability of the clayey subsoil and substratum are major limitations for most nonfarm uses. Special precautions should be taken at construction sites to protect exposed slopes from erosion and gullying. Capability subclass IVe.

Humaquepts and Fibrists, ponded

HW—Humaquepts and Fibrists, ponded. This map unit is made up of fresh water marshes that consist of mixed organic and mineral deposits. The marshes border lakes, ponds, streams, and drainageways. Because the soil properties vary greatly within a short distance, the soil materials in these marshes cannot be classified as a soil series. Some areas consist entirely of Humaquepts, some consist entirely of Fibrists, and some have both kinds of deposits. The areas are mostly natural, and they commonly resulted from the damming of watercourses by beaver. A few areas are manmade.

The areas are covered with water most of the year. They support grasses, cattails, and other herbaceous plants. Trees generally do not grow in the areas except along the edges, where the water is very shallow. Most marshes cannot be economically drained, because they are adjacent to open water. These areas provide excellent habitat for beaver, muskrat, and other water-loving animals and for waterfowl. Capability subclass VIIIw.

Ira series

The Ira series consists of deep, moderately well drained, moderately coarse textured soils that have a fragipan. These soils formed in glacial till derived mainly from sandstone. They are nearly level to moderately steep. They are on ridges and knolls and on the sides and tops of elongated hills on the till plain.

In a representative profile, the surface layer is dark grayish brown gravelly fine sandy loam 8 inches thick. The upper part of the subsoil is yellowish brown, very friable fine sandy loam 5 inches thick. This is underlain by a leached layer of light yellowish brown gravelly fine sandy loam 7 inches thick that has distinct mottles. The lower part of the subsoil is a very firm, dense fragipan of brown, mottled gravelly fine sandy loam 20 inches thick. The substratum, to a depth of 50 inches, is grayish brown gravelly fine sandy loam.

A seasonal high water table is commonly perched above the dense fragipan early in spring and in other excessively wet periods. Permeability is moderate above the fragipan and slow in the fragipan and substratum. Root penetration is restricted by the fragipan. Available water capacity is low to moderate. The natural content of nitrogen is medium to low, and the content of available phosphorus and potassium is low. Unless the soil is limed, the surface layer and upper part of the subsoil are very strongly acid to medium acid.

Some areas of Ira soils are farmed. Other areas, particularly the more sloping and very stony areas, are in pasture or woodland or are idle.

Representative profile of Ira gravelly fine sandy loam, 3 to 8 percent slopes, in a cultivated field in the town of Oswego, 100 feet north of County Route 20 and one-fourth mile west of Oswego:

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) gravelly fine sandy loam; weak fine granular structure; very friable; many fine roots; 20 percent coarse fragments; strongly acid; clear smooth boundary.

B2—8 to 13 inches; yellowish brown (10YR 5/4) fine sandy loam; very weak fine subangular blocky structure; very friable; common fine roots; many fine pores; 10 percent coarse fragments; medium acid; clear wavy boundary.

A'2—13 to 20 inches; light yellowish brown (10YR 6/4) gravelly fine sandy loam; common medium distinct yellowish brown (10YR 5/8) mottles; weak thick platy structure; firm; few roots; common fine pores; 20 percent coarse fragments; medium acid; abrupt irregular boundary.

B'x1—20 to 32 inches; brown (7.5YR 4/2) gravelly fine sandy loam; common medium and coarse distinct strong brown (7.5YR 5/6), pinkish gray (7.5YR 6/2), and light brown (7.5YR 6/4) mottles; weak thick platy structure within moderate very coarse prisms 8 to 24 inches in diameter; pinkish gray (7.5YR 6/2) fine sand coatings between prisms; very firm, brittle; few roots between prisms; common fine pores; thin clay linings in pores inside prisms; 30 percent coarse fragments; medium acid; diffuse boundary.

B'x2—32 to 40 inches; brown (7.5YR 4/2) gravelly fine sandy loam; common distinct yellowish brown (10YR 5/5) mottles; massive; very firm, brittle; common fine pores; thin clay linings in pores; 30 percent coarse fragments; slightly acid; clear wavy boundary.

C—40 to 50 inches; grayish brown (10YR 5/2) gravelly fine sandy loam; few fine and medium faint brown (10YR 4/3) and yellowish brown (10YR 5/4) mottles; moderate thick (lenslike) platy structure; very firm; 40 percent coarse fragments; calcareous; mildly alkaline.

The thickness of the solum ranges from 36 to 60 inches. Depth to the fragipan is 13 to 22 inches, and depth to carbonates is 36 to 72 inches. Depth to bedrock is more than 5 feet. Coarse fragments are gravel and cobbles. They make up 10 to 35 percent, by volume, of the solum and 35 to 70 percent of the substratum. Unless the soil is limed, reaction is very strongly acid to medium acid in the upper part of the solum, medium acid to neutral in the lower part of the solum, and slightly acid to mildly alkaline in the substratum.

In the Ap horizon, hue is 10YR or 7.5YR, value is 3 to 5, and chroma is 2.

In the B2 horizon, hue is 10YR to 5YR, value is 4 or 5, and chroma is 3 to 6. This horizon is not mottled, or the mottles are faint. Texture is sandy loam, fine sandy loam, or loam, and gravelly analogs of these textures are in some places. Structure is very weak granular or subangular blocky, or the material is massive. Consistence is friable or very friable.

The A'2 horizon is lighter in color than the B2 horizon, and mottles are distinct or prominent. Texture is typically slightly coarser and consistence is less friable than in the B2 horizon.

In the Bx horizon, hue is 10YR to 5YR, value is 4 or 5, and chroma is 2 to 4. Texture is fine sandy loam or loam, and gravelly analogs of these textures are in some profiles. In the upper part of the Bx horizon, structure is very coarse prismatic and is platy in places; in the lower part the material generally is massive. Clay films are in pores but are not on faces of peds.

The C horizon has color similar to that of the Bx horizon. Texture is loam or fine sandy loam and their gravelly or very gravelly analogs. Consistence is firm or very firm but is less brittle than that of the Bx horizon.

The Ira soils form a drainage sequence with the Sodus, Scriba, and Sun soils and formed in material similar to that in which those soils formed. Sodus soils are well drained, Scriba soils are somewhat poorly drained, and Sun soils are poorly drained to very poorly drained. Ira soils are similar to Empeyville soils but are at a lower elevation than those soils.

IrA—Ira gravelly fine sandy loam, 0 to 3 percent slopes. This nearly level soil has a profile similar to the one described as representative for the series, except the surface layer is darker in color and the upper part of the subsoil has faint mottles. This soil is slightly wetter than the more sloping Ira soils. It is on slightly convex hilltops and ridgecrests. Individual areas are irregular in shape and are mostly 5 to 40 acres in size.

Included with this soil in mapping are somewhat poorly drained Scriba soils in flats and poorly drained and very poorly drained Sun soils in depressions. Small areas of the well drained Sodus soils on knolls and a few small areas of the silty Williamson soils are also included.

This soil is well suited to small grains, hay, and pasture. It is moderately well suited to row crops. Because of temporary seasonal wetness, it is better suited to short season row crops that do not require early planting or late harvesting than to other crops. Coarse fragments and a few stones somewhat hinder the operation of precise tillage equipment. Stone fences and stone piles made during the clearing of surface stones interfere with operation of large equipment. Some areas benefit from randomly placed subsurface drains for wet spots and for field drainageways. Minimum tillage, using cover crops, and returning crop residue to the soil help to maintain good soil tilth.

Slow permeability in the lower part of the subsoil and in the substratum and temporary seasonal wetness are the main limitations for nonfarm uses. Capability subclass IIw.

IrB—Ira gravelly fine sandy loam, 3 to 8 percent slopes. This gently sloping soil has the profile described as representative for the series. It is on the convex tops of elongated hills and in irregularly shaped, undulating areas on till plains. Individual areas are mainly 5 to 50 acres in size.

Included with this soil in mapping are the somewhat poorly drained Scriba soils in small wet spots and drainageways. Also included are a few areas of the well drained Sodus soils on small sloping knolls and small spots of the moderately well drained, silty Williamson soils that are free of coarse fragments.

This soil is suited to many of the field crops commonly grown in the county. In some years planting is delayed early in spring by temporary seasonal wetness and the presence of included wet spots. Coarse fragments and a few surface stones may interfere with the operation of precision tillage equipment. If cultivated crops are planted, the hazard of erosion is moderate. Erosion can be controlled by the use of cross slope tillage, stripcropping, and diversion ditches. Randomly placed drains for wet spots and interceptor drains to divert surface runoff and subsurface seepage are beneficial in some areas. This soil does not generally respond well to a patterned system of subsurface drainage. Because the fragipan restricts root penetration, droughtiness is a slight problem in some years.

Slow permeability in the fragipan and substratum and temporary seasonal wetness are the main limitations for nonfarm uses. Capability subclass IIe.

IrC—Ira gravelly fine sandy loam, 8 to 15 percent slopes. This sloping soil has a profile similar to the one described as representative for the series, except it has fewer and less distinct mottles above the fragipan. It is on slightly convex and plane sides of elongated hills and generally receives runoff from higher, adjacent soils. Individual areas are commonly oblong in shape and 5 to 20 acres in size.

Included with this soil in mapping are the somewhat poorly drained Scriba soils in small wet spots and drainageways. Also included are areas of the well drained Sodus soils on higher knolls and ridges and a few small areas of the silty Williamson soils at lower elevations. Areas of the gravelly Hinckley soils on small beach ridges are also included.

This soil is suited to some field crops commonly grown in the county, but in many areas it is better suited to hay and pasture crops than to other crops. Slope and the hazard of erosion are problems if cultivated crops are grown. Cross slope tillage, stripcropping, cover crops, and minimum tillage are practices that can be used to reduce the hazard of erosion and to conserve moisture in midsummer. Because the fragipan restricts rooting, droughtiness is a problem in some years. Coarse fragments and a few large surface stones interfere with the operation of some tillage equipment. Randomly placed subsurface drains for wet spots and interceptor drains to divert runoff and subsurface seepage benefit many areas.

Slow permeability in the fragipan and substratum, temporary seasonal wetness, and slope are limitations for many nonfarm uses. Capability subclass IIIe.

IsC—Ira-Sodus gravelly fine sandy loams, rolling. These soils have a profile similar to the one described as representative for their series, except the surface layer is slightly thinner and the fragipan is slightly closer to the surface. These soils are so intermingled that it was not practical to map them separately. The Ira soil makes up 65 percent of the unit, and the Sodus soil makes up 25 percent. These soils are on groups of ridges, low hills, and knolls commonly at the southern end of large drumlinlike hills. The Ira soil commonly receives runoff from the higher, better drained Sodus soils. Slopes are complex and range from 8 to 15 percent. Individual areas are variable in shape and are mainly 25 to more than 100 acres in size.

Included with these soils in mapping are areas of Scriba soils that are similar to these soils but are somewhat poorly drained. The included Scriba soils are in small wet spots, narrow drainageways, and seep spots. Symbols that indicate wet spots and field drainageways identify many areas of these Scriba soils on the soil maps. Stone fences, stone hedges, and piles of stones made during the clearing of fields are prominent features on the landscape.

These soils are suited to some of the field crops commonly grown in the county. In many areas they are better suited to long term hay or pasture crops or to trees than to other crops. Slope, the hazard of erosion, and temporary seasonal wetness are the main limitations to use of these soils for crops. If cultivated crops are grown, a high proportion of sod crops should be included in the cropping system. Cross slope tillage, stripcropping, and diversion ditches commonly are not practical to use because of the complex slopes. Minimum tillage and use of cover crops and mulches are practices that help to protect the soil from erosion and to improve soil tilth and water-holding capacity. Droughtiness is a more serious problem on these soils than on Ira and Sodus soils that are less sloping. Coarse fragments and slope hinder some tillage operations. Randomly placed drains for wet spots benefit some areas.

Slow permeability in the fragipan and substratum, slope, and temporary seasonal wetness are the main limitations for most nonfarm uses. Capability subclass IVe.

IUD—Ira and Sodus very stony soils, moderately steep. These soils have a profile similar to the one described as representative of the series, except the surface layer has a higher content of stones and the fragipan is closer to the surface. Some areas of this map unit consist of Ira soils, some consist of Sodus soils, and a few consist of both soils. The surface layer of these soils, excluding stones, cobbles, and gravel, is mainly fine sandy loam. The surface layer of the Sodus soil is loam in places. Stones and a few boulders are about 5 to 30 feet apart on the surface. These soils are on hillsides and valley sides. Slopes range from 15 to 25 percent. Individual areas are mostly oblong in shape and are mainly 25 to 200 acres in size.

Included with these soils in mapping are small areas of the somewhat poorly drained Scriba soils and the poorly drained to very poorly drained Sun soils along drainageways and in seep spots. Some areas of soils that have slopes of 8 to 15 percent are also included.

These soils are not suited to field crops, because large surface stones and the moderately steep slopes make the use of modern tillage implements impractical. In most areas these soils are better suited to permanent pasture or woodland than to other uses. Pasture commonly is poor in quality because of midsummer droughtiness and the difficulty in applying lime and fertilizer and in reseeding. Removal of surface stones so that tillage equipment can be used is generally not practical because of the moderately steep slopes.

Slope, stoniness, and slow permeability in the fragipan and substratum are the main limitations for most nonfarm uses. Some areas have potential for development of wildlife habitat. Capability subclass VIs.

Lamson series

The Lamson series consists of deep, poorly drained and very poorly drained, medium textured soils. These soils formed in glaciolacustrine deposits that consist mainly of very fine sand and fine sand. They are nearly level. They are on broad flats and in depressions mostly on lake plains.

In a representative profile, the surface layer is very dark gray very fine sandy loam 9 inches thick. The subsurface layer is pinkish gray, mottled very fine sandy loam 4 inches thick. The subsoil extends to a depth of 50 inches. The upper part of the subsoil is brown, mottled, friable very fine sandy loam 6 inches thick, and the lower part is grayish brown, friable very fine sandy loam that is 31 inches thick and has yellowish brown mottles. The substratum, to a depth of 60 inches, is gray, stratified fine sand and very fine sand.

The seasonal high water table is at or just below the surface for long periods in spring and in other excessively wet periods. In some areas these soils are subject to ponding. Permeability is moderately rapid. Roots are restricted by the seasonal high water table. In artificially drained areas, roots extend deep into the subsoil and available water capacity is moderate. The supply of nitrogen is high, but nitrogen is slowly available to plants when the soil is damp and cold. The natural content of phosphorus and potassium is low. In this soil the surface layer and upper part of the subsoil are slightly acid to mildly alkaline.

Most areas are undrained and are not used intensively for farming. Some areas support water-tolerant pasture plants, and some areas support water-tolerant brush and trees.

Representative profile of Lamson very fine sandy loam, in an idle field in the town of Hannibal, 60 feet west of N.Y. Route 34 and 2,300 feet south of Dunham Road:

Ap—0 to 9 inches; very dark gray (10YR 3/1) very fine sandy loam; very dark grayish brown (10YR 3/2) when rubbed; strong coarse granular structure; very friable; many roots; neutral; abrupt wavy boundary.

A2g—9 to 13 inches; pinkish gray (7.5YR 6/2) very fine sandy loam; common fine distinct yellowish brown (10YR 5/6) mottles, mainly horizontally oriented; moderate thick platy structure; friable; common roots; neutral; abrupt wavy boundary.

B21g—13 to 19 inches; brown (7.5YR 5/2) very fine sandy loam; many medium distinct strong brown (7.5YR 5/6) mottles; weak medium prismatic structure parting to weak medium subangular blocky; friable; few roots; neutral; clear wavy boundary.

B22g—19 to 50 inches; grayish brown (10YR 5/2) very fine sandy loam; yellowish brown (10YR 5/6) mottles in root channels and in horizontal streaks; massive; friable; few roots; mildly alkaline; abrupt wavy boundary.

IICg—50 to 60 inches; gray (N 5/0) stratified fine sand and very fine sand; massive; slightly sticky; strongly calcareous; moderately alkaline.

The thickness of the solum ranges from 30 to 50 inches. Depth to carbonates is slightly less than 30 inches to 50 inches, and depth to bedrock is more than 5 feet. Coarse fragments are absent or are very few in number. Reaction is slightly acid to mildly alkaline in the upper part of the solum and moderately alkaline in the substratum. Alkalinity increases with increasing depth in the substratum.

In the Ap horizon, hue is 10YR to 2.5Y, value is 2 or 3, and chroma is 1 or 2.

In the A2g horizon, hue is 10YR or 7.5YR, value is 4 to 6, and chroma is 2 to 4. The redder hues are associated with areas of Medina Sandstone. Mottles are common or many. Texture ranges from fine sandy loam to very fine sandy loam.

In the Bg horizon, hue is 10YR or 7.5YR, value is 4 or 5, and chroma is 1 to 3. Texture ranges from fine sandy loam to very sandy loam. Consistence is friable or very friable.

Texture of the Cg horizon ranges from stratified fine sand to very fine sand. Consistence is mostly friable but ranges from loose to firm.

The Lamson soils form a drainage sequence with Minoa soils and Minoa variant soils. Minoa soils are somewhat poorly drained, and the Minoa variant soils are moderately well drained. Lamson soils are not so silty as the nearby Raynham and Canandaigua soils. They have a higher clay content in the subsoil than the poorly drained and very poorly drained, sandy Granby soils.

Lf—Lamson very fine sandy loam. This is a nearly level soil that formed in glaciolacustrine deposits that consist mainly of very fine sand and fine sand. It is in flats and depressions. Slopes range from 0 to 3 percent. Some areas are broad and nearly circular and are as much as 100 acres in size, and some are long and narrow and are mainly 10 to 50 acres in size. A few acres at the edge of organic deposits are very narrow.

Included with this soil in mapping are areas of the somewhat poorly drained Minoa soils on knolls, benches, and low ridges. Some areas of soils that have a surface layer of mucky very fine sandy loam and a few small areas of Palms soils in places where organic deposits are more than 16 inches thick are also included.

Prolonged wetness is the main limitation to the use of this soil for farming. If undrained, this soil is suited to water-tolerant pasture plants and trees. If adequate outlets are available, this soil responds well to subsurface drainage. Drainage outlets are difficult to locate in some places, however, because of the low position of this soil on the landscape. Special practices, for example, the use of wrapped joints or filters, are needed in places to prevent sand from plugging drains. If properly drained, this soil is well suited to field crops and some vegetable crops. It is free of coarse fragments. Management practices that include minimum tillage and use of cover crops help to maintain good soil tilth and a high content of organic matter. In drained areas this soil has excellent response to applications of fertilizer.

Prolonged wetness is the main limitation to most nonfarm uses of this soil. During the installation of underground utilities, sidewalls of excavations are unstable because the soil is saturated with water. Capability subclass IIIw.

Madalin series

The Madalin series consists of deep, poorly drained and very poorly drained soils that have a medium textured surface layer and a moderately fine textured to fine textured subsoil. These soils formed in glaciolacustrine deposits that consist mainly of clay and silt. They are nearly level and are in low flats and small basinlike areas.

In a representative profile, the surface layer is very dark gray silt loam 6 inches thick. The subsoil extends to a depth of 42 inches. The upper part of the subsoil is gray, mottled silty clay loam 4 inches thick; the middle part is brown, mottled, very plastic silty clay 15 inches thick; and the lower part is gray, plastic silty clay 17 inches thick. The substratum, to a depth of 50 inches, is light olive brown silty clay.

The seasonal high water table is at or near the surface for long periods in spring and in other excessively wet periods. Permeability is moderately slow in the surface layer and slow in the subsoil and substratum. In undrained areas, roots are restricted mostly to the surface layer and upper part of the subsoil by the seasonal high water table. In drained areas, roots penetrate to a greater depth and available water capacity is moderate. The natural content of nitrogen is high, but it is slowly available to plants when the soil is wet. The natural content of available phosphorus is medium, and the content of available potassium is high. Unless the soil is limed, the surface layer and upper part of the suboil are medium acid to neutral.

Madalin soils are not used extensively for farming because of prolonged wetness. Some areas of these soils are partially drained and are in pasture. Many areas are in water-tolerant trees or brush.

Representative profile of Madalin silt loam, in a meadow in the town of West Monroe, 800 feet east of the end of O'Mara Road:

Ap—0 to 6 inches; very dark gray (10YR 3/1) silt loam, gray (10YR 5/1) when dry; common medium distinct yellowish brown (10YR 5/6) mottles; weak fine subangular blocky structure; slightly plastic; many roots; slightly acid; abrupt smooth boundary.

B1g—6 to 10 inches; gray (10YR 5/1) silty clay loam; many coarse distinct yellowish brown (10YR 5/6) mottles; weak medium prismatic structure parting to weak medium subangular blocky; plastic; many roots; few fine pores; neutral; clear wavy boundary.

B2tg—10 to 25 inches; brown (7.5YR 5/2) silty clay; many medium distinct yellowish brown (10YR 5/4) mottles; strong coarse prismatic structure parting to strong coarse angular blocky; very plastic; common roots; few fine pores; gray (10YR 5/1) clay films on faces of peds and in pores; neutral; clear wavy boundary.

B3—25 to 42 inches; gray (10YR 5/1) silty clay; moderate coarse prismatic structure parting to moderate medium angular blocky; plastic; few fine roots; few fine pores; light gray (10YR 7/1) lime coatings in pores and root channels; weakly calcareous; mildly alkaline; clear wavy boundary.

C—42 to 50 inches; light olive brown (2.5Y 5/4) varved silty clay; weak medium platy structure; plastic; coatings of very fine sandy loam and silt on faces of peds; calcareous; moderately alkaline.

The thickness of the solum and depth to carbonates range from 24 to 44 inches. Depth to bedrock is more than 5 feet. Coarse fragments are typically absent, but in some profiles they make up as much as 5 percent of the soil material. The coarse fragments are cobbles and gravel. Reaction ranges from medium acid to neutral in the upper part of the solum and is neutral or mildly alkaline in the lower part of the solum. Alkalinity increases with increasing depth.

In the Ap horizon, hue is dominantly 10YR, value is 2 or 3, and chroma is 1 or 2. When dry, the Ap horizon has value of 4 or 5.

The B horizon has hue of 10YR or 7.5YR and value of 5 or 6. Chroma is 1 or 2 in 60 percent or more of the material in the B horizon to a depth of 30 inches. Texture of the B horizon is silty clay loam, silty clay, or clay.

In the C horizon, hue is 10YR or 2.5Y, value is 4, 5, or 6, and chroma is 1 to 4. Mottles decrease in number with increasing depth or are absent. Where present, mottles are less contrasting than in the B horizon. In many places chroma of 1 or 2 is the result of lime coatings on the surfaces of peds. Texture is silty clay or clay, but some profiles have coatings of very fine sand or silt on peds. In some profiles there are thin to medium laminae of silt and silty clay.

Madalin soils form a drainage sequence with Hudson, Rhinebeck, and Fonda soils. The Hudson soils are well drained and moderately well drained, the Rhinebeck soils are somewhat poorly drained, and the Fonda soils are very poorly drained. Madalin soils have a lower organic-matter content in the surface layer than the Fonda soils. Madalin soils commonly are near Raynham and Canandaigua soils. Raynham soils are somewhat poorly drained and poorly drained, and Canandaigua soils are poorly drained and very poorly drained. Madalin soils have a higher clay content in the subsoil than those soils.

Ma—Madalin silt loam. This is a nearly level soil that formed in lacustrine deposits that consist mainly of clay and silt and are free of coarse fragments. It is in low broad flats, basinlike areas, and narrow areas along drainageways. Slopes range from 0 to 3 percent. Individual areas are mainly 4 to more than 250 acres in size.

Included with this soil in mapping are small areas of mucky Fonda soils in depressions lower on the landscape than this Madalin soil. Also included are a few areas of Palms soils in places where organic deposits are more than 16 inches thick, a few areas of Raynham and Canandaigua soils in places where the deposits are mainly silty, and some small areas of Swanton soils in places that have a thin, sandy mantle.

In undrained areas this soil is used mostly for water-tolerant pasture grasses and trees or is idle. Wetness is the main limitation to the use of this soil for crops. If adequate outlets are available, a combination of surface and subsurface drains generally is needed to provide proper drainage. To be effective, subsurface drains should be closely spaced because of the slowly permeable subsoil. If adequately drained, this soil is suited to many field crops and some vegetable crops. Tilling this soil when wet can cause surface crusting and clodding. Fall plowing, return of crop residue to the soil, use of cover crops, and minimum tillage help to maintain good soil tilth. Bedding helps to improve surface drainage if this soil is used for pasture and field crops.

Prolonged wetness, slow permeability, and the clayey subsoil are major limitations for many nonfarm uses. In some areas this soil has potential for development of marshes for wetland wildlife. Capability subclass IVw.

Massena series

The Massena series consists of deep, somewhat poorly drained and poorly drained, medium textured soils. These soils formed in glacial till derived mainly from sandstone and limestone. They are nearly level. They are in areas where runoff is slow and where a considerable amount of runoff is received.

In a representative profile, the surface layer is dark gray silt loam 7 inches thick. The subsoil extends to a depth of 27 inches. The upper part of the subsoil is yellowish brown, mottled, friable gravelly loam 13 inches thick, and the lower part is brown, mottled, friable gravelly sandy loam 7 inches thick. The substratum, to a depth of 50 inches, is yellowish brown, firm gravelly fine sandy loam.

The seasonal high water table rises into the upper part of the subsoil early in spring and in other excessively wet periods. It commonly is perched above the substratum. Permeability is moderate in the surface layer and slow or moderately slow in the subsoil and substratum. In spring, roots of crops are mainly in the upper 12 inches; however, as the growing season progresses and the water table drops, roots extend to the substratum. Available water capacity is moderate to high. Natural content of nitrogen is medium, and the content of phosphorus and potassium is low. Nitrogen is released slowly to plants early in spring, when the soil is damp and cold. Unless the soil is limed, the surface layer and subsoil are medium acid to neutral.

Massena soils are used for some field crops, and for pasture and woodland. Because of seasonal wetness, some areas are idle and are reverting to brush and trees.

Representative profile of Massena silt loam, in an idle field in the town of Hannibal, 80 feet south of Miner Road between N.Y. Route 34 and County Route 21:

Ap—0 to 7 inches; dark gray (10YR 4/1) silt loam; moderate fine granular structure; very friable; 5 percent coarse fragments; many roots; slightly acid; abrupt smooth boundary.

B2—7 to 20 inches; yellowish brown (10YR 5/4) gravelly loam; many medium faint grayish brown (10YR 5/2) mottles; weak medium subangular blocky structure; friable; few roots; few pores; brown (7.5YR 5/2) coatings on peds; 20 percent coarse fragments; neutral; clear wavy boundary.

B3—20 to 27 inches; brown (7.5YR 5/4) gravelly sandy loam; few medium distinct yellowish brown (10YR 5/6) and many medium distinct brownish yellow (10YR 6/8) mottles; weak medium subangular blocky structure; friable; 30 percent coarse fragments; few roots; few pores; brown (7.5YR 5/2) coatings on surfaces of peds; neutral; abrupt wavy boundary.

C—27 to 50 inches; yellowish brown (10YR 5/6) gravelly fine sandy loam; weak medium platy structure; firm; 20 percent coarse fragments; gray (10YR 6/1) zones of lime accumulation; weakly calcareous; mildly alkaline.

The thickness of the solum and the depth to carbonates range from 24 to 36 inches. Coarse fragments make up 5 to 35 percent, by volume, of the solum and 15 to 50 percent of the substratum. The solum is medium acid to neutral.

In the Ap horizon, hue is 10YR or 7.5YR, value is 3 or 4 wet and 6 or higher dry, and chroma is 1 or 2.

In the B horizon, hue is 10YR to 7.5YR, value is 4, 5, or 6, and chroma is 2, 3, or 4. On faces of peds in the matrix in the B horizon, chroma is 2 or lower. Texture ranges from sandy loam to loam and is fine sandy loam and its gravelly analogs in places. In some places there is no B3 horizon.

The C horizon has color similar to that of the B horizon. Texture ranges from sandy loam or fine sandy loam to loam and includes gravelly and very gravelly analogs of these textures. Consistence is firm or very firm.

The Massena soils commonly are near Ira, Scriba, and Sun soils and formed in glacial till similar to that in which those soils formed. Ira soils are moderately well drained, Scriba soils are somewhat poorly drained, and Sun soils are poorly drained and very poorly drained. Massena soils are less acid than those soils and do not have a fragipan, which those soils have. They commonly are associated with Raynham soils but have more coarse fragments.

Me—Massena silt loam. This is a nearly level soil on the top of elongated hills on undulating plains and in low areas between these hills. Also, it commonly is along narrow drainageways and in small basinlike areas on glacial till plains. Slopes range from 0 to 3 percent and commonly are slightly concave. In many areas this soil receives runoff from adjacent soils. It is mainly somewhat poorly drained. Individual areas vary in shape and are mainly 3 to 30 acres in size.

Included with this soil in mapping are areas of moderately well drained Ira soils, somewhat poorly drained Scriba soils, and poorly drained and very poorly drained Sun soils. Also included are small areas of silty Raynham soils and sandy Lamson soils that are free of coarse fragments. Some areas are crossed by intermittent drainageways that are indentified on the soil map by a special symbol.

If undrained, this soil is not well suited to most field crops because of seasonal wetness; however, the use of interceptor drains to divert runoff and seepage improves many areas. Randomly placed drains for wet spots are needed in many places. To be effective in some places, subsurface drains should be closely spaced because of slow permeability in the subsoil and substratum. If drained, these soils are suited to many of the field crops commonly grown in the county, but liberal applications of fertilizer are needed to obtain optimum yields. Minimum tillage and the use of cover crops help to maintain good soil tilth in intensively cultivated areas. In undrained areas this soil is suited to hay and pasture crops that can tolerate wetness early in the growing season.

Seasonal wetness and moderately slow or slow permeability are the main limitations for nonfarm uses. Artificial drainage is generally required around foundations for buildings. Capability subclass IIIw.

Middlebury series

The Middlebury series consists of deep, moderately well drained, medium textured to moderately coarse textured soils. These soils formed in recent alluvial sediment that was washed from upland glacial drift derived mostly from sandstone. Middlebury soils are nearly level. They are on flood plains along rivers and streams.

In a representative profile, the surface layer is dark brown loam 7 inches thick. The subsoil extends to a depth of 32 inches. The upper part of the subsoil is brown, friable very fine sandy loam 6 inches thick; the middle part is brown, friable fine sandy loam 8 inches thick; and the lower part is brown, mottled, friable fine sandy loam 11 inches thick. The substratum, to a depth of 60 inches, is light gray, friable fine sandy loam.

These soils are subject to flooding in spring, especially when ice jams occur in rivers and streams. A temporary seasonal high water table rises into the subsoil early in spring. Depth to the water table is somewhat controlled by the water level in the adjacent stream. Permeability is moderate. Roots are mainly restricted to the subsoil, but some roots extend deeper as the water table lowers late in spring. Available water capacity is high. Total natural content of nitrogen, available phosphorus, and potassium is medium. Unless limed, these soils are strongly acid to slightly acid.

Middlebury soils are used for crops and pasture. In some areas they are in woodland or are idle.

Representative profile of Middlebury loam, in an idle field in the town of Oswego, one-fourth mile north of the point where Parkhurst Road crosses the Oswego County Line:

Ap—0 to 7 inches; dark brown (10YR 3/3) loam, light brownish gray (10YR 6/2) when dry; strong medium granular structure; very friable; many roots; medium acid; abrupt smooth boundary.

B21—7 to 13 inches; brown (10YR 5/3) very fine sandy loam; weak coarse subangular blocky structure; friable; common fine pores; many roots; medium acid; clear wavy boundary.

B22—13 to 21 inches; brown (10YR 5/3) fine sandy loam; weak medium subangular blocky structure; friable; common light brownish gray (10YR 6/2) roughly circular bodies rimmed with yellowish brown (10YR 5/6); common fine pores; common roots; medium acid; gradual wavy boundary.

B3—21 to 32 inches; brown (7.5YR 5/4) fine sandy loam; common medium distinct light brownish gray (2.5Y 6/2) mottles; weak medium subangular blocky structure; friable; few roots; medium acid; clear smooth boundary.

C—32 to 60 inches; light gray (10YR 7/2) fine sandy loam; many medium distinct strong brown (7.5YR 5/6) mottles; massive; friable; slightly acid.

The thickness of the solum ranges from 20 to 36 inches. Depth to bedrock is more than 5 feet. Gravelly deposits are in some profiles, mainly at a depth of more than 40 inches. Coarse fragments make up 0 to 20 percent, by volume, of individual horizons or layers, but they generally are absent. Unless the soil is limed, reaction is strongly acid to slightly acid.

In the Ap horizon, hue is mostly 10YR, value is 3 or 4, and chroma is 2 or 3. Structure is weak to strong medium and fine granular.

In the B horizon, hue is 10YR or 2.5Y, value is 4 or 5, and chroma is 3 or 4. There are few or common distinct mottles that have chroma of 2 or lower at a depth of 12 to 24 inches. Texture ranges from fine sandy loam to silt loam and includes loam. In places it is gravelly analogs of these textures. Structure ranges from weak medium and coarse subangular blocky to weak and moderate fine granular.

The C horizon has distinct or prominent mottles in some profiles. Texture is dominantly fine sandy loam, but in places it is loam and silt loam and gravelly analogs of these textures. Structure is platy, or the material is massive.

Middlebury soils form a drainage sequence with the Rumney soils and formed in material similar to that in which those soils formed. Rumney soils are somewhat poorly drained to poorly drained. Middlebury soils commonly are near Fluvaquents and Udifluvents, frequently flooded, but are less variable in soil characteristics and less frequently flooded than those soils.

Mf—Middlebury loam. This is a nearly level soil that formed in recent alluvium deposited by flooding from streams. Slopes range from 0 to 3 percent. Individual areas are commonly irregular in shape because of the adjacent meandering streams. They are mainly 5 to 20 acres in size.

Included with this soil in mapping are the wetter Rumney soils in depressions, slack water areas, and remnant meander scars. Small areas of Fluvaquents and Udifluvents, frequently flooded, are also included. A few areas of soils that have sandstone bedrock at a depth of less than 60 inches are included in places where rivers and streams are downcutting rapidly. Also included are a few small areas of soils that are similar to this Middlebury soil but are well drained; these soils are on slightly elevated benches adjacent to streams.

This soil is suited to most crops commonly grown in the county. It is well suited to hay and pasture crops that can tolerate wetness for short periods in spring. Because this soil is nearly free of coarse fragments, it is easy to till. In some years, however, planting is delayed by temporary wetness or flooding late in spring. Streambank erosion is a problem in some areas, and special practices are needed to control it. Land leveling of scours and depressions and subsurface drainage for wet spots in places where outlets are available improve many areas. Use of cover crops and sod crops and return of crop residue to the soil help to maintain good soil tilth and to protect the surface from flood scour. Minimum tillage is effective on this soil. Access to some small areas is difficult.

The hazard of flooding and temporary seasonal wetness are the main limitations for nonfarm uses. Some areas around villages are better suited to use as open space corridors than to other uses. Capability subclass IIw.

Minoa series

The Minoa series consists of deep, somewhat poorly drained soils that formed in glaciolacustrine deposits that are mainly very fine sand. They are nearly level. They are on moderately low benches and in broad flats.

In a representative profile, the surface layer is dark brown very fine sandy loam 8 inches thick. The subsoil extends to a depth of 31 inches. The upper part of the subsoil is brown loamy very fine sand 10 inches thick that is mottled in the lower 4 inches; the middle part is strong brown, mottled, firm very fine sandy loam 8 inches thick; and the lower part is brown, mottled, loose loamy very fine sand 5 inches thick. The substratum is dark brown, loose loamy very fine sand to a depth of 42 inches and brown very fine sandy loam to a depth of 60 inches.

A seasonal high water table is in the subsoil early in spring. Permeability is moderate in the surface layer and subsoil and moderate or moderately rapid in the substratum. In undrained areas roots are mostly restricted to the upper part of the subsoil early in the growing season; however, as the water table lowers in summer, some roots extend to the substratum. Available water capacity is moderate to high. Natural content of total nitrogen is medium, but the content of phosphorus and potassium is low. Unless the soil is limed, the surface layer and subsoil are strongly acid to neutral.

In a few areas Minoa soils are used intensively for farming. Because of seasonal wetness, in many areas they are used for pasture or remain in native woodland. In some areas that previously were cropped, they are idle.

Representative profile of Minoa very fine sandy loam, in a cultivated field in the town of Hannibal, 160 feet west of N.Y. Route 34 and 2,700 feet south of Dunham Road:

Ap—0 to 8 inches; dark brown (7.5YR 3/2) very fine sandy loam; moderate medium granular structure; very friable; many roots; medium acid; abrupt smooth boundary.

B21—8 to 14 inches; brown (7.5YR 5/4) loamy very fine sand; dark brown (7.5YR 3/2) material in old root and worm channels; weak medium granular structure; friable; common roots; medium acid; clear wavy boundary.

B22—14 to 18 inches; brown (10YR 5/3) loamy very fine sand; common medium and coarse distinct strong brown (7.5YR 5/6) mottles; weak medium platy structure; friable; few roots; neutral; clear wavy boundary.

B23—18 to 26 inches; strong brown (7.5YR 5/6) very fine sandy loam; common medium distinct pinkish gray (7.5YR 6/2) mottles; weak medium subangular blocky structure; firm; few roots; neutral; clear smooth boundary.

B3—26 to 31 inches; brown (10YR 5/3) loamy very fine sand; common medium distinct strong brown (7.5YR 5/6) mottles; single grain; loose; few roots; neutral; clear smooth boundary.

C1—31 to 42 inches; dark brown (10YR 4/3) loamy very fine sand; common medium distinct yellowish brown (10YR 5/6) mottles; single grain; loose; few roots; 3 percent gravel; mildly alkaline; clear smooth boundary.

C2—42 to 60 inches; brown (10YR 5/3) very fine sandy loam; common medium distinct strong brown (7.5YR 5/6) mottles along root channels; massive; friable, nonsticky; 3 percent gravel; moderately alkaline.

The thickness of the solum ranges from 30 to 40 inches. Depth to carbonates ranges from 40 inches to more than 50 inches, and depth to bedrock is more than 5 feet. Coarse fragments are absent or are very few in number. Reaction is strongly acid to neutral in the solum and medium acid to moderately alkaline in the substratum.

In the Ap horizon, hue is 10YR or 7.5YR, value is 3 or 4, and chroma is 2 or 3.

In the B horizon, hue is 10YR or 7.5YR, value is 4 or 5, and chroma is 3 to 6. Texture ranges mostly from loamy very fine sand to fine sandy loam but is silt loam in some places. Most of the particles are near the boundary between fine sand and very fine sand.

In the C horizon, hue is 10YR and 7.5YR, value is 4 to 6, and chroma is 2 to 4. Texture ranges from silt loam to loamy very fine sand and is loamy fine sand in some places.

The Minoa soils form a drainage sequence with the Lamson soils and Minoa variant soils. Lamson soils are poorly drained and very poorly drained, and Minoa variant soils are moderately well drained. Minoa soils have more sand than the nearby Raynham soils. They are similar to the sandy Naumburg soils but are finer textured than these soils.

Mn—Minoa very fine sandy loam. This is a nearly level soil that formed in glacial lake deltaic deposits mainly of very fine sand. It is in moderately low flats and on benches. Slopes range from 0 to 3 percent. This soil commonly receives subsurface seepage from higher adjacent soils. Individual areas are oblong or roughly rectangular in shape and are mainly 5 to nearly 100 acres in size.

Included with this soil in mapping are moderately well drained Minoa variant soils on small knolls and wetter Lamson soils and silty Raynham soils in narrow drainageways and depressions.

If undrained, this soil is best suited to hay and pasture plants that can tolerate wetness early in the growing season. If drained, it is suited to most crops commonly grown in the county, especially vegetable crops. This soil is free of coarse fragments. Subsurface drains function well where outlets are available. Special practices, for example, using filters or wrapping tile joints, are needed in places to prevent sand from plugging the drains. If this soil is tilled at the proper moisture content, it is easy to till and generally does not crust or clod. Using cover crops, return of crop residue to the soil, and minimum tillage are practices that help to maintain good soil tilth if this soil is used intensively for row crops. In drained areas this soil has excellent response to applications of lime and large amounts of fertilizer.

Seasonal wetness is the main limitation to use of this soil for nonfarm purposes. Sidewalls of excavations are unstable during the installation of underground utilities. Capability subclass IIIw.

Minoa variant

The Minoa variant consists of deep, moderately coarse textured soils that formed in glaciolacustrine deposits that consist mainly of fine sand. These soils are nearly level and gently sloping. They are on deltaic benches, in broad flats, and on undulating plains.

In a representative profile, the surface layer is dark brown fine sandy loam 9 inches thick. The subsoil extends to a depth of 38 inches. The upper part of the subsoil is yellowish brown, very friable fine sandy loam 8 inches thick; the middle part is brownish yellow, mottled, very friable fine sandy loam 11 inches thick; and the lower part consists of interbedded layers of light brownish gray, dark brown, and brown fine sandy loam 10 inches thick. The substratum, to a depth of 54 inches, is brown, friable loamy fine sand.

The seasonal high water table is in the middle part of the subsoil for brief periods early in spring. Permeability is moderate in the surface layer and subsoil and moderate or moderately rapid in the substratum. Most roots are restricted to the layers above the water table in spring; as the growing season progresses, however, the water table lowers and roots extend to the substratum. Available water capacity is moderate. Natural supply of nitrogen is medium to low. The natural ability of this soil to supply phosphorus and potassium is low. Unless the soil is limed, the surface layer and subsoil are strongly acid to neutral.

Some areas of these soils are used intensively for farming. Many areas are in pasture or woodland or are idle.

Representative profile of Minoa fine sandy loam, moderately well drained variant, 0 to 6 percent slopes, in an idle field in the town of New Haven, 700 feet east of Darrow Road and 1/4-mile south of Stone Road:

Ap—0 to 9 inches; dark brown (10YR 4/3) fine sandy loam; weak medium granular structure; very friable; many roots; slightly acid; abrupt smooth boundary.

B21—9 to 17 inches; yellowish brown (10YR 5/6) fine sandy loam; weak fine granular structure; very friable; few roots; common pores; medium acid; clear wavy boundary.

B22—17 to 28 inches; brownish yellow (10YR 6/6) fine sandy loam; common medium distinct yellowish brown (10YR 5/8) mottles; weak fine subangular blocky structure parting to weak fine granular; very friable; few roots; common pores; medium acid; gradual wavy boundary.

B23—28 to 38 inches; interbedded layers of light brownish gray (10YR 6/2), dark brown (10YR 4/3), and brown (10YR 5/3) fine sandy loam;

weak thick platy structure parting to weak fine subangular blocky; firm to friable; few roots; few pores; slightly acid; clear wavy boundary.

IIC—38 to 54 inches; brown (10YR 5/3) loamy fine sand; massive; friable; slightly acid.

The thickness of the solum ranges from 20 to 40 inches. Depth to carbonates ranges from 40 inches to more than 60 inches, and depth to bedrock is more than 5 feet. Coarse fragments generally are absent but they make up 5 percent, by volume, of the soil material in some horizons. Reaction is strongly acid to neutral in the solum and medium acid to mildly alkaline in the substratum.

In the Ap horizon hue is 10YR or 7.5YR and chroma is 2 or 3. Value of moist soil is 3 or 4, and value of dry soil is more than 5.5.

In some places there is a thin, leached A2 horizon. Where present, this horizon has hue of 10YR or 7.5YR. Texture is loamy fine sand to fine sandy loam.

In the B horizon, hue is 10YR to 5YR, value is 4, 5, or 6, and chroma is 2 to 6. Texture is dominantly fine sandy loam, but in places this horizon has thin strata of loamy fine sand or sandy loam within a depth of 40 inches.

The C horizon has colors similar to those of the B horizon, except chroma is lower with increasing depth. Texture is dominantly fine sand, and thin laminae of silt and very fine sand are common.

The Minoa variant formed in material similar to that in which Minoa and Lamson soils formed. Minoa soils are somewhat poorly drained, and Lamson soils are poorly drained and very poorly drained. Minoa variant soils are near Williamson soils, but they have less silt than Williamson soils and do not have a fragipan, which those soils have. They are similar to Elmwood soils but do not have a clayey substratum, which those soils have.

MoB—Minoa fine sandy loam, moderately well drained variant, 0 to 6 percent slopes. This nearly level and gently sloping soil formed in glaciolacustrine deposits on deltas, sandbars, benches, and plains that are remnants of glacial lakes. Slopes are mostly convex or undulating. Individual areas are nearly circular or oblong in shape and are mainly 6 to 30 acres in size.

Included with this soil in mapping are somewhat poorly drained Minoa soils and the poorly drained and very poorly drained Lamson soils along drainageways and in small depressions. Also included are the better drained Oakville and Windsor soils on slightly elevated ridges and small knolls. A few small areas of a soil that is similar to this Minoa variant soil but has finer textured bands as much as 6 inches thick in the subsoil are also included.

This soil is suited to most crops commonly grown in the county. Temporary wetness slightly delays tillage operations early in spring in some years. Randomly placed surface and subsurface drains help to lower the water table and to eliminate wet spots in some areas. Because this soil is free of stones and coarse fragments, it has potential for midseason vegetable crops. If winter cover crops, crop residue, and minimum tillage are used to maintain good soil tilth, this soil can be intensively cultivated. These practices and the use of cross slope tillage where feasible help to control the hazard of erosion and soil blowing. This soil has excellent response to applications of lime and fertilizers, except droughtiness is a problem in some years. If sprinkler irrigation is used, this soil has potential for high value crops.

Temporary seasonal wetness and the instability of the sandy deposits are the main limitations for most nonfarm uses. Capability subclass IIw.

Naumburg series

The Naumburg series consists of deep, somewhat poorly drained and poorly drained, coarse textured soils. These soils formed in glaciofluvial and glaciolacustrine deposits that are mainly fine sand and sand. They are nearly level and gently sloping. They are on moderately low broad flats and plains.

In a representative profile, the surface layer is dark gray loamy fine sand 8 inches thick. The subsurface layer is pinkish gray, friable loamy fine sand 6 inches thick. The subsoil extends to a depth of 38 inches. The upper part of the subsoil is dark reddish brown, mottled loamy fine sand 2 inches thick that has an accumulation of organic matter; the middle part is reddish yellow, mottled, loose loamy fine sand 8 inches thick; and the lower part is yellowish brown, mottled, loose loamy sand 14 inches thick. The substratum, to a depth of 50 inches, is dark grayish brown, loose sand.

The seasonal high water table is near the surface or within the upper part of the subsoil in spring. Permeability is moderately rapid in the surface layer and rapid below that. Roots are restricted by the seasonal high water table. In drained areas, root penetration is excellent but available water capacity is low to a depth of 40 inches. Total nitrogen content is medium, but nitrogen is slowly available to plants when the soil is wet and cold. The natural ability of these soils to supply phosphorus and potassium to plants is low. Unless the soil is limed, the surface layer and subsoil are extremely acid to strongly acid.

Naumburg soils are not used extensively for farming because of seasonal wetness. A few areas of these soils are drained and are used for crops. Some areas are in water-tolerant pasture plants. Many areas are in brush or trees or are idle.

Representative profile of Naumburg loamy fine sand, in an idle field in the town of Richland, 200 feet west of Valley Road and 150 feet north of point where Valley Road crosses the town limits of the towns of Mexico and Richland:

Ap—0 to 8 inches; dark gray (10YR 4/1) loamy fine sand; weak medium granular structure; friable; many roots; medium acid; abrupt smooth boundary.

A2—8 to 14 inches; pinkish gray (7.5YR 6/2) loamy fine sand; single grain; friable; common roots; many pores; medium acid; abrupt wavy boundary.

B21h—14 to 16 inches; dark reddish brown (5YR 3/2) loamy fine sand; few medium distinct dark brown (7.5YR 4/2) mottles; weak coarse subangular blocky structure; friable and firm; common roots; many pores; medium acid; gradual wavy boundary.

B22ir—16 to 24 inches; reddish yellow (7.5YR 6/6) loamy fine sand; many medium faint strong brown (7.5YR 5/6) and few fine distinct dark reddish brown (5YR 3/2) mottles; weak coarse subangular blocky structure; loose; few roots; common pores; medium acid; gradual wavy boundary.

B3—24 to 38 inches; yellowish brown (10YR 5/4) loamy sand; many medium faint yellowish brown (10YR 5/6) mottles; single grain; loose; medium acid; gradual wavy boundary.

C—38 to 50 inches; dark grayish brown (10YR 4/2) sand; single grain; loose; medium acid.

The thickness of the solum ranges from 18 to 38 inches. Depth to bedrock is more than 6 feet. Coarse fragments generally are absent, but in a few profiles they make up as much as 5 percent, by volume, of the soil material in some horizons. Unless the soil is limed, reaction in the solum is extremely acid to slightly acid.

In some areas of woodland and pastureland, there is a black O2 horizon 3 to 5 inches thick.

In the Ap horizon, hue is dominantly 10YR but is 7.5YR in places, value is 3 or 4, and chroma is 1 or 2.

In the A2 horizon, hue is 7.5YR, value is 5 to 7, and chroma is 2 or 3. Texture ranges from loamy fine sand to sand.

In the B horizon, hue is 10YR to 5YR, value is 3 to 6, and chroma is 2 to 6. Texture ranges from loamy fine sand to fine sand or is sand. Structure is weak subangular blocky, or the material is massive. Consistence is firm to loose.

In the C horizon, hue is 10YR to 5YR, value is 4, 5, or 6, and chroma is 2, 3, or 4. Texture is loamy fine sand, fine sand, or sand.

The Naumburg soils form a drainage sequence with the Adams, Deerfield, and Granby soils and formed in material similar to that in which those soils formed. Adams soils are excessively drained, Deerfield soils are moderately well drained, and Granby soils are poorly drained and very poorly drained. Naumburg soils have fewer coarse fragments than the nearby somewhat poorly drained and poorly drained Fredon soils.

Na—Naumburg loamy fine sand. This is a nearly level soil that formed in sandy, glaciolacustrine and glaciofluvial deposits. It is on broad flats, concave foot slopes, and in slight depressions. Slopes range from 0 to 3 percent. Individual areas are irregular in shape and are mainly 5 to 100 acres in size.

Included with this soil in mapping are small areas of the gravelly Fredon and Halsey soils. Areas of the wetter Granby soils in deep depressions and along drainageways, and areas of moderately well drained Deerfield soils on slightly elevated knolls and benches are also included.

If undrained, this soil is better suited to water-tolerant hay and pasture crops than to other crops. If drained, it is suited to field crops and some vegetable crops. If outlets are available, subsurface drains function well. Special practices, for example, use of filters, are generally required to prevent sloughing and flowing sand from clogging subsurface drains. Sloughing sand also is a problem in establishing open ditches. If drained, this soil is easy to till and responds exceptionally well to lime and fertilizer. It is free of coarse fragments. In midsummer, droughtiness is a hazard in overdrained areas. Soil blowing is a slight hazard in open cultivated areas. Minimum tillage, use of cover crops, and return of crop residue to the soil help to maintain organic-matter content and good soil tilth.

Seasonal wetness is the main limitation for nonfarm uses. Ditchbanks and sidewalls of excavations for underground utilities are very unstable. Capability subclass IIIw.

NDB—Naumburg-Duane complex, gently sloping. The Naumburg soil in this complex has a profile similar to the one described as representative for the series, except the subsoil is slightly thinner. The Duane soil has the profile described as representative for the series. These soils are so intermingled that it was not practical to map them separately. The Naumburg soil makes up 60 percent of the complex and the Duane soil makes up 25 percent. The surface layer of the Naumburg soil is loamy fine sand, and the surface layer of the Duane soil is very gravelly sand. The Naumburg soil is somewhat poorly drained to poorly drained. It is on concave foot slopes, toeslopes, plains, and flats. The Duane soil is moderately well drained. It is on terraces, benches, and convex knolls in a slightly higher position on the landscape than the Naumburg soil. Slopes range from 2 to 6 percent. Individual areas commonly are elongated in shape and about 5 to 50 acres in size.

Included with these soils in mapping are areas of the better drained, sandy Adams and Windsor soils on a few small knolls and ridges in a higher position on the landscape than the Naumburg and Duane soils. The very poorly drained, sandy Granby soils and gravelly Halsey soils in a few depressions and drainageways are also included.

Unless artificially drained, these soils, particularly the Naumburg soil, are better suited to water-tolerant hay and pasture crops than to other crops. If properly drained and managed, these soils are suited to many of the field crops commonly grown in the county. If outlets are available, subsurface drains function well; however, filters or wrapped joints may be needed to prevent sand from plugging drains. Open ditches are difficult to establish because the sandy material is subject to sloughing. Artificial drainage is needed mainly on the Naumburg soil in this complex. Droughtiness is a problem in midsummer, particularly on the drier Duane soil. Coarse fragments in the surface layer of the Duane soil slightly hinder the operation of some tillage equipment. Minimum tillage, return of crop residue to the soil, and use of cover crops help to maintain organic-matter content and good soil tilth. These practices also reduce the moderate hazards of erosion and soil blowing.

Seasonal wetness and the sandy texture are the main limitations for most nonfarm uses that require good drainage. Capability subclass IIIw.

NGB—Naumburg-Granby complex, gently sloping. The Naumburg soil in this complex has a profile similar to the one described as representative for the series, except the subsoil is slightly thinner. The Granby soil has the profile described as representative for the series. These soils are so intermingled that it was not practical to map them separately. The Naumburg soil makes up 50 percent of the complex, and the Granby soil makes up 25 percent. The surface layer is mainly loamy fine sand. These soils are on low, undulating plains and broad flats that are interspersed with depressions and drainageways. The Naumburg soil is in a slightly higher position on the landscape than the wetter Granby soil. Slopes range from 2 to 6 percent. Individual areas are oblong or irregular in shape and are mainly 5 to 50 acres in size.

Included with these soils in mapping are small areas of the better drained Adams, Windsor, and Deerfield soils on slightly elevated ridges and knolls. Also included are a few small areas of somewhat poorly drained and poorly drained Fredon soils and very poorly drained Halsey soils in places where there are pockets of gravelly deposits. A few areas of Palms muck in deep depressions are also included.

If undrained, these soils are better suited to water-tolerant pasture plants than to cultivated crops. Some areas are subject to ponding for brief periods early in spring. These soils are free of coarse fragments. If properly drained, they are suited to many of the field crops and to some of the midseason vegetable crops commonly grown in the county. Drainage outlets are extremely difficult to locate in places because of the low position of these soils on the landscape. If suitable outlets are available, subsurface drains function well; however, filters or wrapped joints are needed in places to prevent sand from plugging drains. Drains can generally be widely spaced, because permeability is rapid. Open ditches commonly are difficult to establish, because the saturated sandy material is subject to sloughing and flowing. Droughtiness is a hazard late in summer, particularly in overdrained areas. Minimum tillage, return of crop residue to the soil, and use of cover crops help to maintain organic-matter content and good soil tilth. These and other practices are needed in places to reduce the hazard of erosion and soil blowing. In drained areas, these soils have excellent response to liberal applications of lime and fertilizer.

Prolonged seasonal wetness and the instability of the sandy material are the main limitations for most nonfarm uses. Capability subclass IVw.

Oakville series

The Oakville series consists of deep, well drained, coarse textured soils. These soils formed in glaciolacustrine, glaciofluvial, and eolian deposits that are mainly fine sand. They are nearly level to gently sloping. They are on terraces, low dunes, remnant beach ridges, and sandbars and deltas of postglacial lakes.

In a representative profile, the surface layer is dark brown loamy fine sand 7 inches thick. The subsoil extends to a depth of 36 inches. The upper part of the subsoil is strong brown, loose fine sand 12 inches thick, and the lower part is brownish yellow, loose fine sand 17 inches thick. The substratum, to a depth of 55 inches, is light yellowish brown fine sand.

The seasonal high water table is generally at a depth of more than 6 feet. Permeability is rapid in the surface layer and very rapid below that. Roots are not restricted, but most are within 3 feet of the surface. Available water capacity is low. The natural ability of these soils to supply nitrogen, phosphorus, and potassium to plants is low. Unless the soil is limed, the surface layer and subsoil are medium acid to neutral.

Some areas of these soils are farmed. Droughtiness and low natural fertility of these soils somewhat limit their use for crops. A few areas are in pasture, and many areas are in woodland or are idle.

Representative profile of Oakville loamy fine sand, 0 to 6 percent slopes, in a meadow in the town of Volney, 300 feet north of Bateman Road, halfway between County Route 6 and Red Brick Schoolhouse Road:

Ap—0 to 7 inches; dark brown (10YR 3/3) loamy fine sand; weak coarse granular structure; very friable; many roots; medium acid; abrupt smooth boundary.

B2—7 to 19 inches; strong brown (7.5YR 5/6) fine sand; single grain; loose; many roots; many pores; medium acid; gradual wavy boundary.

B3—19 to 36 inches; brownish yellow (10YR 6/6) fine sand; single grain; loose; common roots; many pores; slightly acid; gradual wavy boundary.

C—36 to 55 inches; light yellowish brown (10YR 6/4) fine sand; single grain; loose; neutral.

The thickness of the solum ranges from 20 to 36 inches. Coarse fragments are generally absent, but in some profiles they make up as much as 3 percent by volume, of the soil material. Reaction in the solum is medium acid to neutral.

In the Ap horizon, hue is mainly 10YR, value is 3 or 4, and chroma is 2 to 4. In uncultivated areas, there is a dark colored A1 horizon 1 to 3 inches thick.

In the B horizon, hue is 10YR or 7.5YR, value is 4, 5, or 6, and chroma is 4 to 8. Texture is mainly fine sand. Thin discontinuous reddish brown (5YR 4/4) or strong brown (7.5YR 5/6) bands that lack oriented clay are in the B3 horizon in some places.

In the C horizon, color typically is lighter with increasing depth. Hue is 10YR, value is 5 or 6, and chroma is 3 or 4. Texture is similar to that of the B horizon.

Oakville soils formed in material similar to that in which Deerfield and Naumburg soils formed. Deerfield soils are moderately well drained, and Naumburg soils are somewhat poorly drained and poorly drained. Oakville soils are not so gravelly as the nearby Alton soils. They are less acid than Windsor soils and do not have an accumulation of iron in the upper part of the subsoil, which Windsor soils have.

OaB—Oakville loamy fine sand, 0 to 6 percent slopes. This nearly level to gently sloping soil formed in water-deposited and wind-reworked sandy material. It is on ridges, knolls, low dune-shaped hills, undulating terraces, and plains, and in saddle-shaped areas between gravelly ridges. Individual areas are mostly 15 to more than 200 acres in size.

Included with this soil in mapping are small areas of the gravelly Hinckley and Alton soils at a slightly higher elevation than this Oakville soil. Also included are moderately well drained Deerfield soils at a slightly lower elevation and a few areas of the wetter, finer textured Minoa and Lamson soils in depressions and small drainageways. Soils that have highly contrasting layers of gravel or stones below a depth of 40 inches are included in some places.

This soil is better suited to deep-rooted, drought-resistant hay and pasture crops than to shallow-rooted crops. Row crops can be grown, but droughtiness limits yields in most years unless irrigation water is provided. This soil warms early in spring and can be tilled earlier than most soils in the county. Soil blowing is a severe hazard. The use of winter cover crops, minimum tillage, and planting of windbreaks are practices that reduce soil blowing and erosion. These practices and including a high proportion of crops in the cropping system help to maintain good soil tilth and to increase organic-matter content, which in turn improve the water-holding capacity. This soil is well suited to the use of sprinkler irrigation. If irrigated, this soil is well suited to vegetable and fruit crops and has excellent response to liberal applications of lime and fertilizer.

Droughtiness and the sandy texture are limitations for some nonfarm uses. This soil is well suited to septic effluent systems, but because of rapid permeability there is a hazard of polluting ground water. Capability subclass IVs.

Palms series

The Palms series consists of deep, very poorly drained, well decomposed organic soils underlain by mineral soil material at a depth of 16 to 51 inches. These level soils are in low, broad depressions and small bogs and around the fringe of ponds and lakes.

In a representative profile, the surface layer is black muck (sapric material) 13 inches thick. Below this, the material is black to very dark brown, nonsticky muck (sapric material) 13 inches thick. The substratum, to a depth of 55 inches, is gray, slightly sticky fine sandy loam.

The water table in undrained areas is at or near the surface for much of the year. Ponding and flooding are common in spring. Permeability is moderate to moderately rapid in the organic layers and moderately slow to moderate in the underlying substratum of mineral soil. In undrained areas roots are mostly restricted by the water table to the surface layer. If the soil is adequately drained, roots extend into the substratum. Available water capacity is high. Total nitrogen content is high, but nitrogen is slowly availabie to plants when the soil is cold and wet. The natural content of phosphorus in organic form is medium, and the content of potassium is low. Reaction in the organic layers is strongly acid to mildly alkaline.

Some areas are drained and are used for high value vegetable crops, for example, onions, potatoes, and celery. Undrained areas are in water-tolerant swampgrasses, reeds, brush, and trees.

Representative profile of Palms muck, in an uncultivated field in the town of Palermo, one-half mile southwest of Peat Corners:

Oa1—0 to 13 inches; black (10YR 2/1) sapric material (muck), black (10YR 2/1) when broken and rubbed; 5 percent fiber, less than 5 percent when rubbed; strong coarse to very coarse granular structure; very friable; fibers are herbaceous; medium acid; clear smooth boundary.

Oa2—13 to 21 inches; black (10YR 2/1) sapric material (muck), black (10YR 2/1) when broken and rubbed; 10 percent fiber, 5 percent when rubbed; massive; nonsticky; fibers are herbaceous; medium acid; clear smooth boundary.

Oa3—21 to 26 inches; black (10YR 2/1) sapric material (muck), very dark brown (10YR 2/2) when rubbed; 20 percent fiber, less than 10 percent when rubbed; matted; massive; nonsticky; fibers are mostly herbaceous; medium acid; abrupt smooth boundary.

IICg—26 to 55 inches; gray (10YR 5/1) fine sandy loam; common medium distinct yellowish brown (10YR 5/8) and strong brown (7.5YR 5/8) mottles; massive; slightly sticky; slightly acid in upper part and moderately alkaline and calcareous at a depth of 48 inches.

The depth to the loamy mineral material ranges from 16 to 51 inches. Depth to bedrock is more than 5 feet. The organic fibers are mostly herbaceous. Woody fragments make up 10 percent or less, by volume, of the organic material. The fragments are twigs, branches, and logs. Mineral material that consists mostly of a few silt-size particles is in the organic surface layer in some places. Coarse fragments make up as much as 10 percent, by volume, of the mineral soil substratum. Reaction is strongly acid to mildly alkaline in the organic material and slightly acid to moderately alkaline in the substratum.

In some places there is an Oap horizon. In the Oal or Oap horizon, hue is mostly 10YR, value is 2, and chroma is 1 or 2. Structure is fine to very coarse granular.

In the Oa2 and Oa3 horizons, hue is 10YR, 7.5YR, or 5YR, value is 2 or 3, and chroma is 0 to 3. The sapric material (muck) extends to a depth of 30 inches or more. The soil below a depth of 30 inches is a mixture of sapric material (muck) and hemic material (mucky peat) but is mainly sapric material. Structure is granular or platy, or the material is massive. A layer of fibric material (peat) 1 or 2 inches thick is below a depth of 30 inches in some places.

In the gleyed, mineral IIC horizon, texture ranges from fine sandy loam to clay loam. In many places the underlying material is laminar and apparently was deposited in glacial lakes and ponds. Calcareous deposits of marl less than 2 inches thick are in some places.

The Palms soils are near the organic Carlisle soils but have thinner organic deposits than those soils. They are also near the poorly drained and very poorly drained Canandaigua soils and the very poorly drained Fonda soils but have thicker organic deposits than those soils.

Pa—Palms muck. This is a level soil that formed in decomposed, herbaceous organic deposits underlain by loamy mineral soil deposits. Slopes are mainly less than 1 percent but are 2 percent in a few areas. This soil is in low depressions and bogs. Some areas are small and circular, and others are broad and elongated in shape. Individual areas are mainly 4 to 50 acres in size.

Included with this soil in mapping are a few small areas of Carlisle soils in the deepest part of bogs. Also included are a few fringe areas of soils that have organic deposits less than 16 inches thick and some areas of soils that are underlain by very stony glacial till. Soils that have a firm, platy traffic pan in the subsurface layer are commonly included in intensely cultivated areas. Small areas of coprogenous earth in places where organic deposits adjoin deposits of mineral soil material are also included.

If drained, this soil is well suited to vegetable crops and root crops (fig. 9). Drainage is not feasible in many areas because of the lack of good outlets and the relatively thin organic deposits. Where the organic deposits are mainly less than 36 inches thick, this soil has a relatively short productive life because of subsidence and oxidation of the organic material after the soil is drained. If drainage is practical, tile drains function well, even in the mineral soil substratum. Lift pumps are needed in some places where outlets are not available or where substantial subsidence has occurred. Excessive tillage accelerates oxidation and causes traffic pans to form. The hazard of soil blowing can be controlled by the use of windbreaks and cover crops. In undrained areas, the natural vegetation provides cover for wildlife, but timber production is poor.

Prolonged wetness and the instability of the organic material are severe limitations for most nonfarm uses. In some areas this soil has potential for development of wetland wildlife habitat, for example, waterfowl nesting sites. Capability subclass IVw.

Raynham series

The Raynham series consists of deep, somewhat poorly drained and poorly drained, medium textured soils. These soils formed in glaciolacustrine deposits that are mainly coarse silt. They are nearly level to gently sloping. They are on moderately low terraces, benches, and plains.

In a representative profile, the surface layer is dark grayish brown silt loam 9 inches thick. The subsoil extends to a depth of 36 inches. The upper part of the subsoil is light brownish gray, distinctly mottled, friable silt loam 11 inches thick, and the lower part is light olive brown, mottled, friable silt loam 16 inches thick. The substratum, to a depth of 60 inches, is brown, firm silt loam that has thin strata of very fine sand and fine sand.

The seasonal high water table rises into the upper part of the subsoil in spring and in other excessively wet periods. As the growing season progresses, the water table lowers and roots penetrate the subsoil. Permeability is moderate in the surface layer, moderate to moderately slow in the subsoil, and slow in the substratum. Available water capacity is high. Natural content of nitrogen is medium, and the content of phosphorus and potassium is low. Unless the soil is limed, the surface layer and subsoil are strongly acid to slightly acid.

A few areas of these soils are drained and are used intensively for farming. Some undrained areas are in hay or pasture. A few areas are idle, and many are forested.

Representative profile of Raynham silt loam, 0 to 6 percent slopes, in a meadow of alfalfa and timothy in the town of Mexico, 100 feet west of County Route 41 and one-fourth mile northeast of its intersection with Cole Road:

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) silt loam; moderate medium granular structure; friable; many roots; neutral; abrupt smooth boundary.

B21—9 to 20 inches; light brownish gray (10YR 6/2) silt loam; many medium distinct dark brown (10YR 4/3) and yellowish brown (10YR 5/4) mottles; moderate medium subangular blocky structure; friable; many roots; common pores; neutral; wavy diffuse boundary.

B22—20 to 36 inches; light olive brown (2.5Y 5/4) silt loam; many coarse distinct gray (10YR 6/1) mottles; moderate coarse prismatic structure parting to moderate medium subangular blocky; friable; few roots; few pores; neutral clear smooth boundary.

C—36 to 60 inches; brown (10YR 5/3) silt loam that has thin unconforming discontinuous layers of very fine sand and fine sand 1 to 3 inches thick; many medium distinct gray (10YR 6/1) mottles; very weak thick platy structure grading to massive with increasing depth; firm; neutral.

The thickness of the solum ranges from 20 to 38 inches. Depth to bedrock is more than 6 feet. Coarse fragments are very few in number or are absent. Reaction is strongly acid to neutral in the solum and medium acid to neutral in the substratum.

In the Ap horizon, hue is 10YR, value is 3 or 4, and chroma is 2. In undisturbed areas, there is an A1 horizon that when moist has slightly lower value than the Ap horizon and that when dry has value of more than 5.5.

In the B horizon, hue is 7.5YR to 5Y, value is 4 to 6, and chroma is 2 to 4. The B horizon has mottles of high and low chroma. Texture is mainly silt loam and very thin pockets or strata of light silty clay loam or very fine sandy loam are in some profiles.

In the C horizon, color and texture are similar to those in the B horizon.

Raynham soils are similar to Minoa soils in drainage, but they have a higher content of silt and a lower content of sand than those soils. They have a lower clay content than the nearby Canandaigua soils. They are similar to Lamson soils but have a higher silt content than those soils.

RaB—Raynham silt loam, 0 to 6 percent slopes. This nearly level to gently sloping soil formed in silty glaciolacustrine deposits that are free of coarse fragments. It is on moderately low benches and on plains. Individual areas are long and narrow or are broad and oblong. They are 3 to 300 acres in size. This soil is mostly somewhat poorly drained, but in some areas it is poorly drained.

Included with this soil in mapping are better drained Williamson, Hudson, Sodus, and Ira soils on small knolls and narrow ridges. Also included are wetter, finer textured Canandaigua and Madalin soils in a few small swales, depressions, and drainageways. Some areas of soils that have a weakly expressed fragipan in the subsoil, and a few areas of soils that are adjacent to drainageways and have a substratum of poorly sorted sand and gravel are also included.

If undrained, this soil is suited to hay and pasture crops that can tolerate wetness in spring. If this soil is adequately drained with surface and subsurface drains, it is well suited to a wide variety of field and vegetable crops. Drainage outlets are difficult to locate in some areas. Suitable filters or wrapped tile joints are needed in places to prevent silt and very fine sand from plugging drains. This soil is free of coarse fragments. If properly drained, it is easy to till and generally is not subject to surface crusting and clodding. In intensively cropped areas minimum tillage, return of crop residue to the soil, and including sod crops or green manure crops in the cropping system help to maintain organic-matter content and to preserve soil tilth.

Seasonal wetness and slow permeability in the substratum are the main limitations for nonfarm uses. Low bearing strength and sidewall instability are also limitations for some nonfarm uses. Capability subclass IIIw.

Rhinebeck series

The Rhinebeck series consists of deep, somewhat poorly drained soils that have a medium textured surface layer and a moderately fine textured and fine textured subsoil. These soils formed in glaciolacustrine deposits of clay and silt. They are nearly level to gently sloping. They are on moderately low plains and in basins.

In a representative profile, the surface layer is very dark grayish brown silt loam 8 inches thick. The subsoil extends to a depth of 39 inches. The upper part of the subsoil is dark brown, mottled, friable silty clay loam 8 inches thick, and the lower part is grayish brown, mottled, firm silty clay 23 inches thick. The substratum, to a depth of 53 inches, is light olive brown, firm silty clay.

The seasonal high water table generally is perched in the upper part of the subsoil early in spring and in other excessively wet periods. Permeability is moderately slow in the surface layer and slow in the subsoil and substratum. Roots are restricted by the seasonal high water table in spring, but as the water table lowers they extend into the subsoil. The subsoil is clayey, however, and generally provides a poor medium for root development. Available water capacity is moderate to high. The natural content of nitrogen is medium, but nitrogen is released slowly to plants in spring when the soil is damp and cold. The natural ability of these soils to supply phosphorus to plants is medium; their ability to supply potassium is high. Unless the soil is limed, the surface layer and subsoil are medium acid to neutral.

A few areas of these soils are drained and are used intensively for farming. Most areas are in pasture or woodland or are idle.

Representative profile of Rhinebeck silt loam, 2 to 6 percent slopes, in a meadow in the town of Mexico, 150 feet south of U. S. Highway 104 and 660 feet east of Sage Creek:

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam, dark grayish brown (10YR 4/2) when rubbed; moderate medium granular structure; very friable; many roots; neutral; abrupt smooth boundary.

B1—8 to 16 inches; dark brown (10YR 4/3) silty clay loam; many medium faint grayish brown (10YR 5/2) mottles; weak medium subangular blocky structure; friable; common roots; common pores; slightly acid; gradual wavy boundary.

B2tg—16 to 39 inches; grayish brown (10YR 5/2) silty clay; many medium distinct brown (7.5YR 5/4) and yellowish brown (10YR 5/6) mottles; weak coarse prismatic structure parting to moderate coarse subangular blocky; firm; common roots; common pores; brown (10YR 5/3) clay films on horizontal and vertical cleavage planes; slightly acid; clear smooth boundary.

C—39 to 53 inches; light olive brown (2.5Y 5/4) silty clay; common medium faint grayish brown (10YR 5/2) mottles; massive; firm; few fine pores; neutral.

The thickness of the solum ranges from 24 to 42 inches. The depth to carbonates ranges from 24 to 60 inches. Depth to bedrock is more than 6 feet. Coarse fragments generally are absent, but they make up as much as 3 percent, by volume, of the soil material in any horizon. Reaction in the solum is neutral to medium acid.

In the Ap horizon, hue is typically 10YR, value is 3 or 4, and chroma is 2 or 3. In undisturbed areas there is an A1 horizon 2 to 4 inches thick that is slightly darker in color than the Ap horizon.

An A2 horizon that interfingers the B horizon is in some places. The A2 horizon, where present, has hue of 10YR, value of 5 or 6, and chroma of 2 or 3. Texture of the A2 horizon is similar to that of the Ap or A1 horizon.

In the B horizon, hue is 10YR to 5Y, value is 4 or 5, and chroma is 2 to 4. Texture ranges from silty clay loam or silty clay to clay.

In the C horizon, hue is 10YR to 2.5Y, value is 3 to 5, and chroma is 1 to 4. Texture ranges mainly from silty clay loam to silty clay but is varved silt and very fine sand in some profiles.

Rhinebeck soils form a drainage sequence with the Hudson, Madalin, and Fonda soils. Hudson soils are moderately well drained and well drained, Madalin soils are poorly drained and very poorly drained, and Fonda soils are very poorly drained. Rhinebeck soils are near the somewhat poorly drained and poorly drained Raynham soils and the poorly drained and very poorly drained Canandaigua soils. Rhinebeck soils have more clay in the subsoil than those soils.

RhA—Rhinebeck silt loam, 0 to 2 percent slopes. This nearly level soil has the profile described as representative for the series. It is on moderately low, broad flats. Individual areas are commonly oblong in shape and generally as much as 100 acres in size.

Included with this soil in mapping are areas of somewhat poorly drained and poorly drained Raynham soils that have less clay in the subsoil than this Rhinebeck soil. Also included are small areas of Hudson and Williamson soils on slightly elevated knolls and ridges, small areas of Swanton soils in places where a mantle of sandy deposits overlie finer textured sediment, and wetter Madalin soils in shallow depressions and along narrow drainageways.

This soil is suited to water-tolerant hay and pasture plants. Unless artificially drained, this soil is generally not well suited to most field crops. To be effective, subsurface drains should be closely spaced because of the slow permeability. Bedding helps to remove water from the surface, and land leveling benefits areas that have low spots and depressions. This soil is free of coarse fragments. If properly drained it is not difficult to till, but it should be tilled at the proper moisture content to prevent clodding and crusting. Use of cover crops, return of crop residue to the soil, and including sod crops in the cropping system help to maintain good soil tilth and to reduce the hazard of surface crusting and clodding.

Seasonal wetness, slow permeability, and clayey texture in the subsoil are limitations for many nonfarm uses. Low bearing strength is also a limitation for some uses. Capability subclass IIIw.

RhB—Rhinebeck silt loam, 2 to 6 percent slopes. This gently sloping soil has the profile described as representative for the series. It is on concave foot slopes, sides of drainageways, and moderately low, undulating plains. It commonly receives runoff from higher adjacent soils. Individual areas are broad and oblong or are long and narrow. They are mainly 5 to 50 acres in size.

Most commonly included with this soil in mapping are small areas of the better drained Wiliamson and Hudson soils on the upper side of knolls and ridges. Also included are a few small spots of silty Raynham soils and sandy Minoa soils, some areas of this Rhinebeck soil that is underlain by a sandy substratum at a depth of more than 40 inches, and a few areas of gullied and severely eroded soils.

This soil is suited to water-tolerant hay and pasture crops. Artificial drainage generally is needed to obtain optimum yields. Subsurface drains should be closely spaced because of the slowly permeable subsoil. Interceptor drains to divert runoff from higher adjacent soils benefit this soil in most areas. Erosion is a hazard. Cross slope tillage and use of cover crops are practices that help to reduce erosion. This soil should be tilled at the proper moisture content to prevent clodding and crusting. Return of crop residue to the soil, growing green manure crops, and including sod crops in the cropping system help to maintain organic-matter content and good soil tilth and to reduce the hazard of crusting and clodding.

Seasonal wetness, slow permeabilty, and the clayey subsoil are limitations for many nonfarm uses. Capability subclass IIIw.

Rifle series

The Rifle series consists of deep, very poorly drained soils that formed mainly in moderately decomposed organic deposits. These deposits are more than 51 inches. Rifle soils are level and are in low depressions and bogs in the colder and higher parts of the county.

In a representative profile, the surface layer is black muck (sapric material) 15 inches thick. The subsurface layer is dark reddish brown, nonsticky mucky peat (hemic material) 24 inches thick. The next layer, to a depth of 55 inches, is dark reddish brown, moderately decomposed mucky peat (hemic material).

In undrained areas, the water table is at or near the surface for much of the year. Ponding and flooding are common in spring. Permeability is very rapid in the muck surface layer and rapid in the mucky peat layers. Root penetration is excellent in drained areas, but roots are mostly restricted to the surface layer in undrained areas. Available water capacity is high. Total nitrogen content is high, but nitrogen is very slowly available to plants when the soil is cool and wet. The natural content of phosphorus in organic form is medium. Potassium content is low. Unless limed, these soils are medium acid to neutral.

Rifle soils have limited potential for vegetable crops if drained. Most areas are undrained and support water-tolerant swampgrasses, brush, and trees.

Representative profile of Rifle muck, in brush and trees in the town of Redfield, 800 feet north of intersection of County Route 18 and O'Mara Road and 30 feet west of County Route 17:

Oa1—0 to 15 inches; black (10YR 2/1) sapric material (muck), black (10YR 2/1) when rubbed; 10 percent fibers, 5 percent when rubbed; moderate coarse granular structure; nonsticky; sodium pyrophosphate test very pale brown (10YR 7/3); fibers are mostly herbaceous, with some woody twigs and stems 5 to 10 millimeters long; medium acid; clear smooth boundary.

Oe1—15 to 39 inches; dark reddish brown (5YR 3/2) hemic material (mucky peat), dark reddish brown (5Y 3/3) when rubbed; 35 percent fibers, 25 percent when rubbed; weak thick platy structure; nonsticky; sodium pyrophosphate test very pale brown (10YR 8/3); fibers are herbaceous, 25 percent or less are woody twigs and stems; medium acid; gradual smooth boudnary.

Oe2—39 to 55 inches; dark reddish brown (5YR 3/3) and dark reddish brown (5YR 3/4) hemic material (mucky peat); 50 percent fiber, 20 percent when rubbed; weak thick platy structure; nonsticky; sodium pyrophosphate test very pale brown (10YR 8/3); 75 percent of the fibers are herbaceous, about 25 percent are branches, logs, and stumps; medium acid; abrupt smooth boundary.

The organic material is more than 51 inches thick. Depth to bedrock is more than 5 feet. Woody material consists mainly of twigs, branches, logs, and stumps and makes up as much as 35 percent, by volume, of the material in some layers. Reaction is medium acid to neutral.

In the surface layer, hue is 10YR or 7.5YR, value is 2 to 4, and chroma is 1 to 3. In places where the surface layer is above water for most of the year, the material is well decomposed and is black. Some of the material is less well decomposed and has redder hue and higher value and chroma. This layer is generally massive, but in some places the material has coarse granular or thick platy structure.

In the hemic material (mucky peat) in the Oe1 and Oe2 layers, hue is 10YR to 5YR, value is 2 to 5, and chroma is 2 to 4. Structure is commonly thick platy, but in some places the material is massive. Material in the Oe horizon is moderately decomposed. Thin layers of sapric material (muck) or fibric material (peat) are within the hemic material (mucky peat) matrix in some profiles.

Rifle soils are similar to the organic Carlisle and Palms soils. The organic material in Rifle soils is not so well decomposed as that in Carlisle soils and is thicker than that in Palms soils.

RM—Rifle muck. This is a level soil that formed in organic deposits derived mainly from moderately decomposed, herbaceous plant remains. It is in small circular kettles and bogs and in broad, very deep depressions at the higher elevations in the county. Many areas border low-gradient streams. Slopes are mostly less than 1 percent but are 2 percent in a few areas. Most areas are mainly 4 to 40 acres in size. The largest area of this soil is in Toad Harbor Swamp, which is elongated in shape and is 2,500 acres in size.

Included with this soil in mapping are a few small areas of Palms soils that are in fringe areas adjacent to mineral soils. Small areas of coprogenous earth are also included and are identified by a spot symbol on the soil map. A few areas of muck that is dominantly well decomposed are also included.

If undrained, this soil is not suited to crops. It is in the colder parts of the county. The growing season is less than 120 days, and there is a severe hazard of frost damage to crops. If this soil is drained, crops that mature in a short growing season, for example, lettuce, grow better than other crops. Drainage outlets are very difficult to establish in some places because of the low position of this soil on the landscape. A combination of surface and subsurface drains is generally needed. Pumping is necessary where gravity drainage is not feasible. Excessive tillage accelerates the loss of organic matter through oxidation and causes traffic pans to form. Buried, undecomposed stumps and logs hinder the operation of some tillage equipment. Soil blowing is a hazard in drained areas, but it can be controlled by the use of windbreaks and cover crops.

Prolonged wetness, ponding in spring, and instability of the organic material are severe limitations for most nonfarm uses. In undrained areas this soil has potential for development of wetland wildlife habitat. Capability subclass IVw.

Rumney series

The Rumney series consists of deep, somewhat poorly drained and poorly drained, medium textured soils. These soils formed in recent alluvial deposits. They are nearly level and are on flood plains along rivers and streams.

In a representative profile, the surface layer is dark grayish brown loam 8 inches thick. The subsoil extends to a depth of 36 inches. The upper part of the subsoil is grayish brown, mottled, friable loam 22 inches thick, and the lower part is gray, mottled, friable fine sandy loam 6 inches thick. The substratum, to a depth of 50 inches, is gray sandy loam.

These soils are subject to flooding in most years, generally in spring. Surface runoff is slow. A seasonal high water table is in the upper part of the subsoil in spring, and depth to the water table depends somewhat on the water level in the adjacent stream. Permeability is moderate to moderately rapid in the subsurface layer, moderately rapid in the subsoil, and rapid in the substratum. Roots are restricted by the seasonal high water table. Available water capacity is moderate to high. Total nitrogen content is high, but nitrogen is slowly available to plants when the soils are cool and wet. The natural content of phosphorus and potassium is medium. Unless limed, these soils are slightly acid to neutral.

Rumney soils are mainly in pasture or woodland or are idle. A few areas that are intensively cropped are artificially drained.

Representative profile of Rumney loam, in an idle field in the town of Mexico, one-half mile north of U.S. Highway 104 and 300 feet east of Frazer Road:

A1—0 to 8 inches; dark grayish brown (10YR 4/2) loam; moderate very coarse granular structure; very friable; many roots; slightly acid; clear smooth boundary.

B21g—8 to 30 inches; grayish brown (10YR 5/2) loam; many medium faint gray (10YR 5/1) mottles; weak coarse subangular blocky structure; friable; common roots; common pores; neutral; gradual smooth boundary.

B22g—30 to 36 inches; gray (10YR 6/1) fine sandy loam; common fine faint brown to dark brown (10YR 4/3) mottles; weak medium subangular blocky structure; friable; few roots; few pores; neutral; gradual smooth boundary.

C—36 to 50 inches; gray (10YR 5/1) sandy loam; massive; friable; few roots; few pores; neutral.

The thickness of the solum ranges from 20 to 36 inches. Depth to bedrock is more than 5 feet. These soils are generally free of coarse fragments, but gravel makes up as much as 10 percent, by volume, of the soil material in some profiles. Reaction is slightly acid in the surface layer and slightly acid to neutral below that.

In some places there is an Ap horizon. In the Ap or A1 horizon, hue is mainly 10YR but is 2.5Y in places, value is 2 to 4, and chroma is 1 or 2. Structure is weak or moderate fine to very coarse granular.

In the B21 horizon, hue is mainly 10YR but is 2.5Y in places, value is 3 to 5, and chroma is 1 or 2. Mottles are medium to coarse, common to many, and faint to distinct. They are not present in this horizon in some places. Texture ranges from fine sandy loam to loam. Structure is mainly weak or moderate coarse subangular blocky but ranges to weak or moderate fine granular.

In the B22 horizon, hue is mainly 10YR but is 5Y in places, value is 3 to 6, and chroma is 1 or 2. Texture is similar to that of the B21 horizon. Structure is weak or moderate subangular blocky but ranges to fine granular. Consistence is friable or very friable.

In the C horizon, hue is 10YR to 5Y or is neutral, value is 3 to 6, and chroma is 1 or 2. Texture ranges from sandy loam to loam.

The Rumney soils in this survey area are less acid throughout and have a finer textured substratum than Rumney soils mapped in other areas. These properties do not alter their use or management.

Rumney soils form a drainage sequence with Middlebury soils and formed in deposits similar to those in which Middlebury soils formed. Middlebury soils are moderately well drained. Rumney soils commonly are near Fluvaquents and Udifluvents, frequently flooded, but they are less variable in soil characteristics than those soils.

RU—Rumney loam. This is a nearly level alluvial soil in moderately low areas and slack water areas on flood plains. Slopes range from 0 to 3 percent but are mostly less than 2 percent. Individual areas are narrow and irregular in shape and are mainly 3 to 15 acres in size.

Included with this soil in mapping are small areas of the better drained Middlebury soils in higher parts of the flood plain than this Rumney soil. Also included are small areas of Fluvaquents and Udifluvents, frequently flooded. These soils have variable properties and are frequently flooded. Soils that have thin strata of sand, gravel, and silt less than 5 inches thick in the subsoil and a few small areas of soils that have bedrock at a depth of 40 to 60 inches are also included.

If this soil is adequately drained and flooding is controlled, it is suited to many of the crops commonly grown in the county. If undrained, this soil is better suited to water-tolerant pasture grasses than to other crops. Drainage outlets are difficult to locate in many places because of the relatively low position of this soil on the flood plain. If outlets are available, surface or subsurface drains, or both, can be used. In addition, the use of dikes to protect the soil from flooding, land leveling, grassed waterways, and interceptor drains to divert runoff from higher, adjacent soils are also needed in places. If properly drained, this soil is easy to till and can be used intensively for crops. Planting winter cover crops and returning crop residue to the soil help to protect the surface from flood scour and to maintain good soil tilth. Special practices are needed in places to prevent erosion of streambanks. Most fields are small because of dissecting channels and remnant stream meanders.

Flooding and seasonal wetness are the main soil limitations for nonfarm uses. Some areas have potential as sites for large ponds. Capability subclass IIIw.

Scriba series

The Scriba series consists of deep, moderately coarse textured, somewhat poorly drained soils that have a fragipan. These soils formed in glacial till derived mainly from sandstone. They are nearly level to sloping. They are on drumlinlike hills and till plains.

In a representative profile, the surface layer is dark gray gravelly fine sandy loam 7 inches thick. The subsurface layer is leached, light brownish gray, mottled, friable gravelly fine sandy loam 7 inches thick. The subsoil is a dense fragipan of yellowish brown and gray, firm gravelly fine sandy loam 22 inches thick. The substratum, to a depth of 50 inches, is light olive brown, mottled, firm gravelly fine sandy loam.

A seasonal high water table is perched above the slowly permeable fragipan in spring. Permeability above the fragipan is moderate. Roots are restricted by the seasonal high water table and the fragipan. Available water capacity is low to moderate. Total nitrogen content is medium, but nitrogen is released slowly to plants in spring when the soil is wet and cold. The natural supply of phosphorus and potassium is low. Unless the soil is limed, the surface layer and subsoil are very strongly acid to neutral.

Some areas of Scriba soils are artificially drained and are used intensively for farming. Many areas are in pasture or woodland or are idle.

Representative profile of Scriba gravelly fine sandy loam, 0 to 8 percent slopes, in a cultivated field in the town of New Haven, 660 feet west of Green Road and 75 feet south of Hurlbut Road:

Ap—0 to 7 inches; dark gray (10YR 4/1) gravelly fine sandy loam; moderate medium granular structure; friable; many roots; 15 percent coarse fragments, 1 percent coarse fragments more than 3 inches in diameter; neutral; abrupt wavy boundary.

A2g—7 to 14 inches; light brownish gray (2.5Y 6/2) gravelly fine sandy loam; many medium distinct yellowish brown (10YR 5/6) mottles and reddish brown (2.5YR 4/4) iron stains; weak fine subangular blocky structure; friable; common roots; 15 percent coarse fragments, 2 percent coarse fragments more than 3 inches in diameter; neutral; clear wavy boundary.

Bx—14 to 36 inches; yellowish brown (10YR 5/4) and gray (10YR 4/1) gravelly fine sandy loam; weak very coarse prismatic structure; firm and brittle; few roots in upper part; few fine pores; 20 percent coarse fragments, 5 percent coarse fragments more than 3 inches in diameter; thin discontinuous coatings of silt and clay in pores and on gravel fragments; neutral; clear wavy boundary.

C—36 to 50 inches; light olive brown (2.5Y 5/4) gravelly fine sandy loam; many medium discontinuous dark reddish gray (5YR 4/2) mottles and black stains on faces of plates; moderate medium platy structure; firm; 30 percent coarse fragments, 10 percent coarse fragments more than 3 inches in diameter; mildly alkaline; weakly calcareous.

The thickness of the solum ranges from 34 to 48 inches. The depth to carbonates ranges from 36 to 60 inches. Depth to the fragipan ranges from 12 to 15 inches, and depth to bedrock is more than 5 feet. Coarse fragments make up 15 to 30 percent, by volume, of surface and subsurface horizons and 20 to 50 percent of the fragipan and substratum. Reaction in the solum is very strongly acid to neutral.

In the Ap horizon, hue is dominantly 10YR, value is 2 to 4, and chroma is 1 or 2. Texture of the fine earth part is loam or fine sandy loam.

In the A2 horizon, hue is 7.5YR to 2.5Y, value is 4 to 6, and chroma is 1 or 2. There are many mottles, and most have higher chroma. Structure is weak platy or subangular blocky. Consistence is very friable to firm.

In the Bx horizon, hue is 10YR to 5YR, value is 4 to 6, and chroma is 1 to 4. Texture ranges fom gravelly fine sandy loam or very gravelly sandy loam to gravelly silt loam. Consistence is firm or very firm.

In the C horizon, hue is 10YR to 5Y, value is 4 or 5, and chroma is 2 to 4. Texture ranges from gravelly fine sandy loam or very gravelly sandy loam to gravelly silt loam. Reaction ranges from strongly acid to moderately alkaline.

Scriba soils form a drainage sequence with the Sodus, Ira, and Sun soils. Sodus soils are well drained, Ira soils are moderately well drained, and Sun soils are poorly drained and very poorly drained. Scriba soils are near the somewhat poorly drained and poorly drained Massena soils but have a fragipan, which those soils do not have.

ScB—Scriba gravelly fine sandy loam, 0 to 8 percent slopes. This nearly level to gently sloping soil has the profile described as representative for the series. It is on the top and lower side of elongated hills, on concave foot slopes, and in moderately low flats on till plains. The areas are variable in shape and are mainly 5 to 50 acres in size.

Included with this soil in mapping are small areas of the moderately well drained Ira soils in a position slightly higher on the landscape than this Scriba soil. Also included are poorly drained and very poorly drained Sun soils in small depressions, drainageways, and low areas. Small areas of silty Raynham soils and gravelly Fredon soils are in places where lake deposits and outwash deposits adjoin the till plains. Small areas of Palms muck in swamps are also included.

This soil is not well suited to most field crops because of seasonal wetness early in the growing season and lack of moisture in dry periods later in the growing season. Unless drained, it is only moderately well suited to hay and pasture crops. If this soil is used for field crops, installation of surface and subsurface drains generally is beneficial. Interceptor drains can be used in many areas to divert runoff and subsurface seepage from higher adjacent soils. Small stone piles and stone hedges are scattered throughout many fields. They were made when the fields were cleared of surface stones, and in some places they hinder the operation of farm equipment. Use of cover crops, return of crop residue to the soil, and including sod crops in the cropping system are important practices that maintain good soil tilth.

Seasonal wetness, slow permeability in the fragipan and substratum, and the presence of small coarse fragments are limitations for many nonfarm uses. Capability subclass IIIw.

ScC—Scriba gravelly fine sandy loam, 8 to 15 percent slopes. This sloping soil has a profile similar to the one described as representative for the series, except the depth to the fragipan is slightly less. It is on lower side slopes and foot slopes of elongated hills. It receives runoff from higher, adjacent soils. Individual areas are mainly 5 to 30 acres in size.

Included with this soil in mapping are small areas of the poorly drained and very poorly drained Sun soils in drainageways and on toeslopes. Also included are small areas of the moderately well drained Ira soils and very small areas of the well drained Sodus soils in convex positions that are slightly higher on the landscape than this Scriba soil.

This soil has potential for some crops commonly grown in the county, but slope, hazard of erosion, and seasonal wetness are limitations. This soil is generally better suited to hay or pasture crops than to cultivated crops. Erosion is a severe hazard in cultivated areas. Cross slope tillage, stripcropping, and use of diversion ditches and grassed waterways are practices that are needed to control erosion. Minimum tillage, use of cover crops, and return of crop residue to the soil also help to protect the soil from erosion and to promote good soil tilth. Interceptor drains are commonly needed to divert runoff and subsurface seepage from higher soils. Randomly placed drains for wet spots improve many fields. Midsummer droughtiness is a hazard, because roots are restricted by the fragipan.

Seasonal wetness, slope, and slow permeability in the fragipan are the main limitations for most nonfarm uses. Capability subclass IIIe.

SDB—Scriba very stony soils, gently sloping. These soils have a profile similar to the one described as representative for the series, except they have more stones in the surface layer. The surface layer is very stony loam and very stony fine sandy loam. Surface stones are about 5 to 30 feet apart. These soils are in moderately low areas of till plains and on concave foot slopes at the base of elongated hills. Slopes range from 3 to 8 percent. Individual areas are irregular or oblong in shape and are mainly 5 to 100 acres in size.

Included with these soils in mapping are poorly drained and very poorly drained Sun soils in shallow depressions that are identified by wet spot symbols and drainageway symbols on the soil map. Also included are small spots of the better drained, stony Ira and Sodus soils.

These soils are not suited to intertilled crops. Because of surface stoniness the use of tillage implements is not practical (fig. 10). Clearing the fields of stones so that the soils can be intensively cultivated generally is not practical because of seasonal wetness and the dense, slowly permeable fragipan that restricts rooting. If stones are removed so that field crops can be grown, artificial drainage is generally needed. Droughtiness is a hazard late in summer because of the restricted root zone. Surface stones hinder the operation of haying equipment. In most areas these soils are better suited to pasture grasses than to other crops, but applying lime and fertilizer and reseeding are difficult.

The presence of large stones, seasonal wetness, and slow permeability in the fragipan are the main limitations for nonfarm uses. In some areas these soils have potential for development of wildlife habitat or for woodland. Capability subclass VIIs.

Sodus series

The Sodus series consists of deep, well drained, moderately coarse textured soils that have a fragipan. These soils formed in glacial till derived mainly from gray and red sandstone. They are gently sloping to very steep. They are on elongated drumlinlike hills and on convex ridges and knolls on dissected till plains.

In a representative profile, the surface layer is dark brown, friable gravelly fine sandy loam 7 inches thick. The upper part of the subsoil is brown, friable gravelly fine sandy loam 6 inches thick. Below this, and overlying the lower part of the subsoil, is a leached layer of light brownish gray, mottled, friable gravelly fine sandy loam 7 inches thick. The lower part of the subsoil is a dense, firm fragipan of brown gravelly fine sandy loam 31 inches thick. The substratum, to a depth of 60 inches, is brown, firm gravelly fine sandy loam.

A seasonal high water table is perched above the slowly permeable fragipan for very brief periods early in spring. Permeability is moderate in the surface layer and in the upper part of the subsoil. Most roots are restricted by the fragipan at a depth of 15 to 24 inches. Available water capacity is low to moderate. The natural ability of these soils to supply nitrogen to plants is medium. The natural content of phosphorus and potassium is low. Unless the soil is limed the surface layer and subsoil are strongly acid to neutral.

Some areas are farmed. Many areas are in hay or pasture, and a few are in woodland or are idle.

Representative profile of Sodus gravelly fine sandy loam, 8 to 15 percent slopes, in an idle field in the town of Oswego, 400 feet east of Parkhurst Road, midway between Nine-Mile Creek and U.S. Highway 104A:

Ap—0 to 7 inches; dark brown (10YR 3/3) gravelly fine sandy loam; moderate medium granular structure; friable; many roots; 20 percent coarse fragments; medium acid; abrupt wavy boundary.

B2—7 to 13 inches; brown (10YR 5/3) gravelly fine sandy loam; moderate medium granular structure; friable; many roots; many pores; 20 percent coarse fragments; medium acid; clear smooth boundary.

A'2—13 to 20 inches; light brownish gray (10YR 6/2) gravelly fine sandy loam; few fine distinct strong brown (7.5YR 5/6) mottles in lower 3 inches; weak fine subangular blocky structure; friable; few roots; many pores; 25 percent coarse fragments; medium acid; clear wavy boundary.

B'x—20 to 51 inches; brown (7.5YR 5/2) gravelly fine sandy loam; weak very coarse prismatic structure parting to weak coarse angular blocky; firm, brittle; few roots between prisms in upper part; few fine pores; clay linings on some pores; wedge-shaped extensions of pale brown (10YR 6/3) A'2 material along prism faces in upper 10 inches; 30 percent coarse fragments; slightly acid; diffuse boundary.

C—51 to 60 inches; brown (7.5YR 5/4) gravelly fine sandy loam; massive; firm; few pores; 35 percent coarse fragments; slightly acid, grading to neutral at a depth of 60 inches.

The thickness of the solum ranges from 42 to 64 inches. The depth to carbonates ranges from 48 to 84 inches. Depth to the fragipan ranges from 15 to 24 inches, and depth to bedrock is more than 5 feet. Coarse fragments make up 10 to 30 percent, by volume, of the soil material above the fragipan and 25 to 50 percent of the fragipan and substratum. Reaction is strongly acid to neutral in the solum and medium acid to mildly alkaline in the substratum.

In the Ap horizon, hue is 10YR or 7.5YR, value is 3 or 4, and chroma is 2 or 3. Texture is mainly gravelly fine sandy loam, but loam and cobbly analogs of these textures are in some areas.

In the B2 horizon, hue is 10YR to 5YR, value is 4 or 5, and chroma is 3 to 6. Texture ranges from fine sandy loam and very fine sandy loam to loam and includes their gravelly analogs in some places. Structure is moderate granular to weak subangular blocky, or the material is massive. Consistence is friable or very friable.

In the A'2 horizon, hue is 10YR to 5YR, value is 5 or 6, and chroma is 2 or 3. Texture ranges from fine sandy loam and very fine sandy loam to loam and includes their gravelly analogs in some places. Mottles are absent or range to few in number; where present, they are faint or distinct.

In the B'x horizon, hue is 10YR to 5YR, value is 4 or 5, and chroma is 2 to 4. Texture ranges from fine sandy loam and very fine sandy loam to loam and includes their gravelly and very gravelly analogs. Consistence is firm or very firm.

The C horizon has color and texture similar to those in the B'x horizon. Structure is platy, or the material is massive. Consistence is friable or firm.

The Sodus soils form a drainage sequence with the Ira, Scriba, and Sun soils. Ira soils are moderately well drained, Scriba soils are somewhat poorly drained, and Sun soils are poorly drained and very poorly drained. Sodus soils are near Amboy, Alton, and Hinckley soils. They have more coarse fragments than Amboy soils, and they have a fragipan, which the gravelly Alton and Hinckley soils do not have.

SgB—Sodus gravelly fine sandy loam, 3 to 8 percent slopes. This gently sloping soil has a profile similar to the one described as representative for the series except depth to the fragipan is slightly more. It is on convex hilltops, ridges, and knolls. Some areas are undulating. Individual areas commonly are oblong in shape and are mainly from 5 to 30 acres in size.

Included with this soil in mapping are small areas of the moderately well drained Ira soils on the sides of drainageways and somewhat poorly drained Scriba soils and poorly drained and very poorly drained Sun soils in depressions and on the bottom of drainageways. Stone fences, stone hedges, and piles of stones that were made when fields were cleared for cultivation and a few small areas of soils that have a stony or very stony surface layer are also included.

This soil is well suited to many of the field crops commonly grown in the county. In a few areas near Lake Ontario, it has potential for orchard crops. Erosion is a slight hazard if row crops are grown. Cross slope tillage, use of cover crops, return of crop residue to the soil, and minimum tillage help to promote good soil tilth and to reduce erosion. Coarse fragments hinder the operation of some precision tillage and planting equipment. Because of the restricted root zone, droughtiness is a hazard in some years. Although the fragipan slows the downward movement of water, wetness is not a problem if this soil is tilled early in spring.

The slowly permeable fragipan and substratum and the presence of coarse fragments are limitations for some nonfarm uses. Capability subclass IIe.

SgC—Sodus gravelly fine sandy loam, 8 to 15 percent slopes. This sloping soil has the profile described as representative for the series. It is on the convex upper sides of long, drumlinlike hills and ridges that are oriented roughly in a north-south direction. Individual areas are elongated in shape and are mainly 5 to 35 acres in size.

Included with this soil in mapping are the moderately well drained Ira soils and the somewhat poorly drained Scriba soils in a position slightly lower on the landscape than this Sodus soil and along narrow drainageways. Also included are small areas of the more gravelly Hinckley and Alton soils on terraces and beaches. Piles of stones and stone hedges and fences that form field boundaries are also included.

This soil is suited to some of the field crops commonly grown in the county. In a few large areas bordering Lake Ontario, it has potential for fruit trees. The use of this soil is somewhat limited by slope and the fragipan. If row crops are grown, practices to control erosion should include cross slope tillage, stripcropping, use of diversion, and including sod crops in the cropping system. Minimum tillage, use of cover crops, and return of crop residue to the soil also help to reduce erosion and to promote good soil tilth. Because the fragipan restricts rooting, droughtiness is a problem in midsummer in some years. Coarse fragments and slope slightly hinder operation of some farm machinery. Randomly placed drains for wet spots benefit some fields.

Slope, slow permeability in the fragipan and substratum, and the presence of coarse fragments are limitations for many nonfarm uses. Capability subclass IIIe.

SgD—Sodus gravelly fine sandy loam, 15 to 25 percent slopes. This moderately steep soil has a profile similar to the one described as representative for the series, except the surface layer is thinner and depth to the fragipan is slightly less. It is on the sides of elongated hills and on some valley sides. Individual areas are oblong in shape and are mainly 2 to 20 acres in size.

Included with this soil in mapping are small areas of the moderately well drained Ira soils in slight depressions and the somewhat poorly drained Scriba soils in small seep spots. Also included are areas of the well drained to excessively drained, gravelly Alton and Hinckley soils on small, narrow remnant beaches that are commonly on the east side of drumlinlike hills. Many of these areas are identified on the soil map by the symbol for a gravelly spot.

This soil is suited to some of the crops commonly grown in the area, but because of moderately steep slopes the operation of heavy farm machinery is difficult and hazardous. Erosion is a severe hazard if row crops are grown. Practices to control erosion should include cross slope tillage, contour stripcropping, use of diversion, and including a high proportion of sod crops in the cropping system. Droughtiness is a more serious problem on this Sodus soil than on less sloping Sodus soils. Coarse fragments interfere with the operation of some tillage equipment. This soil is generally better suited to hay or pasture than to row crops.

Slope and slow permeability in the fragipan and substratum are severe limitations for most nonfarm uses. Capability subclass IVe.

SHF—Sodus soils, very steep. These soils have a profile similar to the one described as representative for the series, except the surface layer is thinner and depth to the fragipan is less. In addition, the surface layer is fine sandy loam, loam, and gravelly and cobbly analogs of these textures. These soils are on the north end and sides of strongly sloping drumlinlike hills and on the sides of valleys. Slopes range from 35 to 45 percent. Most individual areas are oblong or half-moon shaped, and they are mainly about 5 to 20 acres in size.

Included with these soils in mapping are a few small areas of very stony soils and some large areas of steep soils.

These soils have limited potential for pasture, but in most areas they are better suited to natural vegetation and trees. Slopes are too steep for use of farm machinery. Erosion is a very severe hazard if the plant cover is removed. Droughtiness is a much more serious problem on this Sodus soil than on less sloping Sodus soils; consequently, native pasture is generally poor in quality.

Slope is the principal limitation for nonfarm uses of these soils. In some areas these soils have potential for development of wildlife habitat. Capability subclass VIIe.

Sun series

The Sun series consists of deep, poorly drained and very poorly drained soils that have a medium textured surface layer and a moderately coarse textured subsoil. These soils formed in glacial till derived mainly from sandstone. They are nearly level and are on broad flats and toeslopes, in slight depressions, and along drainageways on till plains.

In a representative profile, the surface layer is very dark gray loam 9 inches thick. The subsoil extends to a depth of 36 inches. The upper part of the subsoil is gray, friable gravelly fine sandy loam 9 inches thick and distinctly mottled, and the lower part is brown, mottled, firm gravelly fine sandy loam 18 inches thick. The substratum, to a depth of 50 inches, is brown, firm gravelly fine sandy loam.

The water table is at or near the surface for long periods in the wettest part of the year. Permeability is moderate in the surface layer and slow in the subsoil and substratum. In undrained areas, roots are restricted by the prolonged high water table. In drained areas, available water capacity is moderate, and roots extend to the substratum. The natural content of nitrogen is high, but nitrogen is released slowly to plants in spring when the soils are wet and cold. The natural supply of phosphorus is medium, and the content of potassium is medium to low. Unless the soil is limed, the surface layer is strongly acid to slightly acid.

A few areas of Sun soils are artificially drained and are used intensively for farming. Most areas are in water-tolerant pasture grasses, trees, or brush or are idle.

Representative profile of Sun loam, in an idle field in the town of Volney, 3 1/2 miles east of Minetto, 1 1/2 miles northwest of Mount Pleasant, and 25 feet from an intermittent drainageway:

Ap—0 to 9 inches; very dark gray (10YR 3/1) loam; weak coarse granular structure; friable; many fine roots; 5 percent gravel; slightly acid; abrupt smooth boundary.

B21g—9 to 18 inches; gray (10YR 6/1) gravelly fine sandy loam; common medium distinct yellowish brown (10YR 5/4) and dark yellowish brown (10YR 4/4) mottles; weak fine blocky structure; friable; few roots; few pores; 20 percent gravel and cobbles; slightly acid; gradual smooth boundary.

B22—18 to 36 inches; brown (10YR 5/3) gravelly fine sandy loam; common medium and coarse distinct yellowish brown (10YR 5/6) mottles and many distinct gray (10YR 5/1) mottles; weak medium subangular blocky structure; firm; few pores; 30 percent gravel and cobbles; neutral; clear wavy boundary.

C—36 to 50 inches; brown (10YR 5/3) gravelly fine sandy loam; common medium and fine faint yellowish brown (10YR 5/4) and distinct gray (10YR 6/1) mottles; massive; firm; few pores; 30 percent gravel and cobbles; mildly alkaline; weakly calcareous.

The thickness of the solum ranges from 24 to 40 inches. The depth to carbonates ranges from 20 to 40 inches, and depth to bedrock is more than 5 feet. Coarse fragments make up 0 to 35 percent, by volume, of the solum and 20 to 50 percent of the substratum. In some places the upper horizons have deposits of local colluvium. Reaction is strongly acid to slightly acid in the surface layer, medium acid to neutral in the subsoil, and slightly acid to mildly alkaline in the substratum.

In some uncultivated areas, there is a dark colored O horizon 1 to 4 inches thick. In some areas there is an A1 horizon. In the Ap or A1 horizon, hue is 2.5Y or 10YR, value is 2 to 4, and chroma is 1 or 2. Structure is weak or moderate granular. Consistence is friable or very friable.

In the upper part of the B horizon, hue is 10YR to 5Y, value is 4 to 6, and chroma is 1 or 2. Mottles are common or many.

In the lower part of the B horizon, hue is 5YR to 5Y, value is 3 to 5, and chroma is 2 to 4. Texture ranges from fine sandy loam or sandy loam to loam and includes their gravelly analogs in some places. Structure is angular blocky or subangular blocky, or the material is massive. Consistence is friable or firm.

In the C horizon, matrix color is similar to that of the B horizon or is 1 unit lower in chroma. Texture ranges from sandy loam or fine sandy loam to loam and includes gravelly or very gravelly analogs. Structure is weak platy, or the material is massive. Consistence is firm or very firm.

The Sun soils are commonly associated with the Sodus, Ira, and Scriba soils and formed in material similar to that in which those soils formed. Sodus soils are well drained, Ira soils are moderately well drained, and Scriba soils are somewhat poorly drained. Sun soils do not have a fragipan, which those soils have. They commonly are near Massena soils and are similar to those soils, but Massena soils are somewhat poorly drained.

Su—Sun loam. This is a nearly level soil that formed in firm glacial till. It is on concave toeslopes between drumlinlike hills, in depressions and low broad flats, and along drainageways. It receives runoff from higher, adjacent soils. Slopes range from 0 to 3 percent. Many areas are long and narrow, and some areas are oblong in shape. Individual areas are mainly 5 to 20 acres in size.

Included with this soil in mapping are small areas of the somewhat poorly drained Scriba soils on slightly elevated rises. Small swampy areas of Palms muck in deeper depressions and some areas of stony soils are also included.

This soil is generally not suited to field crops or hay crops unless it is drained. Suitable outlets for drainage are not available in many places. Where suitable outlets are available, however, use of surface and subsurface drains is feasible. Because of slow permeability in the subsoil, the drains need to be closely spaced. Interceptor drains that divert runoff and subsurface seepage from higher soils are effective in many areas. If this soil is used for cultivated crops, minimum tillage, plowing at the proper moisture content, return of crop residue to the soil, and use of cover crops are practices that help to maintain good soil tilth. Pasture in undrained areas generally is poor in quality and is difficult to improve.

Prolonged wetness and slow permeability in the subsoil and substratum are major limitations for nonfarm uses. In many areas this soil has potential for ponds or for development of wetland wildlife habitat. Capability subclass IVw.

Swanton series

The Swanton series consists of deep, somewhat poorly drained and poorly drained soils. These soils formed in a mantle of moderately coarse textured, glaciofluvial deposits 20 to 40 inches thick that are mainly fine sand and in underlying fine textured, glaciolacustrine sediment that is dominantly clay and silt. These soils are nearly level and are on moderately low plains.

In a representative profile, the surface layer is very dark grayish brown fine sandy loam 8 inches thick. The subsurface layer is leached light brownish gray, mottled, friable fine sandy loam 2 inches thick. The subsoil extends to a depth of 42 inches. The upper part of the subsoil is grayish brown, mottled, friable fine sandy loam 9 inches thick. The lower part of the subsoil is dark gray and gray, mottled, firm silty clay 23 inches thick. The substratum, to a depth of 60 inches, is light gray and yellowish brown, firm clay.

A seasonal high water table is in the upper part of the subsoil for long periods in winter and spring. At times it is perched above the dense, fine textured substratum, but it usually corresponds to the level of ground water. Permeability is moderately rapid in the surface layer and upper part of the subsoil and slow to very slow in the lower part of the subsoil and in the substratum. Roots are mostly restricted to the upper part of the subsoil, but some roots penetrate more deeply as the water table lowers in summer. Available water capacity is moderate to high. The natural content of nitrogen is medium, but nitrogen is released slowly to plants in spring when the soils are damp and cold. The natural content of phosphorus and potassium is low. Unless the soil is limed, the surface layer and upper part of the subsoil are strongly acid to medium acid.

Most areas of these soils are in trees or pasture or are idle. Some areas are in hay, and a few areas are artificially drained and are in cultivated crops.

Representative profile of Swanton fine sandy loam, in a meadow in the town of Schroeppel, 400 feet west of County Route 10 and 30 feet south of abandoned railroad right-of-way:

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) fine sandy loam; weak medium granular structure; friable; many roots; medium acid; abrupt smooth boundary.

A2—8 to 10 inches; light brownish gray (10YR 6/2) fine sandy loam; few medium distinct yellowish brown (10YR 5/4) mottles; weak fine subangular blocky structure; friable; many roots; medium acid; clear irregular and broken boundary.

B21g—10 to 15 inches; grayish brown (2.5Y 5/2) fine sandy loam; many medium distinct reddish yellow (7.5YR 7/6) mottles; moderate medium subangular blocky structure; friable; common roots; medium acid; gradual wavy boundary.

B22g—15 to 19 inches; grayish brown (10YR 5/2) fine sandy loam; many coarse distinct yellowish brown (10YR 5/6) mottles; weak medium granular structure; friable; few roots; medium acid; abrupt smooth boundary.

IIB23g—19 to 24 inches; dark gray (10YR 4/1) silty clay; many medium distinct yellowish brown (10YR 5/8) mottles; moderate coarse angular block structure; firm; few fine roots; few pores; neutral; gradual wavy boundary.

IIB3g—24 to 42 inches; gray (10YR 5/1) silty clay; many medium distinct yellowish brown (10YR 5/6) mottles; weak coarse angular blocky structure; firm; few pores lined with patchy light gray to gray (N 6/0) clay films; few thin brown (10YR 5/3) clay films on vertical faces of peds; neutral; gradual wavy boundary.

IIC—42 to 60 inches; laminated light gray (N 7/0) and yellowish brown (10YR 5/4) clay; strong thick platy structure; firm; weakly calcareous; mildly alkaline.

The thickness of the moderately coarse textured mantle that overlies the fine textured sediment ranges from 20 to 40 inches. Depth to carbonates is more than 40 inches, and depth to bedrock is more than 5 feet. Swanton soils are mostly free of coarse fragments, but some profiles have a few pebbles in the upper part. Reaction is strongly acid to medium acid in the upper part of the solum and medium acid to mildly alkaline in the lower part of the solum and in the substratum.

In the Ap horizon, hue is mainly 10YR, value is 3, and chroma is 1 or 2. In unplowed areas there is an A1 horizon. It has colors similar to those of the Ap horizon.

In the A2 horizon, hue is mainly 10YR, value is 6, and chroma is 2 or 3. Mottles are distinct or prominent. Structure is subangular blocky or granular.

In the B21g horizon, hue is 2.5Y or 10YR, value is 4 to 6, and chroma is 1 to 3. Mottles are distinct or prominent. Texture is mainly fine sandy loam but ranges from sandy loam to very fine sandy loam. Structure is subangular blocky or platy.

In the B22g horizon, hue is 2.5Y or 10YR, value is 4 or 5, and chroma is 1 to 3. Mottles are faint or distinct. Texture is mainly fine sandy loam but ranges from sandy loam to very fine sandy loam. Structure is weak granular or very weak subangular blocky.

In the IIB23g horizon, hue is 10YR to 2.5Y, value is 4 or 5, and chroma is 1 or 2. Mottles are distinct or prominent. Texture ranges from silty clay loam or silty clay to clay. Structure is angular or subangular blocky.

The IIB3g horizon has properties similar to those of the IIB23g horizon, except it has weaker structure.

In the IIC horizon, hue is 2.5Y and 10YR or is neutral, value is 5 to 7, and chroma is 0 to 4. Texture is dominantly silty clay but ranges from silty clay loam to clay. Structure is medium to thick platy.

The Swanton soils form a drainage sequence with the moderately well drained Elmwood soils. They commonly are near the somewhat poorly drained Minoa soils and are similar to those soils, except Swanton soils have fine textured deposits at a depth of 20 to 40 inches. Swanton soils commonly are near the somewhat poorly drained Rhinebeck soils, and they have a coarse textured mantle, which Rhinebeck soils do not have.

Sw—Swanton fine sandy loam. This is a nearly level soil that formed in multiple lacustrine deposits of moderately coarse textured material that is mainly fine sand and in underlying, fine textured sediment that is mainly clay and silt. This soil is on moderately low flats. Slopes range from 0 to 3 percent. Individual areas commonly are elongated in shape and are mainly 3 to 20 acres in size.

Included with this soil in mapping are small areas of the moderately well drained Elmwood soils on slightly elevated ridges and knolls. Also included are soils that are similar to this Swanton soil but are very poorly drained in a few small depressions. These depressional areas are identified on the soil map by the symbol for a wet spot. A few very small areas of sandy Minoa and Lamson soils and clayey Rhinebeck soils are also included.

If undrained, this soil is generally not suited to cultivated crops but is suited to water-tolerant hay and pasture plants. Artificial drainage is difficult to establish in some areas because of the lack of suitable outlets. If subsurface drains are placed in the fine textured lower part of the subsoil or substratum, they should be closely spaced. Land smoothing or bedding can improve surface drainage in some areas. If the soil is adequately drained, field crops and vegetable crops respond well to the application of large amounts of fertilizer. This soil is free of coarse fragments, and it is easy to till at the proper moisture content. Minimum tillage and use of cover crops are practices that help to maintain good soil tilth.

Prolonged seasonal wetness and very slow or slow permeability in the lower part of the subsoil and in the substratum are limitations for many nonfarm uses. Capability subclass IIIw.

Urban Land

UB—Urban land. This map unit consists of large areas in which the original soil has been altered or removed by construction of houses, stores, schools, churches, factories, shopping centers, sidewalks, parking lots, railroad yards, and docks. In most areas the surface is covered by asphalt, concrete, or similar material. Because the properties of the soil material vary greatly from place to place, it is not possible to identify distinct soil types. These areas are in business districts of the larger villages in the county, for example, Oswego and Fulton. Not placed in a capability subclass.

Wallkill series

The Wallkill series consists of deep, very poorly drained soils. These soils formed in silty alluvial sediment underlain by organic material. They are nearly level and are on low flood plains along streams that dissect areas of organic deposits.

In a representative profile, the surface layer is very dark brown silt loam 8 inches thick. The subsoil is grayish brown, mottled firm silt loam 12 inches thick. The mineral soil substratum is grayish brown, firm silt loam 4 inches thick. The mineral soil material is underlain by 2 organic soil layers that extend to a depth of 50 inches. The upper layer is black, friable muck (sapric material) 8 inches thick, and the lower layer is very dark grayish brown mucky peat (hemic material) 18 inches thick.

These soils are subject to flooding. Unless these soils are drained, the water table is at or near the surface for long periods during the year. Permeability is moderate in the mineral soil layers and moderately rapid or rapid in the underlying organic deposits. In undrained areas, roots are mainly restricted to the surface layer and upper part of the subsoil. In drained areas, root penetration is good and the available water capacity is high. The natural supply of nitrogen is high, but nitrogen is released slowly to plants in spring when the soil is damp and cold. The natural content of phosphorus and potassium is medium. Unless the soil is limed, the surface layer and subsoil are strongly acid to slightly acid.

A few areas of Wallkill soils are drained and intensively cropped. Undrained areas are in water-tolerant pasture or trees or are idle.

Representative profile of Wallkill silt loam, in a cultivated field in the town of Schroeppel, beside Six-Mile Creek, one-eighth mile northeast of junction of Six-Mile and Bells Creeks:

Ap—0 to 8 inches; very dark brown (10YR 2/2) silt loam; moderate medium granular structure; friable; common fine roots; medium acid; clear smooth boundary.

Bg—8 to 20 inches; grayish brown (10YR 5/2) silt loam; common fine distinct gray (10YR 5/1) mottles; weak coarse prismatic structure; firm; few fine roots; few pores; medium acid; clear wavy boundary.

Cg—20 to 24 inches; grayish brown (10YR 5/2) silt loam; common fine distinct gray (10YR 5/1) mottles; massive; firm; medium acid; abrupt smooth boundary.

IIOa—24 to 32 inches; black (10YR 2/1) sapric material (muck); very dark brown (10YR 2/2) when rubbed and pressed; 40 percent fibers when broken, 10 percent when rubbed and pressed; massive; friable; medium acid; gradual wavy boundary.

IIOe—32 to 50 inches; very dark grayish brown (10YR 3/2) hemic material (mucky peat); 60 percent fibers when broken, 40 percent when rubbed; massive; neutral.

The thickness of mineral soil overlying organic material ranges from 18 to 36 inches. The organic material is at least 16 inches thick. Depth to bedrock is more than 6 feet. Coarse fragments are generally absent, but very few pebbles are in some profiles. Reaction is strongly acid to medium acid in the mineral soil horizons and medium acid to neutral in the underlying organic soil horizons.

In undisturbed areas there is an A1 horizon 4 to 5 inches thick. In the A1 or Ap horizon, hue is 10YR or 2.5Y, value is 2 to 4, and chroma is 1 or 2. Structure is weak or moderate granular. Consistence is friable or very friable.

In the B horizon, hue is 5Y to 5YR but is mainly 2.5Y or 10YR, value is 4 or 5, and chroma is 1 or 2. Texture is dominantly loam or silt loam, but the texture of subhorizons in some profiles ranges from fine sandy loam to silty clay loam. Structure is weak prismatic or blocky. Consistence is friable or firm. In some profiles, weak structure is absent and only a C horizon is present. In some profiles, the B horizon extends to the organic material and there is no C horizon.

The C horizon has color, texture, and consistence that are the same as those of the B horizon. The C horizon differs from the B horizon in lacking structural development.

The O horizons are hemic material (mucky peat) or sapric material (muck). They include woody or herbaceous plant remnants, or both.

The Wallkill soils commonly are near Middlebury and Rumney soils on alluvial flood plains. Middlebury soils are moderately well drained, and Rumney soils are somewhat poorly drained and poorly drained. Wallkill soils are also near Carlisle and Palms soils, which are very poorly drained. Wallkill soils have a silty mantle of mineral soil, which Carlisle and Palms soils do not have, and they are deeper than Palms soils.

Wa—Wallkill silt loam. This soil is nearly level and formed in a mantle of alluvial sediment that overlies organic deposits. It is in low, elongated areas along streams that dissect basins in which organic material has accumulated. It is subject to flooding from stream overflow. Slopes range from 0 to 3 percent but are mostly less than 2 percent. Individual areas are mainly 5 to 30 acres in size.

Included with this soil in mapping are small areas of poorly drained and very poorly drained, finer textured Canandaigua and Madalin soils. Areas of Palms and Carlisle soils, which do not have an overlying mantle of mineral soil, are also included. A few small areas of the alluvial Rumney soils are also included in places where there are no underlying organic deposits.

This soil is well suited to most crops grown in the county, including vegetable crops, if it is adequately drained and flooding is controlled. If undrained, this soil supports water-tolerant sedges, grasses, and trees. Drainage is difficult and expensive to establish in some places because of the low position of this soil on the landscape. Using deep open ditches, lowering the water level in the adjacent stream, and building dikes are required to prevent flooding and to adequately drain some areas. Streambank erosion is a hazard in some areas. This soil is free of coarse fragments. If drained, it is easy to work at the proper moisture content and can be kept in good tilth with a minimum of conservation practices.

The hazard of flooding, prolonged wetness, and instability of the underlying organic deposits are limitations for many nonfarm uses. In some areas this soil has potential for development of wetland wildlife habitat, and in other areas it can be used as an open space corridor. Capability subclass IIIw.

Westbury series

The Westbury series consists of deep, somewhat poorly drained, moderately coarse textured soils that have a fragipan. These soils formed in glacial till deposits derived mainly from sandstone. They are nearly level and gently sloping. They are in moderately low areas on upland till plains.

In a representative profile, the surface layer is very dark gray gravelly fine sandy loam 8 inches thick. The upper part of the subsoil is yellowish brown, mottled, firm gravelly fine sandy loam 7 inches thick. Below this is a leached layer of gray, mottled gravelly fine sandy loam 5 inches thick. The lower part of the subsoil is a fragipan of brown and gray, firm gravelly fine sandy loam 21 inches thick. The substratum, to a depth of 50 inches, is light brownish gray gravelly and cobbly sandy loam.

The seasonal high water table is perched above the slowly permeable fragipan and substratum late in winter and in spring. Permeability is moderate in the surface layer and in the upper part of the subsoil. Roots are restricted above the fragipan. Available water capacity is low to moderate above the fragipan. The content of organic matter and nitrogen in the surface layer is medium. Nitrogen is slowly available to plants when the soils are wet and cold in spring. The natural ability of these soils to supply potassium and phosphorus to plants is low. Unless the soil is limed, the surface layer and upper part of the subsoil are extremely acid to medium acid.

Most areas are in woodland or pasture or are idle. Some areas are used for hay crops, and a few areas are used for row crops.

Representative profile of Westbury gravelly fine sandy loam, 0 to 8 percent slopes, in an idle field in the town of Redfield, 40 feet west of County Route 17 and 1 mile south of Salmon River Reservoir:

Ap—0 to 8 inches; very dark gray (10YR 3/1) gravelly fine sandy loam, very dark grayish brown (10YR 3/2) when rubbed; dark red (2.5YR 3/6) organic stains in lower part; moderate medium granular structure; very friable; many roots; 20 percent coarse fragments; very strongly acid; clear wavy boundary.

B2ir—8 to 15 inches; yellowish brown (10YR 5/4) gravelly fine sandy loam; common medium prominent red (2.5YR 4/6) mottles, oriented horizontally and in pores; weak thick platy structure; firm; common roots; common fine pores; 20 percent coarse fragments; strongly acid; abrupt wavy boundary.

A'2—15 to 20 inches; gray (10YR 6/1) gravelly fine sandy loam; common medium distinct yellowish brown (10YR 5/4) mottles; weak thick platy structure; common pores; 15 percent coarse fragments; strongly acid; clear wavy boundary.

B'x—20 to 41 inches; brown (10YR 5/3) and gray (10YR 6/1) gravelly fine sandy loam; vertical wedges, 1 to 2-1/2 inches thick, that have light gray to gray (10YR 6/1) centers and yellowish brown (10YR 5/6) borders along faces of prisms; moderate very coarse prismatic structure; firm, brittle; few fine pores; 25 percent coarse fragments, less than 3 percent coarse fragments greater than 3 inches in diameter; strongly acid; clear wavy boundary.

C—41 to 50 inches; light brownish gray (10YR 6/2) gravelly and cobbly sandy loam; massive; slightly sticky; firm; 30 percent coarse fragments, 5 percent coarse fragments greater than 3 inches in diameter; neutral.

The thickness of the solum ranges from 40 to 60 inches. Depth to the fragipan ranges from 17 to 22 inches, and depth to bedrock is more than 5 feet. Coarse fragments are mainly gravel and cobbles. They make up 15 to 35 percent, by volume, of the soil material above the fragipan and 25 to 50 percent of the fragipan and substratum. Reaction is extremely acid to medium acid in the upper part of the solum and very strongly acid to medium acid in the lower part of the solum.

In the Ap horizon, hue is 10YR or 7.5YR, value is 2 or 3, and chroma is 1 or 2. In undisturbed areas there commonly is a dark O2 horizon 2 to 5 inches thick that overlies a light colored A2 horizon 1 to 3 inches thick. The surface layer in some areas is very stony or extremely stony.

In the Bir horizon, hue is 5YR to 10YR, value is 3 to 6, and chroma is 4 to 6. Mottles are common to many. Texture ranges from sandy loam to silt loam and includes their gravelly analogs. Structure is weak granular, medium or coarse subangular blocky, or platy. Consistence is friable or firm.

In the A'2 horizon, hue is 10YR or 7.5YR, value is 5 to 7, and chroma is 1 to 4. Mottles are in some profiles. Texture ranges from gravelly sandy loam to gravelly silt loam. Structure is weak platy, or the material is massive. Consistence is friable or firm.

In the B'x horizon hue is 10YR or 7.5YR, value is 5 or 6, and chroma is 1 to 4. A few fine faint mottles are in some profiles. Texture is sandy loam and fine sandy loam and their gravelly and very gravelly analogs. Structure is weak or moderate coarse platy or is prismatic. Consistence is firm or very firm and is brittle.

The C horizon has color and texture similar to those of the B'x horizon. Structure is weak platy, or the material is massive. Consistence is firm or very firm.

Westbury soils form a drainage sequence with Worth, Empeyville, and Dannemora soils and formed in material similar to that in which those soils formed. Worth soils are well drained, Empeyville soils are moderately well drained, and Dannemora soils are poorly drained. Westbury soils are near Fredon soils on low outwash terraces. Fredon soils are somewhat poorly drained and poorly drained. Westbury soils have less gravel than Fredon soils and have a fragipan, which Fredon soils do not have.

WbB—Westbury gravelly fine sandy loam, 0 to 8 percent slopes. This nearly level to gently sloping soil has the profile described as representative for the series. It is on concave foot slopes, along drainageways, on the nearly level top of broad hills, and on moderately low flats on till plains. Individual areas are oblong, long and narrow, or irregular in shape and are mainly 2 to 20 acres in size.

Included with this soil in mapping are small areas of well drained Worth soils and moderately well drained Empeyville soils on slightly elevated knolls and benches. Also included are Dannemora soils in depressions and a few low areas, many of which are indicated on the soil map by the symbol for a wet spot. Some areas of stony soils are also included.

This soil is not well suited to most field crops because of seasonal wetness. The installation of subsurface and surface drains has limited effectiveness because of the slow movement of water through the fragipan. Interceptor drains that divert runoff and subsurface seepage from higher soils benefit some fields. Coarse fragments and surface stones in some places hinder the operation of some tillage equipment. If row crops are grown, this soil is best suited to short-season varieties because the growing season is relatively short. Minimum tillage, use of cover crops, and including sod crops in the cropping system help to maintain good tilth. In many areas this soil is better suited to hay and pasture crops that are moderately tolerant of wetness than to row crops.

Seasonal wetness, slow permeability in the fragipan and substratum, and the presence of small coarse fragments are the main limitations for many nonfarm uses. In some areas this soil has potential for pond sites. Capability subclass IIIw.

WDB—Westbury-Dannemora complex, very stony, gently sloping. The Westbury soil in this complex has a profile similar to the one described as representative for the series, except large stones are in the surface layer. The Dannemora soil has the profile described as representative for its series. These soils are so closely intermingled that it was not feasible to map them separately. The Westbury soil makes up 60 percent of the complex, and the Dannemora soil makes up 25 percent. The surface layer of these soils is gravelly fine sandy loam that is as much as 3 percent large stones. Stones and a few boulders are 5 to 30 feet apart on the surface. These soils are in moderately low and low areas on till plains at the higher elevations in the county. Slopes range from 3 to 8 percent. The Westbury soil is slightly higher on the landscape than the Dannemora soil. Individual areas are irregular in shape and are mainly 30 to 150 acres in size.

Included with these soils in mapping are small areas of well drained Worth soils and moderately well drained Empeyville soils on knolls and ridges. Also included are a few small areas where the soil is free of stones or is extremely stony.

These soils are not suited to intertilled crops, because the surface stones make the use of tillage implements impractical. Surface stones also hinder the operation of haying equipment. The prolonged seasonal wetness, a relatively short growing season, and the dense and slowly permeable fragipan which restricts rooting also are limitations to the use of these soils for crops. Because of these additional limitations, it may not be practical to remove the surface stones so that tillage implements can be used. In many areas these soils are better suited to pasture than to other uses. Pasture generally is poor in quality, however, because of droughtiness late in summer and the difficulty in reseeding and in applying fertilizer.

Surface stoniness, prolonged seasonal wetness, and slow permeability in the fragipan are the main limitations for nonfarm uses of these soils. Some areas have potential for development of wildlife habitat. Capability subclass VIIs.

WEB—Westbury-Dannemora complex, extremely stony, gently sloping. The Westbury and Dannemora soils in this complex have a profile similar to the one described as representative for their series, except they have more stones in the surface layer. The soils are so closely intermingled that it was not feasible to map them separately. The Westbury soil makes up 60 percent of the complex, and the Dannemora soil makes up about 25 percent. The surface layer is gravelly fine sandy loam that is as much as 15 percent large stones. Stones and a few boulders are 2.5 to 5 feet apart on the surface. These soils are in moderately low and low areas at the higher elevations in the county. The Westbury soil is somewhat poorly drained and is in slightly higher positions on the landscape than the Dannemora soil. The Dannemora soil is poorly drained. Slopes range from 3 to 8 percent. Individual areas vary in shape and are mainly 20 to 100 acres in size.

Included with these soils in mapping are small areas of the well drained Worth soils and the moderately well drained Empeyville soils on slightly convex knolls and ridges. Also included are a few areas of stony and very stony soils and some areas of soils that have slopes of 0 to 3 percent.

These soils are not suited to most crops, because surface stoniness prevents the use of farm equipment. Prolonged seasonal wetness, a relatively short growing season, and the dense and slowly permeable fragipan that restricts rooting also are limitations. Because of these additional limitations, removing surface stones so that crops can be grown is not feasible. Pasture generally is poor in quality because of droughtiness late in summer and the extreme difficulty in reseeding and in applying lime and fertilizer.

Excessive surface stoniness, prolonged seasonal wetness, and slow permeability in the fragipan are severe limitations for most nonfarm uses. Most areas of these soils are better suited to wildlife habitat or woodland than to other uses, but hand planting of trees is required in some of these areas. Capability subclass VIIs.

Williamson series

The Williamson series consists of deep, moderately well drained, medium textured soils that have a fragipan. These soils formed in glaciolacustrine deposits that are dominantly silt and very fine sand. They are nearly level to sloping and are on flats, ridges, knolls, and low hills on the lake plain.

In a representative profile, the surface layer is brown very fine sandy loam 9 inches thick. The upper part of the subsoil is dark brown, very friable very fine sandy loam 8 inches thick. Below this is a leached layer of pale brown, mottled, firm very fine sandy loam 3 inches thick. The lower part of the subsoil is a fragipan of brown, firm, brittle silt loam 24 inches thick. The substratum, to a depth of 50 inches, is brown, firm silt loam.

A seasonal high water table is perched above the fragipan early in spring. Permeability is moderate above the fragipan and slow in the fragipan and substratum. Root penetration is somewhat restricted by the fragipan. Available water capacity is moderate. The natural ability of these soils to supply nitrogen, phosphorus, and potassium to plants is medium. Unless the soil is limed, the surface layer and upper part of the subsoil are very strongly acid to slightly acid.

Many areas of these soils are intensively farmed. Some areas are in pasture or woodland, and a few areas are idle.

Representative profile of Williamson very fine sandy loam, 2 to 6 percent slopes, in a cultivated field in the town of Granby, 2,000 feet south of Granby Road and 50 feet east of County Route 14:

Ap—0 to 9 inches; brown (10YR 4/3) very fine sandy loam; weak medium and fine granular structure; very friable; many roots; slightly acid; abrupt smooth boundary.

B2—9 to 17 inches; dark brown (7.5YR 4/4) very fine sandy loam; weak medium and fine subangular blocky structure parting to weak fine granular; friable; common roots; common pores; medium acid; clear wavy boundary.

A'2—17 to 20 inches; pale brown (10YR 6/3) very fine sandy loam; common medium distinct dark yellowish brown (10YR 4/4) and reddish brown (2.5YR 5/4) mottles; weak medium to thick platy structure; firm; few fine roots; few pores; medium acid; clear wavy boundary.

B'x—20 to 44 inches; brown (7.5YR 4/4) silt loam; common medium faint dark reddish brown (5YR 3/2) mottles; brown (7.5YR 5/2) vertical wedges with strong brown (7.5YR 5/6) mottled borders; moderate very coarse prismatic structure parting to weak medium and thick platy; firm and brittle; few roots along prism faces; thin discontinuous clay films on surface of plates and linings in pores; strongly acid; clear smooth boundary.

C—44 to 50 inches; brown (7.5YR 4/2) silt loam; weak thick platy structure; firm and slightly plastic; dark reddish brown (5YR 3/4) iron stains in pores; strongly acid.

The thickness of the solum ranges from 40 to 52 inches. The depth to the fragipan ranges from 17 to 24 inches, and depth to bedrock is more than 6 feet. Coarse fragments are very few in number or are absent. Reaction is very strongly acid to slightly acid in the surface layer and upper part of the subsoil and strongly acid to slightly acid in the fragipan and substratum.

In the Ap horizon, hue is dominantly 10YR, value is 3 or 4, and chroma is 2 or 3. Structure is weak or moderate granular. Consistence is very friable or friable.

In the B2 horizon, hue is dominantly 10YR but is 7.5YR in places, value is 4 to 6, and chroma is 3 to 6. Texture is very fine sandy loam or silt loam. Mottles that have high chroma are within 12 to 24 inches of the surface. Structure is weak or very weak fine or medium subangular blocky or granular, or both.

In the A'2 horizon, hue is dominantly 10YR but is 7.5YR in places, value is 5 or 6, and chroma is 3. Mottles are common or many and are distinct or prominent. Texture is very fine sandy loam or silt loam. Structure is weak platy, or the material is massive. Consistence is friable or firm.

In the B'x horizon, or fragipan, hue is dominantly 10YR but is 7.5YR in places, value is 4 or 5, and chroma is 3 or 4. Mottles are few or common and are faint or distinct. Texture is very fine sandy loam or silt loam. Structure is prismatic parting to platy, or the material is massive.

In the C horizon, hue is 7.5YR to 2.5Y, value is 4 or 5, and chroma is 2 to 4. Texture is stratified silt to very fine sandy loam. Structure is weak to moderate platy, or the material is massive.

Williamson soils form a drainage sequence with Amboy soils. Williamson soils are moderately well drained, and Amboy soils are well drained. Williamson soils are near the Raynham and Canandaigua soils and formed in material similar to that in which those soils formed. Raynham soils are somewhat poorly drained and poorly drained, and Canandaigua soils are poorly drained and very poorly drained. Williamson soils have a fragipan, which those soils lack, and are better drained than those soils.

W1A—Williamson very fine sandy loam, 0 to 2 percent slopes. This nearly level soil has a profile similar to the one described as representative for the series, except mottles are closer to the surface. It is on broad, slightly elevated flats and benches on lake plains. Individual areas are circular or oblong in shape and are mainly 3 to 15 acres in size.

Included with this soil in mapping are small areas of the well drained Amboy soils on slightly elevated knolls and the somewhat poorly drained Raynham soils in low areas and along drainageways. Also included are areas of the moderately well drained Minoa variant soils and the somewhat poorly drained Minoa soils in places where deposits have a higher content of fine sand. Poorly drained and very poorly drained, silty Canandaigua soils in a few small depressions are also included.

This soil is suited to many of the crops commonly grown in the county. This soil is free of coarse fragments. In some areas it is well suited to midseason vegetable and fruit crops. In some years temporary wetness in spring slightly delays tillage operations. Many fields benefit from subsurface drainage for the included wet spots. This soil is easy to till at the proper moisture content. If row crops are grown intensively, practices such as mimimum tillage, return of crop residue to the soil, use of cover crops, and including sod crops in the cropping system help to maintain organic-matter content and to promote good soil tilth. This soil has excellent response to fertilizer and lime.

Temporary seasonal wetness, slow permeability in the fragipan, and low strength are limitations for many nonfarm uses. Sidewalls of excavations for underground utilities generally are unstable. Capability subclass IIw.

W1B—Williamson very fine sandy loam, 2 to 6 percent slopes. This gently sloping soil has the profile described as representative for the series. It is on slightly convex ridges and knolls, on the top of low hills, and on undulating landscapes on lake plains. Individual areas are mainly circular or oblong in shape and are generally about 3 to 15 acres in size.

Included with this soil in mapping are small areas of the well drained Amboy soils on higher ridges and the somewhat poorly drained Raynham soils in low areas and along drainageways. Also included are areas of the moderately well drained Minoa variant soils, the somewhat poorly drained Minoa soils, and the poorly drained and very poorly drained Lamson soils in places where deposits are dominantly fine sand. Some areas of soils that have a surface layer of silt loam are also included.

This soil is suited to the field crops commonly grown in the county. It is suited to vegetable and fruit crops in some areas. Wetness slightly delays tillage operations for brief periods in spring. Erosion is a moderate hazard, especially if this soil is used intensively for row crops. Use of cover crops, return of crop residue to the soils, and minimum tillage are practices that control erosion and maintain good soil tilth. Randomly placed drains for wet spots and interceptor drains to divert runoff improve many fields. This soil is free of coarse fragments. It is easy to till and has excellent response to lime and fertilizer.

Temporary seasonal wetness, slow permeability in the fragipan, and low strength are limitations for many nonfarm uses. Capability subclass IIe.

W1C—Williamson very fine sandy loam, 6 to 12 percent slopes. This sloping soil has a profile similar to the one described as representative for the series, except depth to the fragipan is slightly less. It is on slightly convex ridges and the lower side slopes of hills and on rolling landscapes on lake plains. In many areas it receives runoff from higher, adjacent soils. Areas are oblong or irregular in shape and are mainly 4 to 40 acres in size.

Included with this soil in mapping are small areas of the well drained Amboy soils slightly higher on the landscape than this Williamson soil and the excessively drained, sandy Windsor soils. Some areas of eroded soils that have small rills or gullies are also included.

This soil is moderately well suited to many of the crops commonly grown in the county. The hazard of erosion is severe if the soil is left unprotected. A cropping system that includes a high proportion of sod crops benefits this soil. Use of cover crops, return of crop residue to the soil, minimum tillage, and cross slope tillage where practical are important practices that maintain good soil tilth and conserve soil and moisture. Brief seasonal wetness is a management concern. Interceptor drains to divert runoff from adjacent higher soils benefit some fields. This is free of coarse soil fragments and is easy to till, but slopes may slightly hinder the operation of some farm machinery.

Slope, temporary seasonal wetness, low strength, and moderately slow permeability in the fragipan are limitations for many nonfarm uses. Steep cuts or excavations on toeslopes in some places cause hazardous slumps or slides. Capability subclass IIIe.

Windsor series

The Windsor series consists of deep, excessively drained, coarse textured soils. These soils formed in sandy glaciofluvial and eolian deposits on outwash terraces, remnant beaches, deltas, and low dunelike hills. They are undulating to moderately steep.

In a representative profile, the surface layer is dark brown loamy fine sand 9 inches thick. The subsoil extends to a depth of 21 inches. The upper part of the subsoil is strong brown, very friable loamy fine sand 4 inches thick, and the lower part is brownish yellow, very friable fine sand 8 inches thick. The substratum is yellowish brown, very friable fine sand to a depth of 47 inches and is light reddish brown, loose fine sand to a depth of 63 inches.

The seasonal high water table is at a depth of more than 6 feet. Permeability is rapid. Available water capacity is very low to moderate. Root penetration is excellent if sufficient moisture is available to plants. The natural content of nitrogen, phosphorus, and potassium is low. Unless the soil is limed, the surface layer and subsoil are very strongly acid to medium acid.

These soils are not intensively farmed because they generally are droughty. Most areas are in poor quality pasture or woodland or are idle.

Representative profile of Windsor loamy fine sand, undulating, in an idle field in the town of Constantia, at the junction of County Road 23 and Salt Road:

Ap—0 to 9 inches; dark brown (10YR 3/3) loamy fine sand; weak medium granular structure; very friable; many roots; medium acid; abrupt smooth boundary.

B21—9 to 13 inches; strong brown (7.5YR 5/8) loamy fine sand; very weak fine to medium granular structure; very friable; common roots; medium acid; clear wavy boundary.

B22—13 to 21 inches; brownish yellow (10YR 6/6) fine sand; single grain; very friable; common roots; medium acid; clear wavy boundary.

C1—21 to 47 inches; yellowish brown (10YR 5/4) fine sand; single grain; very friable; few roots; medium acid; clear wavy boundary.

C2—47 to 63 inches; light reddish brown (5YR 6/3) fine sand; single grain; loose; medium acid.

The thickness of the solum ranges from 20 to 32 inches. Depth to bedrock is more than 5 feet. In some profiles, gravel makes up as much as 5 percent of the solum and 10 percent of the substratum. Reaction is very strongly acid to medium acid in the solum and very strongly acid to slightly acid in the substratum.

In the Ap horizon, hue is 7.5YR or 10YR, value is 3 or 4, and chroma is 2 or 3. Structure is medium or fine granular, or the material is single grained.

In the B21 horizon, hue is 5YR or 7.5YR, value is 4 or 5, and chroma is 4 to 8. Texture ranges from sand to loamy sand or loamy fine sand. Structure is granular, or the material is single grained.

In the B22 horizon, hue is 7.5YR or 10YR, value is 5 or 6, and chroma is 3 to 6. Texture is similar to that of the B21 horizon. Consistence is very friable or loose.

In the C horizon, hue is 5YR to 10YR, value is 5 or 6, and chroma is 2 to 4. Texture is sand or fine sand.

Windsor soils form a drainage sequence with Deerfield, Minoa, and Lamson soils and formed in material similar to that in which those soils formed. Deerfield soils are moderately well drained, Minoa soils are somewhat poorly drained, and Lamson soils are poorly drained and very poorly drained. Windsor soils are near Adams, Alton, and Hinckley soils. Unlike Adams soils Windsor soils do not have illuvial organic matter in the upper part of the B horizon. Windsor soils do not have a high gravel content, which Alton and Hinckley soils have.

WnB—Windsor loamy fine sand, undulating. This soil has the profile described as representative for the series. It is in convex, undulating areas on deltas, beaches, plains, and terraces. Slopes range from 2 to 6 percent. Individual areas are irregular in shape and are mainly 2 to 100 acres in size.

Included with this soil in mapping are small areas of the well drained Oakville soils and areas of the wetter Deerfield, Naumburg, Minoa, Lamson, and Granby soils. Also included are some large areas of the excessively drained Adams soils and some areas of nearly level soils.

This soil is better suited to deep-rooted, drought-tolerant hay and pasture crops than to shallow-rooted field crops. It is suited to cultivated crops, but sod crops should be included in the cropping system. Contour tillage, where practical, helps to conserve moisture and to minimize erosion. The use of winter cover crops, minimum tillage, return of crop residue to the soil, and planting of windbreaks minimize soil blowing and erosion (fig. 11). This soil is suited to vegetable and fruit crops, but irrigation generally is required to obtain optimum yields.

Droughtiness and the sandy texture are limitations for most nonfarm uses. Capability subclass IIIs.

WnC—Windsor loamy fine sand, rolling. This soil has a profile similar to the one described as representative for the series, except the surface layer is thinner. It is in convex, rolling areas on glacial outwash terraces, plains, and low dunelike knolls and hills. Slopes range from 6 to 12 percent. Individual areas are irregular in shape and are mainly 2 to 30 acres in size.

Included with this soil in mapping are the wetter Deerfield, Minoa, Lamson, and Granby soils in small troughs between areas of the Windsor soil on convex slopes. Also included are a few areas of the gravelly Alton, Colton, and Hinckley soils. Large areas of the excessively drained Adams soils in a higher position on the landscape than this Windsor soil are also included.

This soil is better suited to deep-rooted, drought-tolerant hay and pasture crops than to other crops. It is suited to cultivated crops, but the cropping system should include sod crops in most years. Contour farming helps to conserve moisture and to minimize erosion if the slopes are of sufficient length and shape to permit this practice. Use of winter cover crops, minimum tillage, maintaining a cover of crop residue, and planting of windbreaks are some of the practices that minimize soil blowing and erosion. This soil can be used for early season truck crops and fruit crops, but use of many conservation practices and of sprinkler irrigation is necessary to obtain optimum yields.

Slope, droughtiness, and the sandy texture are the principal limitations for most nonfarm uses. In many areas this soil is a good source of sand. Capability subclass IVs.

Worth series

The Worth series consists of deep, well drained, moderately coarse textured soils that have a fragipan. These soils formed in glacial till derived from acid sandstone. They are gently sloping to steep. They are in convex areas of till plains at the higher elevations in the county.

In a representative profile, the surface layer is brown gravelly fine sandy loam 7 inches thick. The upper part of the subsoil is yellowish brown, very friable, and friable gravelly fine sandy loam 8 inches thick. This is underlain by a leached layer of very pale brown, fraible gravelly fine sandy loam 12 inches thick. The lower part of the subsoil is a brown, very firm, brittle fragipan 21 inches thick. The upper part of the fragipan is gravelly fine sandy loam, and the lower part is very gravelly fine sandy loam. The substratum, to a depth of 62 inches, is brown, firm very gravelly fine sandy loam.

A seasonal high water table is perched above the slowly permeable fragipan for very brief periods early in spring. Permeability is moderate above the fragipan. Roots are mostly restricted above the fragipan. Available water capacity is moderate. The natural ability of these soils to supply nitrogen, phosphorus, and potassium to plants is low. Unless the soil is limed, the surface layer and upper part of the subsoil are strongly acid or very strongly acid.

Some areas of these soils are cropped. A relatively short growing season, however, somewhat limits intensive cultivation. Many areas are in hay, pasture, or woodland, and some areas are idle.

Representative profile of Worth gravelly fine sandy loam, 8 to 15 percent slopes, in an idle field in the town of Boylston, 425 feet east of the town line of Sandy Creek and 190 feet north of Center Road:

Ap—0 to 7 inches; brown (10YR 4/3) gravelly fine sandy loam; moderate medium granular structure; very friable; many roots; 30 percent coarse fragments; very strongly acid; abrupt smooth boundary.

B21ir—7 to 13 inches; yellowish brown (10YR 5/6) gravelly fine sandy loam; moderate fine granular structure; very friable; many roots; common pores; 20 percent coarse fragments; strongly acid; clear smooth boundary.

B22—13 to 15 inches; yellowish brown (10YR 5/4) gravelly fine sandy loam; weak thin platy structure; very thin reddish brown (5YR 4/3) oxide coatings on plate faces; friable; common pores; 20 percent coarse fragments; strongly acid; clear wavy boundary.

A'2—15 to 27 inches; very pale brown (10YR 7/3) gravelly fine sandy loam; weak thin and medium platy structure; friable; few roots; few pores; 30 percent coarse fragments; strongly acid; clear irregular boundary.

B'x1—27 to 39 inches; brown (7.5YR 5/4) gravelly fine sandy loam; weak thick platy structure within weak very coarse prisms; few fine faint strong brown (7.5YR 5/8) mottles on plate faces; very firm; brittle; few pores; very thin linings of silt and clay in pores; 30 percent coarse fragments; medium acid; gradual irregular boundary.

B'x2—39 to 48 inches; brown (7.5YR 5/4) very gravelly fine sandy loam; massive within weak coarse prismatic structure; light gray (10YR 7/2) tongues of silty material between prisms; very firm; brittle; few pores; very thin linings of silt and clay in pores; 40 percent coarse fragments; medium acid; diffuse boundary.

C—48 to 62 inches; (10YR 4/3) very gravelly fine sandy loam; massive; firm; few pores; 50 percent coarse fragments; medium acid.

The thickness of the solum ranges from 40 to 60 inches. Depth to the fragipan ranges from 20 to 30 inches, and depth to bedrock is more than 5 feet. Coarse fragments make up 15 to 35 percent, by volume, of the soil material above the fragipan and 25 to 50 percent of the fragipan and substratum. Reaction is very strongly acid or strongly acid in the surface layer and upper part of the subsoil, strongly acid or medium acid in the lower part of the subsoil, and medium acid in the substratum.

In the Ap horizon, hue is dominantly 10YR but is 7.5YR in places, value is 3 or 4, and chroma is 2 or 3. Texture is mainly gravelly fine sandy loam but is gravelly loam and cobbly fine sandy loam in some places. Structure is weak to moderate granular. Consistence is friable to very friable. In undisturbed areas there is a dark colored O2 horizon 3 to 5 inches thick and a light colored A2 horizon 1 to 4 inches thick.

In the B21ir horizon, hue is 10YR to 5YR, value is 4 or 5, and chroma is 3 to 6. The texture is fine sandy loam or loam and includes their gravelly analogs. Structure is weak or moderate granular or subangular blocky. Consistence is friable or very friable.

In the B22 horizon, hue is 10YR to 5YR, value is 4 or 5, and chroma is 4 to 6. Few to common faint or distinct mottles are in some profiles. Texture is fine sandy loam or loam and includes their gravelly analogs. Structure is weak thin platy or subangular blocky.

In the A'2 horizon, hue is 10YR to 5YR, value is 6 or 7, and chroma is 2 or 3. Texture ranges from fine sandy loam to loam and includes their gravelly analogs. Structure is weak thin or medium platy, or the material is massive. Consistence is firm or friable.

In the B'x horizon, hue is 7.5YR or 5YR, value is 4 or 5, and chroma is 2 to 4. Texture is fine sandy loam or loam and includes their gravelly and very gravelly analogs. Structure is weak thin or thick platy, or prismatic, or both. Consistence is very firm or firm and is brittle.

In the C horizon, hue is dominantly 10YR but is 7.5YR in places, value is 4 or 5, and chroma is 2 or 3. Texture is loam or fine sandy loam and includes very gravelly analogs.

The Worth soils form a drainage sequence with Empeyville, Westbury, and Dannemora soils and formed in material similar to that in which those soils formed. Empeyville soils are moderately well drained, Westbury soils are somewhat poorly drained, and Dannemora soils are poorly drained. Worth soils commonly are near Colton and Hinckley soils but have fewer coarse fragments and are finer textured than those soils.

WoB—Worth gravelly fine sandy loam, 3 to 8 percent slopes. This gently sloping soil has a profile similar to the one described as representative for the series, except the surface layer is slightly thicker and faint mottles are just above the fragipan. It is on convex ridges, knolls, and upper shoulder slopes of elongated hills. Individual areas are circular to oval in shape and are mainly 3 to 50 acres in size.

Included with this soil in mapping are small areas of the wetter Empeyville, Westbury, and Dannemora soils in slightly lower areas and along drainageways. Many of these areas are identified on the soil map by the symbol for a wet spot. A few small areas of soils that have surficial deposits of silt and very fine sand 1 1/2 to 3 feet thick are also included.

This soil is suited to some of the crops commonly grown in the county. Because this soil is in the higher and colder parts of the county, it generally is better suited to short season crops than to other crops. Crops cannot be planted until late in spring, and they must be harvested earlier in the fall than crops in warmer parts of the county. The hazard of erosion is slight. Erosion can be controlled by cross slope tillage, use of cover crops, return of crop residue to the soil, and stripcropping where practical. Randomly placed drains for the included wet spots and drainageways improve many areas and permit tillage earlier in spring. The presence of small coarse fragments and a few large stones slightly hinders the operation of some precision tillage machinery.

Slow permeability in the fragipan and substratum and the presence of coarse fragments are the main limitations for most nonfarm uses. Capability subclass IIe.

WoC—Worth gravelly fine sandy loam, 8 to 15 percent slopes. This sloping soil has the profile described as representative for the series. It is on the sides of convex ridges and hills. Individual areas are mainly oval in shape and are mainly 3 to 50 acres in size.

Included with this soil in mapping are small areas of the wetter Empeyville, Westbury, and Dannemora soils in low areas and along drainageways. Small wet areas are identified on the soil map by the symbol for a wet spot. A few small areas of soils that have surficial deposits of silt and very fine sand 1 1/2 to 3 feet thick are also included.

This soil is suited to some of the crops commonly grown in the county. Slope, low natural fertility, the fragipan, and a relatively short growing season are limitations to its use for crops. The hazard of erosion is moderate if cultivated crops are grown. Cross slope tillage, stripcropping, diversions, and use of cover crops help to minimize the hazard of erosion and to maintain good soil tilth. Minimum tillage, return of crop residue to the soil, and including sod crops in the cropping system, also help to maintain good soil tilth. The presence of coarse fragments and a few large stones slightly hinders operation of some tillage equipment. In some areas this soil is better suited to hay and pasture crops than to row crops.

Slow permeability in the fragipan and substratum and slope are the main limitations for nonfarm uses. Capability subclass IIIe.

WoCK—Worth gravelly fine sandy loam, rolling. This soil is on the sides of hills that have convex slopes and on knolls on glacial till plains. Slopes are irregular or complex and range from 8 to 15 percent. Some individual areas are oval, others are variable in shape. Most mapped areas are 3 to 50 acres in size.

Included with this soil in mapping are small areas of the wetter Empeyville, Westbury, and Dannemora soils on foot slopes between knolls, along drainageways, and in slight depressions. Many of the wetter areas are identified on the soil map by the symbol for a wet spot. A few small areas of soil that have surficial deposits of silt and very fine sand 1 1/2 to 3 feet thick are also included.

This soil is suited to some of the crops commonly grown in the county. Slope, the dense fragipan that restricts rooting, low natural fertility, and a relatively short growing season are limitations to its use for crops. The hazard of erosion is severe if row crops are grown, and erosion is difficult to control because of the irregular slopes. Cross slope tillage and contour stripcropping are generally not practical on this soil. Minimum tillage, return of crop residue to the soil, use of cover crops, and including a high proportion of sod crops in the cropping system help to reduce erosion and to promote good soil tilth. This soil must be tilled later in spring than many of the other well drained soils in the county. The presence of coarse fragments and a few large stones hinders the operation of some tillage equipment.

Slow permeability in the fragipan and substratum and complex slopes are the main limitations for nonfarm uses. Capability subclass IVe.

WRE—Worth soils, steep. These soils have a profile similar to the one described as representative for the series, except the surface layer is thinner and is more variable in texture. Texture of the surface layer is gravelly loam, cobbly fine sandy loam, and gravelly fine sandy loam. These soils are on the steep sides of elongated hills and on valley sides of dissected till plains. Slopes range from 25 to 35 percent. Most areas are elongated in shape and are mainly 5 to 50 acres in size.

Included with these soils in mapping are some large areas of moderately steep soils, a few areas of eroded soils, and some areas of stony and very stony soils. Also included are moderately well drained Empeyville soils and somewhat poorly drained Westbury soils on a few foot slopes, along drainageways, and in seep areas.

Slope is the main limitation to the use of these soils for crops. Slopes are generally too steep for the operation of farm machinery. The hazard of erosion is severe if the plant cover is removed. These soils can be used for pasture early in the growing season, but pasture generally is poor in quality because of the difficulty in reseeding and in applying fertilizer. Droughtiness is a problem in midsummer in many years. Overgrazing of pasture increases the hazard of erosion. In many areas these soils are suited to woodland or to wildlife habitat.

Slope and slow permeability in the fragipan and substratum are severe limitations for most nonfarm uses. In a few areas these soils have potential for recreational uses, for example, ski slopes. Capability subclass VIe.

WSC—Worth and Empeyville very stony soils, sloping. The soils in this map unit have a profile similar to the one described as representative for the series, except the surface layer is more stony and is more variable in texture. Many areas consist entirely of the well drained Worth soils, some areas consist entirely of the moderately well drained Empeyville soils, and some areas have both soils. Texture of the fine earth part of the surface layer is fine sandy loam and loam. These soils are on hillsides and the sides of ridges. Slopes range from 8 to 15 percent. Stones and a few boulders are 5 to 30 feet apart on the surface. Individual areas are variable in shape and are mainly 20 to 150 acres in size.

Included with these soils in mapping are small areas of the wetter Westbury and Dannemora soils in drainageways and on foot slopes. Many of these areas are identified on the soil map by the symbol for a wet spot. A few small areas of soils that have surficial deposits of silt and very fine sand 1 1/2 to 3 feet thick are also included. One area in which these deposits are concentrated is in the town of Redfield, east of the north branch of the Salmon River.

These soils are not suited to most crops; because of numerous surface stones, the use of modern tillage implements is impractical. The dense, slowly permeable fragipan limits rooting depth and the amount of water available to plants. The relatively short growing season and low natural fertility also are limitations, and these limitations should be considered in determining the feasibility of removing stones so that crops can be grown. In most areas these soils are suitable for pasture, but reseeding and applying fertilizer are difficult. In some areas these soils are better suited to woodland than to other uses.

Stoniness and slow permeability in the fragipan and substratum are the main limitations for most nonfarm uses. In some areas these soils have potential for development of wildlife habitat. Capability subclass VIs.

WSD—Worth and Empeyville very stony soils, moderately steep. The soils in this map unit have a profile similar to the one described as representative for the series, except the surface layer is thinner, has more stones, and is more variable in texture. Many areas consist entirely of the well drained Worth soils, others consist entirely of the moderately well drained Empeyville soils, and some areas have both soils. Texture of the fine earth part of the surface layer is fine sandy loam and loam. These soils are on valley sides and sides of elongated hills. Slopes range from 15 to 25 percent. Stones and a few boulders are 5 to 30 feet apart on the surface. Most areas are oblong in shape and are mainly 5 to 50 acres in size.

Included with these soils in mapping are small areas of the somewhat poorly drained Westbury soils and the poorly drained Dannemora soils on foot slopes and along drainageways. A few areas of stony and extremely stony soils and a few areas of the coarse textured Colton soils in places where gravelly outwash deposits adjoin the till plains are also included.

These soils are not suited to intertilled crops; because of numerous stones on the surface it is not possible to use modern farm equipment. Generally, removing the surface stones so that crops can be grown is impractical because of moderately steep slopes, low natural fertility, a relatively short growing season, and the fragipan that restricts rooting depth. In some areas these soils are suited to pasture, but pasture generally is poor in quality because of the difficulty in reseeding and in applying fertilizer. Droughtiness is also a problem in some years. The hazard of erosion is severe if the plant cover is removed.

Stoniness, slope, and slow permeability in the fragipan are the main limitations for most nonfarm uses. In some areas these soils have potential for reforestation and for development of wildlife habitat. Hand planting of tree seedlings generally is required. Capability subclass VIs.

WYD—Worth and Empeyville extremely stony soils, moderately steep. These soils have a profile similar to the one described as representative for the series, except the surface layer is thinner, is extremely stony, and is more variable in texture. Many areas consist entirely of the well drained Worth soils, some consist entirely of the moderately well drained Empeyville soils, and some areas have both soils. The fine earth part of the surface layer is fine sandy loam and loam. These soils are on valley sides and on sides of moderately steep elongated hills on till plains. Slopes range from 15 to 25 percent. Stones and a few boulders are about 2.5 to 5 feet apart on the surface.

Individual areas are oblong or irregular in shape and are mainly 15 to 100 acres in size.

Included with these soils in mapping are small areas of the wetter Westbury and Dannemora soils on foot slopes and toeslopes and along drainageways. Small areas of the excessively drained, coarse textured Colton soils are also included in places where gravelly outwash deposits merge with till plains. Some areas of sloping and steep soils and a few areas of very stony soils are also included.

These soils are suited to woodland and wildlife habitat. Because of excessive surface stoniness, they are not suited to crops. The use of equipment, except for hand tools, is impossible because of the very high stone content. Removal of stones generally is not practical because of moderately steep slopes, a relatively short growing season, low natural fertility, and the fragipan that restricts rooting depth. These soils can support some native pasture; however, pasture is poor in quality and practices to improve pasture, for example, adding lime and fertilizer, are impractical. Droughtiness is also a problem in some years.

Excessive surface stoniness, slope, and slow permeability in the fragipan are major limitations for nonfarm uses. Hand planting of tree seedlings can improve these soils for use as wildlife habitat. Capability subclass VIIs.

Use and management of the soils

The soil survey is a detailed inventory and evaluation of the most basic resource of the survey area—the soil. It is useful in adjusting land use, including urbanization, to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in uses of the land.

While a soil survey is in progress, soil scientists, conservationists, engineers, and others keep extensive notes about the nature of the soils and about unique aspects of behavior of the soils. These notes include data on erosion, drought damage to specific crops, yield estimates, flooding, the functioning of septic tank disposal systems, and other factors affecting the productivity, potential, and limitations of the soils under various uses and management. In this way, field experience and measured data on soil properties and performance are used as a basis for predicting soil behavior.

Information in this section is useful in planning use and management of soils for crops, pasture, and woodland, as sites for buildings, highways and other transportation systems, sanitary facilities, and parks and other recreation facilities, and for wildlife habitat. From the data presented, the potential of each soil for specified land uses can be determined, soil limitations to these land uses can be identified, and costly failures in houses and other structures, caused by unfavorable soil properties, can be avoided. A site where soil properties are favorable can be selected, or practices that will overcome the soil limitations can be planned.

Planners and others using the soil survey can evaluate the impact of specific land uses on the overall productivity of the survey area or other broad planning area and on the environment. Productivity and the environment are closely related to the nature of the soil. Plans should maintain or create a land-use pattern in harmony with the natural soil.

Contractors can find information that is useful in locating sources of sand and gravel, roadfill, and topsoil. Other information indicates the presence of bedrock, wetness, or very firm soil horizons that cause difficulty in excavation.

Health officials, highway officials, engineers, and many other specialists also can find useful information in this soil survey. The safe disposal of wastes, for example, is closely related to properties of the soil. Pavements, sidewalks, campsites, playgrounds, lawns, and trees and shrubs are influenced by the nature of the soil.

Crops and pasture

The major management concerns in the use of the soils for crops and pasture are described in this section. In addition, the crops or pasture plants best suited to the soil, including some not commonly grown in the survey area, are discussed; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are presented for each soil.

This section provides information about the overall agricultural potential of the survey area and about the management practices that are needed. The information is useful to equipment dealers, land improvement contractors, fertilizer companies, processing companies, planners, conservationists, and others. For each kind of soil, information about management is presented in the section "Descriptions of the soils." Planners of management systems for individual fields or farms should also consider the detailed information given in the description of each soil.

General principles of soil management

Some principles of soil management can be applied to all soils suitable for farm crops in the county. Specific management practices to be used should be modified, as knowledge of soil problems and crop production increases.

Fertility. Most soils in Oswego County need applications of lime or fertilizer, or both. The amounts needed depend on the natural content of lime and plant nutrients, which is determined by laboratory analyses of soil samples; on the needs of the crop to be grown; and on the level of the yield desired. For assistance in making and interpreting soil tests, farmers and others should consult the local Cooperative Extension Agent.

The average organic-matter content in the surface layer of the soils in Oswego County is about 4 percent. Nitrogen is released by organic matter, but most of this nitrogen is in a complex organic form and is unusable by plants. It is necessary to apply nitorgen fertilizer to supplement the nitrogen made available to plants by the soil.

The soils in the survey area are naturally low to medium in their ability to supply phosphorus to plants. Therefore, the addition of a proper amount of phosphate in the form of commercial fertilizer is essential for optimum crop yields.

Most soils in Oswego County are low to medium in their ability to supply potassium to plants. However, soils that have a clayey subsoil, for example, Hudson soils, are high in their ability to supply potassium.

Application of nitrogen and phosphorus should be timely. Nitrogen is lost through leaching from rapidly permeable soils, for example, Alton soils, and through the denitrification from more slowly permeable soils, for example, Brockport soils. A small amount of nitrogen applied at frequent or timely intervals, for example, at time of planting and at intervals later in the growing season as a sidedressing, generally produces the best results.

Current information that can be used as a guide in determining the need for lime and fertilizer is available on request from the New York College of Agriculture at Cornell University, the local Cooperative Extension Service, and the Soil Conservation Service and from private companies.

Tilth. Soil tilth affects germination of seeds, ease of tillage, and infiltration of water into the soil. Soils that have good tilth are granular and porous. Most soils in Oswego County are moderately high in organic-matter content. Maintaining the organic-matter content promotes good soil tilth and improves fertility. Regularly adding animal manure, returning plant residue to the soil, and using sod crops, cover crops, and green manure crops are practices that help to maintain a high organic-matter content.

Tillage gradually reduces organic-matter content and breaks down soil structure. Therefore, it should be kept to a minimum necessary for seedbed preparation and weed control.

Drainage. On wet soils, for example, Canandaigua or Lamson soils, yields of cultivated crops can be increased by artificial drainage. Open ditches or tile drains can be used. Compared to open ditches, tile drains cost more to install, but they generally require less maintenance and the land is easier to farm than if open ditches are used. Drainage on sloping soils is more effective if the ditches or tile lines are placed perpendicular to the direction of the slope. Whether tile drains or open ditches are used, suitable outlets are needed.

Erosion. Erosion is a principal source of sediment, which is a major cause of pollution. All soils are subject to erosion. A surface layer that is exposed after cultivation, especially on sloping to steep soils, greatly increases the hazard of erosion. On a highly erodible soil, for example, Williamson very fine sandy loam, 6 to 12 percent slopes, a cropping system that reduces runoff and erosion should be used in combination with other practices to control erosion. A cropping system consists of the sequence of crops grown and certain management practices. These practices include minimum tillage, mulch planting, return of crop residue to the soil, using cover crops and green manure crops, and applications of lime and fertilizer. Other practices that reduce erosion are contour cultivation, terracing, contour stripcropping, use of diversions and grassed waterways, and planting of windbreaks.

Using the land for pasture controls erosion on nearly all of the soils in the county. A high level of pasture management is needed on some soils to provide sufficient ground cover to protect the soil from erosion. A high level of pasture management provides for fertilization, control of grazing, and careful selection of seeding mixtures. Grazing is controlled by rotating the livestock from one pasture to another, which allows time for the regrowth of plants. On some soils it is important to select pasture plants that require minimal renovation to maintain a good ground cover and produce an adequate supply and quality of forage.

Field crops. Corn for grain and silage is the principal row crop in the county. Dry beans and potatoes are grown in a few areas. Many areas have potential for soybeans if market and economic conditions are favorable.

Wheat and oats are common close-growing grain crops in the county. Barley, rye, and buckwheat are grown in a few areas.

Special crops. Vegetables, small fruits, fruit trees, and nursery shrubs are grown in a few areas in Oswego County. Vegetables grown for fresh market and for a limited processing market include sweet corn, peas, cabbage, and tomatoes. These crops are grown at the lower elevations in the county, where the growing season begins earlier in spring. Small fruits such as strawberries, raspberries, and melons have commercial potential, although the acreage in these crops currently is small. Deep soils that are free of coarse fragments, have good natural drainage, and warm rapidly in spring are especially well suited to vegetables and small fruits. Amboy, Elmwood, and Windsor soils are examples.

Special vegetable crops, for example, onions and lettuce, are grown exclusively in drained areas of mucky organic soils. Carlisle soils can produce about 450 hundredweight of onions, 800 boxes of lettuce, or 360 hundredweight of potatoes per acre in a normal year. Palms soils, which have thinner organic deposits than Carlisle soils, can produce about 350 hundredweight of onions, 750 boxes of lettuce, or 350 hundredweight of potatoes per acre in a normal year. Rifle soils are in the higher and colder parts of the county, where the growing season is shorter. Rifle soils can produce about 300 hundredweight of onions, 750 boxes of lettuce, or 320 hundredweight of potatoes per acre in a normal year.

Fruit trees, commonly apple or cherry trees, are grown in a few small orchards near Lake Ontario, where the temperature is more moderate than in other parts of the county.

Current information and suggestions for growing special crops can be obtained from local offices of the Cooperative Extension Service and the Soil Conservation Service.

Capability classes and subclasses

Capability classes and subclasses show, in a general way, the suitability of soils for most kinds of field crops. The soils are classed according to their limitations when they are used for field crops, the risk of damage when they are used, and the way they respond to treatment. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils; does not take into consideration possible but unlikely major reclamation projects; and does not apply to rice, cranberries, horticultural crops, or other crops that require special management. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for forest trees, or for engineering purposes.

In the capability system, all kinds of soil are grouped at two levels: capability class and subclass. These levels are defined in the following paragraphs. A survey area may not have soils of all classes.

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 landforms 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 too cold or too 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, though they have other limitations that restrict their use to pasture, rangeland, woodland, wildlife habitat, or recreation.

The acreage of soils in each capability class and subclass is indicated in table 2. All land in the survey area, except cut and fill land, gravel pits, made land, and other miscellaneous areas, is included. Some of the soils that are well suited to crops and pasture may be in low-intensity use, for example, soils in capability classes I and II. Data in this table can be used to determine the farming potential of such soils.

The capability subclass is identified in the description of each map unit in the section "Descriptions of the soils."

Yields per acre

H. L. HANSEN, conservation agronomist, L. J. CROWELL, SR., conservation technician, and L. H. ROBINSON, soil scientist, Soil Conservation Service; F. C. DELLAMANO, D. H. YOUNG, and T. JOHNSON, cooperative extension agents, Cooperative Extension Service, Agricultural Division, assisted in the review of this section.

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 3. 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. Absence of an estimated yield indicates that the crop is not suited to or not commonly grown on the soil.

The estimated yields were based mainly on the experience and records of farmers, conservationists, and extension agents. Results of field trials and demonstrations and available yield data from nearby counties were also considered.

The yields were estimated assuming that the latest soil and crop management practices were used. Hay and pasture yields were estimated for the most productive varieties of grasses and legumes suited to the climate and the soil. A few farmers may be obtaining average yields higher than those shown in table 3.

The management needed to achieve the indicated yields of the various crops depends on the kind of soil and the crop. Such management provides drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate tillage practices, including time of tillage and seedbed preparation and tilling when soil moisture is favorable; 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 residues, barnyard manure, and green-manure crops; harvesting crops with the smallest possible loss; and timeliness of all fieldwork.

The estimated yields reflect the productive capacity of the soils 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 3 are grown in the survey area, but estimated yields are not included because the acreage of these crops is small. The local offices of the Soil Conservation Service and the Cooperative Extension Service can provide information about the management concerns and productivity of the soils for these crops.

Woodland management and productivity

MEREDITH A. PETERS, woodland conservationist, Soil Conservation Service, assisted in preparing this section.

Approximately 389,000 acres, or 62 percent of Oswego County is commercial forest land (*10*).

The acreage in commercial forest-type groups in the county are as follows: white or red pine, 11,400 acres; oak, 25,600 acres; elm, ash, and red maple, 157,300 acres; maple, beech, and birch, 154,600 acres; and aspen and birch, 20,500 acres. There are 19,600 acres in tree plantations in the county.

Table 4 contains information useful to woodland owners or forest managers planning use of soils for wood crops. Map unit symbols for soils suitable for wood crops are listed, and the ordination (woodland suitability) symbol for each soil is given. All soils bearing the same ordination symbol require the same general kinds of woodland management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for important trees. The number 1 indicates very high productivity; 2, high; 3, moderately high; 4, moderate; and 5, low. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *x* indicates stoniness or rockiness; *w*, excessive water in or on the soil; *t*, toxic substances in the soil; *d*, restricted root depth; *c*, clay in the upper part of the soil; *s*, sandy texture; *f*, high content of coarse fragments in the soil profile; and *r*, steep slopes. The letter *o* indicates insignificant limitations or restrictions. If a soil has more than one limitation, priority in placing the soil into a limitation class is in the following order: x, w, t, d, c, s, f, and r.

In table 4 the soils are also rated for a number of factors to be considered in management. *Slight*, *moderate*, and *severe* are used to indicate the degree of major soil limitations.

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 some 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 equipment; *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 that the soil affects expected mortality of planted tree seedlings. Plant competition is not considered in the ratings. Seedlings from good planting stock that are properly planted during a period of sufficient rainfall are rated. A rating of *slight* indicates that the expected mortality of the planted seedlings is less than 25 percent; *moderate*, 25 to 50 percent; and *severe*, more than 50 percent.

Considered in the ratings of *windthrow hazard* are characteristics of the soil that affect the development of tree roots and the ability of the soil to hold trees firmly. A rating of *slight* indicates that trees in wooded areas are not expected to be blown down by commonly occurring winds; *moderate*, that some trees are 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 indicator species or *important trees* on a soil is expressed as a *site index*. This index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Important 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 suitable for commercial wood production and that are suited to the soils.

Wildlife habitat

ROBERT E. MYERS, wildlife biologist, Soil Conservation Service, Syracuse, New York, assisted in preparing this section.

Wildlife is an important resource in Oswego County. In the western portion of the county there generally is a moderate number of white-tailed deer, ruffed grouse, and cottontail. There is a large number of woodcock during migration periods, and many woodcock remain to nest during the summer. In the eastern portion of the county, there is a large number of deer, grouse, and snowshoe hare; a moderate number of rabbits; and a small number of woodcock. In the upper elevations of the Tughill Plateau, deep snow cover limits the number of wildlife.

Soils directly affect the kind and amount of vegetation that is available to wildlife as food and cover, and they affect the construction of water impoundments. The kind and abundance of wildlife that populate an area depend largely on the amount and distribution of food, cover, and water. If any one of these elements is missing, is inadequate, or is inaccessible, wildlife either are scarce or do not inhabit the area.

If the soils have the potential, wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by helping the natural establishment of desirable plants.

In table 5, the soils in the survey area are rated according to their potential to support the main kinds of wildlife habitat in the area. This information can be used in planning for parks, wildlife refuges, nature study areas, and other developments for wildlife; selecting areas that are suitable for wildlife; selecting soils that are suitable for creating, improving, or maintaining specific elements of wildlife habitat; and 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* means that the element of wildlife habitat or the kind of habitat is easily created, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected if the soil is used for the designated purpose. A rating of *fair* means that the element of wildlife habitat or kind of habitat can be created, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* means that limitations are severe for the designated element or kind of wildlife habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* means that restrictions for the element of wildlife habitat or kind of wildlife are very severe, and that unsatisfactory results can be expected. Wildlife habitat is impractical or even impossible to create, improve, or maintain on soils having such a rating.

The elements of wildlife habitat are briefly described in the following paragraphs.

Grain and seed crops are seed-producing annuals used by wildlife. The major soil properties 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 that are planted for wildlife food and cover. Major soil properties 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, that provide food and cover for wildlife. Major soil properties that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, ragweed, lambsquarters, goldenrod, beggarweed, and pigweed.

Hardwood trees and the associated woody understory provide cover for wildlife and produce nuts or other fruit, buds, catkins, twigs, bark, or foliage that wildlife eat. Major soil properties that affect growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of native plants are oak, poplar, cherry, apple, hawthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are commercially available and suitable for planting on soils rated *good* are autumn-olive and crabapple.

Coniferous plants are cone-bearing trees, shrubs, or ground cover plants that furnish habitat or supply food in the form of browse, seeds, or fruitlike cones. Soil properties that have a major effect on the growth of coniferous plants are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, fir, cedar, and juniper.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites, exclusive of submerged or floating aquatics. They produce food or cover for wildlife that use wetland as habitat. Major soil properties affecting wetland plants are texture of the surface layer, wetness, reaction, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, wildrice, and cordgrass and rushes, sedges, and reeds.

Shallow water areas are bodies of water that have an average depth of less than 5 feet and that are useful to wildlife. They can be naturally wet areas, or they can be created by dams or levees or by water-control structures in marshes or streams. Major soil properties affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. The availability of a dependable water supply is important if water areas are to be developed. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The kinds of wildlife habitat are briefly described in the following paragraphs.

Openland habitat 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 kinds of wildlife attracted to these areas include bobwhite quail, pheasant, meadowlark, field sparrow, cottontail, and red fox.

Woodland habitat consists of areas of hardwoods or conifers, or a mixture of both, and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, and deer.

Wetland habitat consists of open, marshy or swampy, shallow water areas where water-tolerant plants grow. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, mink, and beaver.

Recreation

The soils of the survey area are rated in table 6 according to limitations that affect their suitability for recreation uses. The ratings are based on such restrictive soil features as flooding, wetness, slope, and texture of the surface layer. Not considered in these ratings, but important in evaluating a site, are location and accessibility of the area, size and shape of the area and its scenic quality, the ability of the soil to support vegetation, access to water, potential water impoundment sites available, and either access to public sewerlines or capacity of the soil to absorb septic tank effluent. Soils subject to flooding are limited, in varying degree, for recreation use by the duration and intensity of flooding and the season when flooding occurs. Onsite assessment of height, duration, intensity, and frequency of flooding is essential in planning recreation facilities.

The degree of the limitation of the soils is expressed as slight, moderate, or severe. *Slight* means that the soil properties are generally favorable and that the limitations are minor and easily overcome. *Moderate* means that the 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 6 can be supplemented by information in other parts of this survey. Especially helpful are interpretations for septic tank absorption fields, given in table 8, and interpretations for dwellings without basements and for local roads and streets, given in table 7.

Camp areas require such site preparation as shaping and leveling for 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 for this use 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 camping sites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for use as 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 will 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 or boulders, is firm after rains, and is not dusty when dry. If shaping is required to obtain a uniform grade, the depth of the soil over bedrock or hardpan should be enough to allow necessary grading.

Paths and trails for walking, horseback riding, bicycling, and other uses should require little or no cutting and filling. The best soils for this use are those that are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once during the annual period of use. They should have moderate slopes and have few or no stones or boulders on the surface.

Engineering

EDWARD A. FERNAU, senior soil engineer, New York State Department of Transportation, Soil Mechanics Bureau, assisted in preparing this section.

This section provides information about the use of soils for building sites, sanitary facilities, construction material, and water management. Among those who can benefit from this information are engineers, landowners, community planners, town and city managers, land developers, builders, contractors, and farmers and ranchers.

The ratings in the engineering tables are based on test data and estimated data in the "Soil properties" section. The ratings were determined jointly by soil scientists and engineers of the Soil Conservation Service using known relationships between the soil properties and the behavior of soils in various engineering uses.

Among the soil properties and site conditions identified by a soil survey and used in determining the ratings in this section were grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock that is within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure or aggregation, in-place soil density, and geologic origin of the soil material. Where pertinent, data about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of absorbed cations were also considered.

On the basis of information assembled about soil properties, ranges of values can be estimated for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, shear strength, compressibility, slope stability, and other factors of expected soil behavior in engineering uses. As appropriate, these values can be applied to each major horizon of each soil or to the entire profile.

These factors of soil behavior affect construction and maintenance of roads, airport runways, pipelines, foundations for small buildings, ponds and small dams, irrigation projects, drainage systems, sewage and refuse disposal systems, and other engineering works. The ranges of values can be used to (1) select potential residential, commercial, industrial, and recreational uses; (2) make preliminary estimates pertinent to construction in a particular area; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for location of sanitary landfills, onsite sewage disposal systems, and other waste disposal facilities; (5) plan detailed onsite investigations of soils and geology; (6) find sources of gravel, sand, clay, and topsoil; (7) plan farm drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; (8) relate performance of structures already built to the properties of the kinds of soil on which they are built so that performance of similar structures on the same or a similar soil in other locations can be predicted; and (9) predict the trafficability of soils for cross-country movement of vehicles and construction equipment.

Data presented in this section are useful for land-use planning and for choosing alternative practices or general designs that will overcome unfavorable soil properties and minimize soil-related failures. Limitations to the use of these data, however, should be well understood. First, the data are generally not presented for soil material below a depth of 5 or 6 feet. Also, because of the scale of the detailed map in this soil survey, small areas of soils that differ from the dominant soil may be included in mapping. Thus, these data do not eliminate the need for onsite investigations, testing, and analysis by personnel having expertise in the specific use contemplated.

The information is presented mainly in tables. Table 7 shows, for each kind of soil, the degree and kind of limitations for building site development; table 8, for sanitary facilities; and table 10, for water management. Table 9 shows the suitability of each kind of soil as a source of construction materials.

The information in the tables, along with the soil map, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations and to construct interpretive maps for specific uses of land.

Some of the terms used in this soil survey have a special meaning in soil science. Many of these terms are defined in the Glossary.

Building site development

The degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, and local roads and streets are indicated in table 7. A *slight* limitation indicates that soil properties generally are favorable for the specified use; any limitation is minor and easily overcome. A *moderate* limitation indicates that soil properties and site features are unfavorable for the specified use, but the limitations can be overcome or minimized by special planning and design. A *severe* limitation indicates that one or more soil properties or site features are so unfavorable or difficult to overcome that a major increase in construction effort, special design, or intensive maintenance is required. For some soils rated severe, such costly measures may not be feasible.

Shallow excavations are made for pipelines, sewerlines, communications and power transmission lines, basements, open ditches, and cemeteries. Such digging or trenching is influenced by soil wetness caused by a seasonal high water table; the texture and consistence of soils; the tendency of soils to cave in or slough; and the presence of very firm, dense soil layers, bedrock, or large stones. In addition, excavations are affected by slope of the soil and the probability of flooding. Ratings do not apply to soil horizons below a depth of 6 feet unless otherwise noted.

In the soil series descriptions, the consistence of each soil horizon is given, and the presence of very firm or extremely firm horizons, usually difficult to excavate, is indicated.

Dwellings and *small commercial buildings* referred to in table 7 are built on undisturbed soil and have foundation loads of a dwelling no more than three stories high. Separate ratings are made for small commercial buildings without basements and for dwellings with and without basements. For such structures, soils should be sufficiently stable that cracking or subsidence of the structure from settling or shear failure of the foundation does not occur. These ratings were determined from estimates of the shear strength, compressibility, and shrink-swell potential of the soil. Soil texture, plasticity and in-place density, potential frost action, soil wetness, and depth to a seasonal high water table were also considered. Soil wetness and depth to a seasonal high water table indicate potential difficulty in providing adequate drainage for basements, lawns, and gardens. Depth to bedrock, slope, and large stones in or on the soil are also important considerations in the choice of sites for these structures and were considered in determining the ratings. Susceptibility to flooding is a serious hazard.

Local roads and streets referred to in table 7 have an all-weather surface that can carry light to medium traffic all year. They consist of a subgrade of the underlying soil material; a base of gravel, crushed rock fragments, or soil material stabilized with lime or cement; and a flexible or rigid surface, commonly asphalt or concrete. The roads are graded with soil material at hand, and most cuts and fills are less than 6 feet deep.

The load supporting capacity and the stability of the soil as well as the quantity and workability of fill material available are important in design and construction of roads and streets. The classifications of the soil and the soil texture, density, shrink-swell potential, and potential frost action are indicators of the traffic supporting capacity used in making the ratings. Soil wetness, flooding, slope, depth to hard rock or very compact layers, and content of large stones affect stability and ease of excavation.

Sanitary facilities

Favorable soil properties and site features are needed for proper functioning of septic tank absorption fields, sewage lagoons, and sanitary landfills. The nature of the soil is important in selecting sites for these facilities and in identifying limiting soil properties and site features to be considered in design and installation. Also, those soil properties that affect ease of excavation or installation of these facilities will be of interest to contractors and local officials. Table 8 shows the degree and kind of limitations of each soil for such uses and for use of the soil as daily cover for landfills. It is important to observe local ordinances and regulations.

If the degree of soil limitation is expressed as *slight*, soils are generally favorable for the specified use and limitations are minor and easily overcome; if *moderate*, soil properties or site features are unfavorable for the specified use, but limitations can be overcome by special planning and design; and if *severe*, soil properties or site features are so unfavorable or difficult to overcome that major soil reclamation, special designs, or intensive maintenance is required. Soil suitability is rated by the terms *good*, *fair*, or *poor*, which, respectively, mean about the same as the terms *slight*, *moderate*, and *severe*.

Septic tank absorption fields are subsurface systems of tile or perforated pipe that distribute effluent from a septic tank into the natural soil. Only the soil horizons between depths of 18 and 72 inches are evaluated for this use. The soil properties and site features considered are those that affect the absorption of the effluent and those that affect the construction of the system.

Properties and features that affect absorption of the effluent are permeability, depth to seasonal high water table, depth to bedrock, and susceptibility to flooding. Stones, boulders, and shallowness to bedrock interfere with installation. Excessive slope can cause lateral seepage and surfacing of the effluent. Also, soil erosion and soil slippage are hazards if absorption fields are installed on sloping soils.

In some soils, loose sand and gravel or fractured bedrock is less than 4 feet below the tile lines. In these soils the absorption field does not adequately filter the effluent, and ground water in the area may be contaminated.

On many of the soils that have moderate or severe limitations for use as septic tank absorption fields, a system to lower the seasonal water table can be installed or the size of the absorption field can be increased so that performance is satisfactory.

Sewage lagoon areas are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons have a nearly level floor and cut slopes or embankments of compacted soil material. Aerobic lagoons generally are designed to hold 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. Soils that are very high in content of organic matter and those that have cobbles, stones, or boulders are not suitable. Unless the soil has very slow permeability, contamination of ground water is a hazard where the seasonal high water table is above the level of the lagoon floor. In soils where the water table is seasonally high, seepage of ground water into the lagoon can seriously reduce the lagoon's capacity for liquid waste. Slope, depth to bedrock, and susceptibility to flooding also affect the suitability of sites for sewage lagoons or the cost of construction. Shear strength and permeability of compacted soil material affect the performance of embankments.

Sanitary landfill is a method of disposing of solid waste by placing refuse in successive layers either in excavated trenches or on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil material. Landfill areas are subject to heavy vehicular traffic. Risk of polluting ground water and trafficability affect the suitability of a soil for this use. The best soils have a loamy or silty texture, have moderate to slow permeability, are deep to a seasonal water table, and are not subject to flooding. Clayey soils are likely to be sticky and difficult to spread. Sandy or gravelly soils generally have rapid permeability, which might allow noxious liquids to contaminate ground water. Soil wetness can be a limitation, because operating heavy equipment on a wet soil is difficult. Seepage into the refuse increases the risk of pollution of ground water.

Ease of excavation affects the suitability of a soil for the trench type of landfill. A suitable soil is deep to bedrock and free of large stones and boulders. If the seasonal water table is high, water will seep into trenches.

Unless otherwise stated, the limitations in table 8 apply only to the soil material within a depth of about 6 feet. If the trench is deeper, a limitation of slight or moderate may not be valid. Site investigation is needed before a site is selected.

Daily cover for landfill should be soil that is easy to excavate and spread over the compacted fill in wet and dry periods. Soils that are loamy or silty and free of stones or boulders are better than other soils. Clayey soils may be sticky and difficult to spread; sandy soils may be subject to soil blowing.

The soils selected for final cover of landfills should be suitable for growing plants. Of all the horizons, the A horizon in most soils has the best workability, more organic matter, and the best potential for growing plants. Thus, for either the area- or trench-type landfill, stockpiling material from the A horizon for use as the surface layer of the final cover is desirable.

Where it is necessary to bring in soil material for daily or final cover, thickness of suitable soil material available and depth to a seasonal high water table in soils surrounding the sites should be evaluated. Other factors to be evaluated are those that affect reclamation of the borrow areas. These factors include slope, erodibility, and potential for plant growth.

Construction materials

The suitability of each soil as a source of roadfill, sand, gravel, and topsoil is indicated in table 9 by ratings of good, fair, or poor. The texture, thickness, and organic-matter content of each soil horizon are important factors in rating soils for use as construction materials. Each soil is evaluated to the depth observed, generally about 6 feet.

Roadfill is soil material used in embankments for roads. Soils are evaluated as a source of roadfill for low embankments, which generally are less than 6 feet high and less exacting in design than high embankments. The ratings reflect the ease of excavating and working the material and the expected performance of the material where it has been compacted and adequately drained. The performance of soil after it is stabilized with lime or cement is not considered in the ratings, but information about some of the soil properties that influence such performance is given in the descriptions of the soil series.

The ratings apply to the soil material between the A horizon and a depth of 5 to 6 feet. It is assumed that soil horizons will be mixed during excavation and spreading. Many soils have horizons of contrasting suitability within their profile. The estimated engineering properties in table 11 provide specific information about the nature of each horizon. This information can help determine the suitability of each horizon for roadfill.

Soils rated *good* are coarse grained. They have low shrink-swell potential, low potential frost action, and few cobbles and stones. They are at least moderately well drained and have slopes of 15 percent or less. Soils rated *fair* have a plasticity index of less than 15 and have other limiting features, such as moderate shrink-swell potential, moderately steep slopes, wetness, or many stones. If the thickness of suitable material is less than 3 feet, the entire soil is rated *poor.*

Sand and *gravel* are used in great quantities in many kinds of construction. The ratings in table 9 provide guidance as to where to look for probable sources and are based on the probability that soils in a given area contain sizable quantities of sand or gravel. A soil rated *good* or *fair* has a layer of suitable material at least 3 feet thick, the top of which is within a depth of 6 feet. Coarse fragments of soft bedrock material, such as shale and siltstone, are not considered to be sand and gravel. Fine-grained soils are not suitable sources of sand and gravel.

The ratings do not take into account depth to the water table or other factors that affect excavation of the material. Descriptions of grain size, kinds of minerals, reaction, and stratification are given in the section "Descriptions of the soils" and in table 11.

Topsoil is used in areas where vegetation is to be established and maintained. Suitability is affected mainly by the ease of working and spreading the soil material in preparing a seedbed and by the ability of the soil material to support plantlife. Also considered is the damage that can result at the area from which the topsoil is taken.

The ease of excavation is influenced by the thickness of suitable material, wetness, slope, and amount of stones. The ability of the soil to support plantlife is determined by texture, structure, and the amount of soluble salts or toxic substances. Organic matter in the A1 or Ap horizon greatly increases the absorption and retention of moisture and nutrients. Therefore, the soil material from these horizons should be carefully preserved for later use.

Soils rated *good* have at least 16 inches of friable loamy material at their surface. They are free of stones and cobbles, are low in content of gravel, and have gentle slopes. They are low in soluble salts that can limit or prevent plant growth. They are naturally fertile or respond well to fertilizer. They are not so wet that excavation is difficult during most of the year.

Soils rated *fair* are loose sandy soils or firm loamy or clayey soils in which the suitable material is only 8 to 16 inches thick or soils that have appreciable amounts of gravel, stones, or soluble salt.

Soils rated *poor* are very sandy soils and very firm clayey soils; soils with suitable layers less than 8 inches thick; soils having large amounts of gravel, stones, or soluble salt; steep soils; and poorly drained soils.

Although a rating of *good* is not based entirely on high content of organic matter, a surface horizon is generally preferred for topsoil because of its organic-matter content. This horizon is designated as A1 or Ap in the soil series descriptions. The absorption and retention of moisture and nutrients for plant growth are greatly increased by organic matter.

Water management

Many soil properties and site features that affect water management practices have been identified in this soil survey. In table 10 soil and site features that affect use are indicated for each kind of soil. This information is significant in planning, installing, and maintaining water control structures.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have a low seepage potential, which is determined by permeability and the depth to fractured or permeable bedrock or other permeable material.

Embankments, dikes, and levees require soil material that is resistant to seepage, erosion, and piping and has favorable stability, shrink-swell potential, shear strength, and compaction characteristics. Large stones and organic matter in a soil downgrade the suitability of a soil for use in embankments, dikes, and levees.

Aquifer-fed excavated ponds are bodies of water made by excavating a pit or dugout into a ground-water aquifer. Excluded are ponds that are fed by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Ratings in table 10 are for ponds that are properly designed, located, and constructed. Soil properties and site features that affect aquifer-fed ponds are depth to a permanent water table, permeability of the aquifer, quality of the water, and ease of excavation.

Drainage of soil is affected by such soil properties as permeability; texture; depth to bedrock, hardpan, or other layers that affect the rate of water movement; depth to the water table; slope; stability of ditchbanks; susceptibility to flooding; salinity and alkalinity; and availability of outlets for drainage.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to intercept runoff. They allow water to soak into the soil or flow slowly to an outlet. Features that affect suitability of a soil for terraces are uniformity and steepness of slope; depth to bedrock, hardpan, or other unfavorable material; large stones; permeability; ease of establishing vegetation; and resistance to water erosion, soil blowing, soil slipping, and piping.

Grassed waterways are constructed to channel runoff to outlets at a nonerosive velocity. Features that affect the use of soils for waterways are slope, permeability, erodibility, wetness, and suitability for permanent vegetation.

Soil properties

EDWARD A. FERNAU, senior soil engineer, New York State Department of Transportation, Soil Mechanics Bureau, assisted in preparing this section.

Extensive data about soil properties are summarized on the following pages. The two main sources of these data are the many thousands of soil borings made during the course of the survey and the laboratory analyses of selected soil samples from typical profiles.

In making soil borings during field mapping, soil scientists can identify several important soil properties. They note the seasonal soil moisture condition or the presence of free water and its depth. For each horizon in the profile, they note the thickness and color of the soil material; the texture, or amount of clay, silt, sand, and gravel or other coarse fragments; the structure, or the natural pattern of cracks and pores in the undisturbed soil; and the consistence of the soil material in place under the existing soil moisture conditions. They record the depth of plant roots, determine the pH or reaction of the soil, and identify any free carbonates.

Samples of soil material are analyzed in the laboratory to verify the field estimates of soil properties and to determine all major properties of key soils, especially properties that cannot be estimated accurately by field observation. Laboratory analyses are not conducted for all soil series in the survey area, but laboratory data for many soil series not tested are available from nearby survey areas.

The available field and laboratory data are summarized in tables. The tables give the estimated range of engineering properties, the engineering classifications, and the physical and chemical properties of each major horizon of each soil in the survey area. They also present data about pertinent soil and water features, engineering test data, and data obtained from physical and chemical laboratory analyses of soils.

Engineering properties

Table 11 gives estimates of engineering properties and classifications for the major horizons of each soil in the survey area.

Most soils have, within the upper 5 or 6 feet, horizons of contrasting properties. Table 11 gives information for each of these contrasting horizons in a representative profile. *Depth* to the upper and lower boundaries of each horizon is indicated. More information about the range in depth and about other properties in each horizon is given for each soil series in the section "Descriptions of the soils."

Texture is described in table 11 in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in soil material that is less than 2 millimeters in diameter. "Loam," for example, is soil material that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If a soil contains gravel or other particles coarser than sand, an appropriate modifier is added, for example, "gravelly loam." Other texture terms are defined in the Glossary.

The two systems commonly used in classifying soils for engineering use are the Unified Soil Classification System (Unified) (*2*) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO) (*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, plasticity index, liquid limit, and organic-matter content. Soils are grouped into 15 classes—eight classes of coarse-grained soils, identified as GW, GP, GM, GC, SW, SP, SM, and SC; six classes of fine-grained soils, identified as ML, CL, OL, MH, CH, and OH; and one class of highly organic soils, identified as Pt. Soils on the borderline between two classes have a dual classification symbol, for example, CL-ML.

The *AASHTO* system classifies soils according to those properties that affect their use in highway construction and maintenance. In this system a mineral soil is classified in one of seven basic groups ranging 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. At the other extreme, in group A-7, are fine-grained soils. Highly organic soils are classified in group A-8 on the basis of visual inspection.

When laboratory data are available, the A-1, A-2, and A-7 groups are further classified as follows: A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, and A-7-6. As an additional refinement, the desirability of soils as subgrade material can be indicated by a group index number. These numbers range from 0 for the best subgrade material to 20 or higher for the poorest. The AASHTO classification for soils tested in the survey area, without group index numbers, is given in table 11. Also in table 11 the percentage, by weight, of rock fragments more than 3 inches in diameter is estimated for each major horizon. These estimates are determined mainly by observing volume percentage in the field and then converting that, by formula, to weight percentage.

Percentage of the soil material less than 3 inches in diameter that passes each of four sieves (U.S. standard) is estimated for each major horizon. The estimates are based on tests of soils that were sampled in the survey area and in nearby areas and on field estimates from many borings made during the survey.

Liquid limit and *plasticity index* indicate the effect of water on the strength and consistence of soil. These indexes are used in both the Unified and AASHTO soil classification systems. They are also used as indicators in making general predictions of soil behavior. Range in liquid limit and plasticity index are estimated on the basis of test data from the survey area or from nearby areas and on observations of the many soil borings made during the survey.

In some surveys, the estimates are rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterburg limits extend a marginal amount across classification boundaries (1 or 2 percent), the classification in the marginal zone is omitted.

Physical and chemical properties

Table 12 shows estimated values for several soil characteristics and features that affect behavior of soils in engineering uses. These estimates are given for each major horizon, at the depths indicated, in the typical pedon of each soil. The estimates are based on field observations and on test data for these and similar soils.

Permeability is estimated on the basis of known relationships among the soil characteristics observed in the field—particularly soil structure, porosity, and gradation or texture—that influence the downward movement of water in the soil. The estimates are for vertical water movement when the soil is saturated. Not considered in the estimates is lateral seepage or such transient soil features as plowpans and surface crusts. Permeability of the soil is an important factor to be considered in planning and designing drainage systems, in evaluating the potential of soils for septic tank systems and other waste disposal systems, and in many other aspects of land use and management.

Available water capacity is rated on the basis of soil characteristics that influence the ability of the soil to hold water and make it available to plants. Important characteristics are content of organic matter, soil texture, and soil structure. Shallow-rooted plants are not likely to use the available water from the deeper soil horizons. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design of irrigation systems.

Soil reaction is expressed as a range in pH values. The range in pH of each major horizon is based on many field checks. For many soils, the values have been verified by laboratory analyses. Soil reaction is important in selecting the crops, ornamental plants, or other plants to be grown; in evaluating soil amendments for fertility and stabilization; and in evaluating the corrosivity of soils.

Shrink-swell potential depends mainly on the amount and kind of clay in the soil. Laboratory measurements of the swelling of undisturbed clods were made for many soils. For others the swelling was estimated on the basis of the kind and amount of clay in the soil and on measurements of similar soils. The size of the load and the magnitude of the change in soil moisture content also influence the swelling of soils. Shrinking and swelling of some soils can cause damage to building foundations, basement walls, roads, and other structures unless special designs are used. A high shrink-swell potential indicates that special design and added expense may be required if the planned use of the soil will not tolerate large volume changes.

Risk of corrosion pertains to potential soil-induced chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to soil moisture, particle-size distribution, total acidity, and electrical conductivity of the soil material. The rate of corrosion of concrete is based mainly on the sulfate content, texture, and acidity of the soil. Protective measures for steel or more resistant concrete help to avoid or minimize damage resulting from the corrosion. Uncoated steel intersecting soil boundaries or soil horizons is more susceptible to corrosion than an installation that is entirely within one kind of soil or within one soil horizon.

Erosion factors are used to predict the erodibility of a soil and its tolerance to erosion in relation to specific kinds of land use and treatment. The soil erodibility factor (K) is a measure of the susceptibility of the soil to erosion by water. Soils having the highest K values are the most erodible. K values range from 0.10 to 0.64. To estimate annual soil loss per acre, the K value of a soil is modified by factors representing plant cover, grade and length of slope, management practices, and climate. The soil-loss tolerance factor (T) is the maximum rate of soil erosion, whether from rainfall or soil blowing, that can occur without reducing crop production or environmental quality. The rate is expressed in tons of soil loss per acre per year.

Soil and water features

Table 13 contains information helpful in planning land uses and engineering projects that are likely to be affected by soil and water features.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are placed in one of four groups on the basis of the intake of water after the soils have been wetted and have received 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 chiefly of deep, well drained to excessively drained sands or gravels. 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 that have a layer that impedes the downward movement of water or soils that have 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 clay soils that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding is the temporary covering of soil with water from overflowing streams, with runoff from adjacent slopes, and by tides. Water standing for short periods after rains or after snow melts is not considered flooding, nor is water in swamps and marshes. Flooding is rated in general terms that describe the frequency and duration of flooding and the time of year when flooding is most likely. The ratings are based on evidence in the soil profile of the effects of flooding, namely thin strata of gravel, sand, silt, or, in places, clay deposited by floodwater; irregular decrease in organic-matter content with increasing depth; and absence of distinctive soil horizons that form in soils of the area that are not subject to flooding. The ratings are also based on local information about floodwater levels in the area and the extent of flooding and on information that relates the position of each soil on the landscape to historic floods.

The generalized description of flood hazards is of value in land-use planning and provides a valid basis for land-use restrictions. The soil data are less specific, however, than those provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table is the highest level of a saturated zone more than 6 inches thick for a continuous period of more than 2 weeks during most years. The depth to a seasonal high water table applies to undrained soils. Estimates are based mainly on the relationship between grayish colors or mottles in the soil and the depth to free water observed in many borings made during the course of the soil survey. Indicated in table 13 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. Only saturated zones above a depth of 5 or 6 feet are indicated.

Information about the seasonal high water table helps in assessing the need for specially designed foundations, the need for specific kinds of drainage systems, and the need for footing drains to insure dry basements. Such information is also needed to decide whether or not construction of basements is feasible and to determine how septic tank absorption fields and other underground installations will function. Also, a seasonal high water table affects ease of excavation.

Depth to bedrock is shown for all soils that are underlain by bedrock at a depth of 5 to 6 feet or less. For many soils, the limited depth to bedrock is a part of the definition of the soil series. The depths shown are based on measurements made in many soil borings and on other observations during the mapping of the soils. The kind of bedrock and its hardness as related to ease of excavation is also shown. Rippable bedrock can be excavated with a single-tooth ripping attachment on a 200-horsepower tractor, but hard bedrock generally requires blasting.

Potential frost action refers to the likelihood of damage to pavements and other structures by frost heaving and low soil strength after thawing. Frost action results from the movement of soil moisture into the freezing temperature zone in the soil, which causes ice lenses to form. Soil texture, temperature, moisture content, porosity, permeability, and content of organic matter are the most important soil properties that affect frost action. It is assumed that the soil is not covered by insulating vegetation or snow and is not artificially drained. Silty and clayey soils that have a high water table in winter are most susceptible to frost action. Well drained very gravelly or sandy soils are the least susceptible.

Engineering test data

The results of analyses of engineering properties of several typical soils of the survey area are given in table 14.

The data presented are for soil samples that were collected from carefully selected sites. The soil profiles sampled are typical of the series discussed in the section "Descriptions of the soils." The soil samples were analyzed by the New York State Department of Transportation, Soil Mechanics Bureau.

The methods used in obtaining the data are listed by code in the next paragraph. Most of the codes, in parentheses, refer to the methods assigned by the American Association of State Highway and Transportation Officials. The code for Unified classification, is that assigned by the American Society for Testing and Materials.

The methods and codes are AASHTO classification (M-145-49); Unified classification (D-2487-66T); mechanical analysis (T88-57); moisture-density, method C (T99-57).

Other soil properties significant in engineering are discussed in the section "Engineering properties of geologic deposits." Terms used in that section may have meanings somewhat different from those used in soil science.

Engineering properties of geologic deposits

Many kinds of geologic deposits are in Oswego County: glacial till, outwash, kame, esker, beach ridge, delta, lacustrine plain, alluvial fan, flood plain, and organic. The engineering properties of each kind of geologic deposit are influenced greatly by the mode of deposition. The mode of deposition determines the texture and internal structure of the soil. Position of the deposit on the landscape and position of the water table also influence engineering properties. In Oswego County the geologic deposits are grouped into the following categories: deep till deposits, shallow till deposits, stratified coarse grained deposits, stratified fine grained deposits, and organic deposits.

Deep till deposits. These are thick deposits of unstratified, highly variable mixtures of all particle sizes, ranging from rock fragments to clay. This material was scoured and transported from nearby sources by glacial ice and was deposited as landforms of drumlins, ground moraines, and recessional moraines. Isolated pockets of sorted material are in some places, especially in the recessional moraines.

Bedrock is generally at a depth of more than 5 feet, but in some small areas the depth is less or there are outcrops of bedrock. The rock and mineral fragments in the soil generally reflect the kinds of bedrock in an area.

Soils that formed in deep till deposits are those of the Dannemora, Empeyville, Ira, Massena, Scriba, Sodus, Sun, Westbury, and Worth series. These soils are the most dense and compact of the soils that formed in unconsolidated deposits in the county. Most of the till has been compacted by glacial ice. Deep till soils, except those in drainageways, range from gently sloping to very steep, and in many places cutting and filling are required for most kinds of construction. The soils generally provide a stable, relatively incompressible foundation for engineering works. If properly compacted, fill material from these deposits generally provides stable embankments. In the more stony deposits, oversized material is a limitation for engineering works. Steep cut slopes commonly are subject to surface sloughing and erosion.

Shallow till deposits. These deposits are unstratified mixtures of glacially transported material that was deposited in a veneer over sandstone and shale bedrock. They generally are 2 to 5 feet thick, and rock outcrops are common in some areas. Landforms and topography are generally controlled by bedrock.

Canaan soils formed in shallow till overlying sandstone, and Brockport soils formed in shallow till or residual material overlying shale. Bedrock in Oswego County is described in the section "Physiography and geology."

Soils that formed in shallow till deposits generally have adequate foundation strength for light structures. The primary engineering concerns are the underlying bedrock and ground water. Because of the topography in some places, cut and fill earthwork is necesary for extensive engineering works. Generally, the shale bedrock is softer and more deeply weathered than sandstone. The amount of fill material is limited by the shallow depth to bedrock.

Stratified coarse grained deposits. These deposits consist mainly of stratified gravel and sand that were sorted by glacial melt water. They are on outwash plains and terraces, kames, eskers, beaches and bars, and alluvial fans and on the coarse textured parts of deltas and other lacustrine shore deposits. The stratified material within these deposits is well sorted to poorly sorted, and particle size ranges from cobbles to silt. The deposits are mostly loose and porous.

The Alton, Colton, Duane, Fredon, Halsey, and Hinckley soils formed in gravelly outwash, kame, esker, and beach and bar deposits. Herkimer soils formed in alluvial fan deposits. Adams, Deerfield, Granby, Lamson, Minoa variant, Naumburg, Oakville, and Rumney soils formed in sandy deltaic deposits. In places these sandy deposits have been reworked by wind into dunes.

Coarse grained deposits generally have relatively high strength. Because they are loose and porous, most of these deposits are not highly erodible but they are subject to settlement when vibrated. Adams, Deerfield, Minoa variant, Oakville, and Windsor soils, however, are susceptible to soil blowing if the topsoil is removed. Sandy soils that have a high content of fine sand and a seasonal high water table are highly susceptible to frost action. Granby and Rumney soils are frequently ponded or flooded.

These deposits of gravel and sand have many uses as construction material. Depending on gradation, soundness, and plasticity they are suitable for use as:

1. Fill material for highway embankments.
2. Fill material for parking areas and housing developments.
3. Fill material for decreasing stress on underlying soils so that construction can proceed.
4. Subbase for pavements.
5. Wearing surfaces for driveways, parking lots, and some roads.
6. Material for highway shoulders.
7. Free-draining backfill for structures and pipes.
8. Outside shells of dams for impounding water.
9. Blankets to drain and help stabilize wet cut slopes.
10. Sources of sand and gravel for general use.

Stratified fine grained deposits. These deposits consist of fine grained lacustrine sediment that was transported by glacial melt water and deposited in glacial lakes and ponds. The deposits have distinct layers or laminae that generally consist of silt- and clay-sized particles. The particles are mostly silt, but there is generally sufficient clay to make the deposits plastic and sticky. Some of these deposits are soils on recent flood plains, and some are on the more silty parts of deltas.

Soils that formed in deep lacustrine deposits of silt and clay are those of the Canandaigua, Fonda, Hudson, Madalin, and Rhinebeck series. Minoa and Swanton soils formed in deep deposits of fine sand and silt on deltas, and Williamson and Raynham soils formed in deep deposits of silt on deltas. Amboy soils formed in deposits of fine sand and silt overlying coarse grained material. Elmwood soils formed in deposits of very fine sand overlying silt and clay. Middlebury soils formed in fine grained deposits on flood plains and are subject to flooding.

Because of their fine texture and high moisture content, these deposits have relatively low strength. They are highly compressible, and settlement can occur over a long period. Soils that have a high content of silt and fine sand are the least compressible of these fine grained deposits but are highly erodible and are susceptible to frost action.

Soils that formed in the fine grained deposits have severe limitations for use in engineering works, especially nearly level wet soils that are subject to ponding. Canandaigua, Fonda, and Madalin soils are examples. For use as embankments and as sites for heavy structures and buildings, all of the soils that formed in these fine sediments require onsite investigation of their strength and settlement characteristics and of the effects of ground water.

Organic deposits. These deposits mainly consist of accumulations of plant and animal remains. In places there are also thin deposits of mineral soil. Organic deposits are in very poorly drained depressions and bogs. Carlisle, Rifle, and Palms soils and Humaquepts and Fibrists, ponded, overlie mineral soil deposits at varying depths. Wallkill soils formed in a veneer of mineral soil overlying organic deposits. The soils that formed in organic deposits are unsuitable for use as foundations, because they are weak and highly compressible. Generally the organic material should be excavated to a depth at which there is suitable underlying material and replaced with suitable backfill. Filling over organic deposits causes settlement of the soil over a long period.

Formation, morphology, and classification of the soils

This section discusses the major factors that affect formation and morphology of the soils in Oswego County, defines the categories in the system of soil classification, and places the soils into higher categories of the system.

Factors of soil formation

Soils formed through the interaction of five major factors: climate, plant and animal life, parent material, topography, and time. The relative influence of each factor generally varies from place to place. Local variations in soils are caused by differences in the kind of parent material and in topography and drainage.

Climate

Climate, particularly the pattern of temperature and precipitation, is an active soil-forming factor. It largely determines the degree of weathering of mineral material. In addition, climate affects the growth of vegetation and the leaching of weathered material. Frost action contributes to the weathering of stones and boulders.

The cool, humid climate of Oswego County is marked by extreme variation in seasonal temperature. Annual precipitation ranges from 36 to 40 inches, except in the Tughill area it is more than 40 inches. The mean annual air temperature is 48 degrees in most of the county and is 43 degrees in the Tughill area. The amount of precipitation is sufficient to promote leaching of soluble material, for example, calcium and magnesium, and the downward movement of fine particles, for example, clay. The cool temperature has promoted an accumulation of organic matter in the surface layer of the soils. For more detailed information on climate, see the subsection on climate in "General nature of the county."

Plant and animal life

All living organisms—plants, animals, bacteria, and fungi—are important factors in soil formation. Plants generally are responsible for the color of the surface layer and the amount of nutrients and organic matter in the soil. Animals such as earthworms and cicadas and burrowing animals help keep the soil open and porous. Bacteria and fungi decompose dead plants, thus releasing nutrients for use by plants. In Oswego County the native forests have had a major influence on soil formation. Windthrow of trees has mixed the upper 1 1/2 to 3 feet of soil material. In addition, trees absorb nutrients from the lower part of the soil and translocate them to the surface in fallen leaves and stems. Man also has had a strong influence on the soils, particularly in areas where he has cleared forests and plowed the land. He has added fertilizers, mixed the soil horizons in places, altered the plant community and moved soil material from place to place.

Parent material

Parent material is the unconsolidated mass in which soils form. It also determines the mineral and chemical composition of the soil and, to a large extent, the rate at which soil-forming processes occur.

In Oswego County soils formed in glacial till, glaciolacustrine sediment, glaciofluvial deposits, eolian dune deposits, recent stream alluvium, and organic material. Most parent material was deposited as the result of glaciation 10,000 to 15,000 years ago. Alluvium and organic material are of recent origin and are continually being deposited.

Soils that formed in glacial till are the most extensive soils in the county. They have a wide range of characteristics and commonly have firm substrata. Worth, Empeyville, Sodus, Ira, and Scriba soils, for example, formed in glacial till. The stone-free Amboy, Williamson, Rhinebeck, Madalin, and Raynham soils are examples of soils that formed in glaciolacustrine sediment. Soils that formed in glaciofluvial deposits are generally loamy or sandy and commonly are underlain by stratified gravel and sand. Alton, Colton, Hinckley, Fredon, and Halsey soils are examples of soils that formed in glaciofluvial deposits. Soils on flood plains formed in water-deposited material that is called recent alluvium. They are medium textured and moderately coarse textured and only have slight profile development. Middlebury and Rumney soils are examples. Carlisle and Palms soils are examples of soils that formed in organic material.

Topography

The shape of the land surface, the slope, and the depth to the water table have strongly influenced the formation of soils in Oswego County. Soils that formed in areas that have convex slopes, where runoff is moderate to rapid generally are well drained and have a brightly colored, unmottled subsoil. These soils are generally leached to a greater depth than low-lying, wetter soils in the same general area. In more gently sloping areas, where runoff is slow, the soils commonly have some evidence of wetness in the profile, for example, mottling in the subsoil. Soils that formed in level areas or slight depressions, where the water table is near the surface for prolonged periods, show strong evidence of wetness. These soils generally have a thick, dark colored, organic surface layer and many mottles or grayish colors in the subsoil. Factors that cause wetness in soils are a high ground water table, a position on the landscape where water is received from higher areas and accumulates, and impervious layers in the subsoil or substratum. Length, gradient, and configuration of slopes influence drainage and, consequently, the kind of soil that forms. Local differences in soils largely result from differences in parent material and in topography.

Time

During the formation of soils, time—generally a long time—is required for changes to occur in the parent material. The soils of Oswego County have developed mostly since the last period of glaciation. This relatively brief time is evident in the soils.

Soils that formed on low bottoms and that are subject to varying degrees of overflow receive new deposits of sediment with each flooding. These soils have weak structure, and color differences are small from horizon to horizon. An example is Middlebury soils. Soils that have well developed horizons, for example, Worth soils, have been forming for a longer period than Middlebury soils.

Morphology of soils

This section briefly describes soil horizon nomenclature and explains the processes of horizon development in the soils of Oswego County.

Major soil horizons

The results of the soil-forming factors can be distinguished by different layers or soil horizons seen in a soil profile. The profile extends from the surface downward to material that is little altered by the soil-forming process.

Most soils have three major horizons: the A, B, and C horizons. In many soils these horizons have subdivisions identified by numbers and letters that indicate changes within the major horizon. An example is a B2t horizon, which represents a B horizon that contains an accumulation of clay.

The surface horizon is designated by Ap or A1. The suffix p indicates a surface layer that has been plowed at regular intervals. This layer generally is uniform in thickness and in distribution of organic material. The suffix 1 indicates a surface layer that is relatively undisturbed by man. It is generally thinner and has a higher content of organic material decomposed from the native vegetation than an Ap horizon. The A horizon is also the layer of maximum leaching, or eluviation, of clay and iron. If considerable leaching has taken place in a soil, the Ap or A1 horizon is underlain by an A2 horizon. The A2 horizon is lighter in color than the overlying and underlying horizons, because of the loss of iron compounds.

The B horizon underlies the A horizon and is commonly called the subsoil. It is the horizon of maximum accumulation, or illuviation, of clay, iron, aluminum, and other compounds that have leached from the surface layer. In many soils of Oswego County, however, the B horizon formed by alteration in place rather than by illuviation. This alteration is caused by oxidation and reduction of iron or by the weathering of clay minerals. The B horizon commonly has blocky or prismatic structure. It commonly is firmer and lighter in color than the A1 horizon and generally is darker in color than the C horizon.

The C horizon is below the A and B horizons. It consists of material that is little altered by soil-forming processes but that may be modified by weathering. In some soils, for example, Deerfield and Hinckley soils, the material is massive and is friable or loose. In other soils, for example, Empeyville soils, the material is platy and is firm.

More information about soil horizons is in the Glossary of this soil survey.

Processes of soil horizon differentiation

In Oswego County several processes affect the development of soil horizons. Among these are the accumulation of organic matter, the leaching of soluble salts, the reduction and transfer of iron, the formation of soil structure, and the formation and translocation of clay minerals. These processes take place continually and generally at the same time throughout the profile. These processes have been active for thousands of years.

Organic matter accumulates and is incorporated in the soil when plant remains decompose. It darkens the surface layer and helps to form the A1 horizon. Organic matter, if lost from the soil, generally takes a long time to replace. In Oswego County the organic-matter content of a plowed surface layer of mineral soil averages about 4 percent.

For soils to have distinct subsoil horizons, some of the lime and other soluble salts are leached before clay minerals are translocated. The factors that affect this leaching include the kinds of salt originally present, the depth to which the soil solution percolates, and the texture of the soil.

An important process of horizon development is the translocation of silicate clay minerals. The amount of clay minerals throughout a soil profile depends upon the parent material, but the amount varies from one horizon to another. Clay minerals eluviate from the A horizon and illuviate in the B horizon as clay films on ped faces and as linings in pores and root channels. In some soils, the A2 horizon formed by the eluviation of a considerable amount of clay minerals to the B horizon. Rhinebeck soils are an example of soils in which this translocation of clay minerals has occurred. Argillic is the term applied to a horizon of clay accumulation.

Some well drained and moderately well drained soils in Oswego County have yellowish brown or reddish brown subsoil horizons. These colors are caused mainly by thin coatings of iron oxides on sand and silt grains; however, in some soils, for example, Granby soils, the colors are inherited from the reddish glaciolacustrine material in which they formed.

A fragipan develops in the subsoil of some of the well drained, moderately well drained, and somewhat poorly drained soils, for example, Worth, Ira, and Scriba soils. The fragipan horizon is very firm and brittle when moist and is very hard when dry. Because the soil particles are tightly packed, bulk density is high and pore space is low. The genesis of these horizons is not fully understood, but swelling and shrinking that take place in alternating wet and dry periods, may account for the packing of soil particles and for a gross polygonal pattern of cracks in the fragipan. Clay, silica, and oxides of aluminum are the cementing agents most likely to cause brittleness and hardness. Soils that have a fragipan appear to be associated with noncalcareous parent material (*12*).

Another important process of horizon development is the accumulation of organic matter, iron, and aluminum in the upper part of the subsoil. These substances move from overlying horizons in a complex form and accumulate in the subsoil. The result is that the overlying A2 horizon, unless plowed, is strongly leached and is very light in color. This process is common in woodland soils in the colder parts of the county and in a very acid soil environment. The Adams and Colton soils are examples. The term applied to this kind of horizon is spodic.

The reduction and transfer of iron is associated mainly with the more poorly drained soils. This process is called gleying. Moderately well drained to somewhat poorly drained soils have mottles of yellowish brown and reddish brown that indicate the segregation of iron. However, in poorly drained and very poorly drained soils, for example, Canandaigua, Sun, and Madalin soils, characteristics of gleying are dominant. The grayish color associated with gleying indicates reduction and transfer of iron (*4*).

Classification of the soils

The system of soil classification currently used was adopted by the National Cooperative Soil Survey in 1965. Readers interested in further details about the system should refer to "Soil taxonomy" (*11*).

The system of classification has six categories. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. In this system the classification is based on the different soil properties that can be observed in the field or those that can be inferred either from other properties that are observable in the field or from the combined data of soil science and other disciplines. The properties selected for the higher categories are the result of soil genesis or of factors that affect soil genesis. In table 15, the soils of the survey area are classified according to the system. Categories of the system are discussed in the following paragraphs.

ORDER. Ten soil orders are recognized as classes in the system. The properties used to differentiate among orders are those that reflect the kind and degree of dominant soil-forming processes that have taken place. Each order is identified by a word ending in *sol*. An example is Inceptisol.

SUBORDER. Each order is divided into suborders based primarily on properties that influence soil genesis and are important to plant growth or that are selected to reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aquepts (*Aqu*, meaning water, plus *epts*, from Inceptisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of expression of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and a prefix that suggests something about the properties of the soil. An example is Haplaquepts (*Hapl*, meaning simple horizons, plus *aquept*, the suborder of Inceptisols that have an aquic moisture regime).

SUBGROUP. Each great group may be divided into three subgroups: the central (typic) concept of the great groups, which is not necessarily the most extensive subgroup; the intergrades, or transitional forms to other orders, suborders, or great groups; and the extragrades, which have some properties that are representative of the great groups 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 of the great group. An example is Aeric Haplaquepts.

FAMILY. Families are established within a subgroup on the basis of similar physical and chemical properties that affect management. Among the properties considered in horizons of major biological activity below plow depth are particle-size distribution, mineral content, temperature regime, thickness of the soil penetrable by roots, consistence, moisture equivalent, soil slope, and permanent cracks. A family name consists of the name of a subgroup and a series of adjectives. The adjectives are the class names for the soil properties used as family differentiae. An example is coarse-loamy, mixed, nonacid, mesic Aeric Haplaquents.

SERIES. The series consists of soils that formed in a particular kind of material and have horizons that, except for texture of the surface soil or of the underlying substratum, are similar in differentiating characteristics and in arrangement in the soil profile. Among these characteristics are color, texture, structure, reaction, consistence, and mineral and chemical composition.

General nature of the county

This section gives information about the effects of the environment of Oswego County on soil use. It discusses climate, physiography and geology, drainage, water supply, natural vegetation, and transportation.

Climate

ByA. BOYD PACK, PH.D., senior research associate, Division of Atmospheric Sciences, Department of Agronomy, Cornell University.

Oswego County has a humid-continental climate that is broadly representative of the northeastern part of the United States. The climate is governed primarily by atmospheric flow from various regions of North America. Cold, dry air masses frequently cross the county from the northwest, and prevailing winds from the south and southwest bring warm and occasionally humid weather Also, maritime air masses from the Atlantic Ocean occasionally bring moderate temperatures to the area.

Lake Ontario is a major influence on climate in the county. It moderates the temperature, reducing heat in summer and extreme cold in winter. Because spring temperatures rise slowly, plant growth is slow and tender crops are less affected by frost damage. The frost-free season extends longer in autumn, because heat coming from the lake keeps temperatures warmer at night.

Lake Ontario significantly affects precipitation in winter. Cold air flowing across the unfrozen, relatively warm lake acquires moisture and heat. Precipitation falls leeward of the lake as snow showers or snow squalls. Snowfall is often very heavy inland and occurs in bands of varying width and depth.

In the eastern part of the county, topography and elevation have some influence on climate. In winter, air coming inland from Lake Ontario releases a heavier amount of snow as it travels upslope and eastwards. The higher elevations tend to counteract the moderating effect of the lake on temperature. Compared to the lakeshore of the western part of Oswego County, the eastern uplands have appreciably colder minimum temperatures in winter and a much shorter growing season.

Winters are long and cold. Because of the moderating influence of Lake Ontario, however, extremely low temperatures are less common than in inland areas at a similar latitude in New York State. A temperature of 0 degrees F or lower occurs on 3 to 6 days each winter near the lakeshore in the western part of the county and on about 12 days in the eastern part. A temperature of 15 degrees F below zero or lower can be expected in about one winter in ten in the city of Oswego. Some areas in the interior of the county have a minimum temperature of 20 degrees F below zero or lower in most winters.

Summer is pleasantly warm. Near the lake, however, the daily maximum temperature is mostly about 75 to 80 degrees F, as indicated in table 16. A temperature of 90 degrees F or higher occurs on 5 to 10 days per year in the interior of the county and on about 2 to 5 days near the lakeshore.

The frost-free season is about 180 days in the vicinity of Oswego, about 160 days in the southeastern part of the county, and about 150 days in the northeastern part. In the eastern part of the county, the last freeze in spring occurs on about May 10 to 15 and the first freeze in fall occurs in the first week of October, on the average. Freeze dates for the lakeshore area are given in table 17.

The amount of annual precipitation increases markedly from the extreme western part of the county to the northeastern part. Average annual precipitation ranges from 36 inches in the vicinity of Oswego to 50 inches on the Tug Hill Plateau. In much of eastern and southern Oswego County, average annual precipitation ranges from 40 to 45 inches. Rainfall in the period May through September ranges from an average of about 14 inches near Lake Ontario to more than 18 inches on the Tug Hill Plateau. In most years the amount and distribution of precipitation are adequate for agriculture and for the maintenance of domestic water supplies. Serious droughts are rare, but in most growing seasons there are periods of deficient soil moisture.

Snowfall is very heavy throughout the county. The average seasonal total ranges from 100 to 125 inches in the extreme western part and from 150 to 200 inches in the eastern half of the county. Monthly snowfall of 25 inches or more is common in December, January, and February, and a total accumulation of 70 inches or more in two successive months is not unusual. Much of the annual snowfall consists of squalls, showers, and snow bursts coming off Lake Ontario.

Persistent cloudiness late in fall and in winter is a distinctive feature of climate in the county. During this period sunshine averages about 20 to 30 percent of the maximum possible. Summers, however, are quite sunny, and sunshine averages 65 to 70 percent of the maximum possible.

Physiography and geology

ByBERNARD S. ELLIS, senior staff geologist, Soil Conservation Service, Syracuse, New York.

Oswego County consists of two physiographic provinces: the Tug Hill Plateau is in the northeastern part, and the Erie-Ontario Plain makes up the rest of the county. Except for the Tug Hill Plateau, the county has little significant relief. On the Erie-Ontario Plain, the topography is a gently rolling landscape that is interspersed with moderately large level areas. The level areas commonly are swampy. East of a line drawn on a map from Williamstown to Lacona, the topography is more pronounced. North of the Salmon River Reservoir, the landscape typically is an eroded plateau that has steep slopes and valleys that cut into the flat-lying bedrock.

Extending north from Port Ontario to the county line is a relatively rare and well developed coastal geomorphic feature. Sand spits and bay bars are nearly continuous for this distance of 10 miles, and they extend northwards into Jefferson County for about 7 miles. These sand spits and bars were formed by lake currents flowing north along the eastern shore of Lake Ontario.

Elevation in the county ranges from 200 feet above mean sea level in the swampy areas that border Lake Ontario to 1,750 feet on the Tug Hill Plateau in the northeast corner of the county. In the western two-thirds of the county, relief is fairly uniform. River valleys are not much lower than the surrounding countryside, and high valley walls are rare. The most pronounced relief in the western part of the county is drumlins. These drumlins are elongated hills oriented generally in a north-south direction. They were formed by glaciers that moved down over the area and deposited material under the ice in a streamlined form.

The bedrock that underlies most of the county is flat-lying sedimentary rock. The groups of rocks are in broad bands that generally extend east and west across the county (fig. 12) (*3*).

The layers of rock tilt toward the south-southwest. The younger rocks, those on top, are near the southern boundary of the county. Bedrock formations are older with distance northward. The sandstone and shale of the Herkimer, Willowvale, and Sanquoit Formations are the youngest bedrock underlying the county. These formations are underlain by older sandstones of the Medina group. The next oldest bedrock, Oswego Sandstone, is in a band that extends east from the Lake Ontario shoreline to the Tug Hill Plateau. The oldest bedrock in the county is the siltstone and shale of the Pulaski and Whetstone Gulf Formation. This rock is in the northwest corner of the county, extending from the eastern shore of Lake Ontario to the base of the Tug Hill Plateau.

Oswego County has been covered and uncovered by several advances and retreats of glacial ice. This ice age began about 300,000 years ago; the ice last retreated from the area about 12,000 years ago.

This repeated advance and retreat of glaciers markedly influenced the topography and soils of Oswego County.

Ice advances generally smoothed the ground surface and commonly deepened valleys that were oriented in a north-south direction.

The predominant glacial deposit in Oswego County is glacial till. This till consists of a mixture of gravel, sand, silt, and clay that was mostly deposited directly on the surface as material was carried along at the bottom of the glacier. Some till was deposited when glacial ice containing fragments of material melted in place. Empeyville, Sodus, Scriba, Worth, Ira, and Westbury soils are the major soils in the county that formed in glacial till.

The discharge of water from melting glacier fronts frequently approached flood proportions. This melt water transported coarse grained particles and fragments. The size of the particles depended largely upon the velocity of the water. Alton and Hinckley soils are examples of soils that formed in gravelly deposits, and Adams and Windsor soils formed in sandy deposts. Some windblown material was deposited during the glacial period. Adams and Windsor soils formed in these windblown, or eolian, deposits.

Many lakes were formed and fed by melting ice in the survey area. Fine grained material, such as silt and clay, was deposited in these glacial lakes. Remnants of these glacial lake deposits are in many areas of the county. Hudson and Rhinebeck soils formed in clayey lake sediment, and Williamson and Raynham soils formed in siltier deposits.

Many of the lakes fed by glacial melt water were very shallow. Vegetation that grew on these shallow, marshlike lakes resulted in an accumulation of organic material. Carlisle, Palms, and Rifle soils formed in these mucky organic deposits.

Streams flowing during and after glaciation deposited alluvium and formed alluvial fans in many areas in the county. Herkimer soils formed in alluvial fans and Rumney and Middlebury soils formed in recent alluvium.

Drainage

Most of Oswego County is drained by three river systems: Oswego, Little Salmon, and Salmon Rivers. All of the county eventually is drained into Lake Ontario. Most of it is drained directly by these river systems, and the rest is drained mostly by tributaries of Fish Creek. These tributaries flow southeasterly out of the county into Oneida Lake, and water in Oneida Lake flows through the Oswego River Channel into Lake Ontario.

Oswego River drains the south-central part of the county. It flows north through the county and flows into Lake Ontario at the town of Oswego.

Salmon River drains most of the northeast part of the county. It originates on the Tug Hill Plateau and flows into the lake at the town of Port Ontario.

Little Salmon River drains the area between that drained by the Oswego and the Salmon rivers.

Oneida River forms part of the southern boundary of Oswego County, but it drains only a very small area of the county.

Water supply

Water for domestic, industrial, and farm use comes from two major sources in the county. These sources are ground water (wells and springs) and surface water (streams and reservoirs).

About one-third of the inhabitants of the county use ground water as their primary source of supply (*6*). Nearly two-thirds of the available surface water is used to supply industrial and public requirements.

In most places, water quantity and quality in the county are about average for New York State. In some areas, however, chemical quality of the water is poor, the quantity derived from wells is insufficient, or the water is polluted.

Most of the ground water supply is tapped either by dug wells which are relatively shallow or by drilled wells which are generally deeper. For dug wells the median yield is 50 gallons per minute, and for open-hole drilled wells it is 15 gallons per minute. Screened, drilled wells have a median yield of 350 gallons per minute. These wells are mainly located in high yield aquifers of sand and gravel.

The county has an ample supply of water. Much more of the ground water supply can be used in rural areas. Industrial and public supplies can limit the quality of water; however, Lake Ontario is a source of adequate amounts.

Natural vegetation

When Oswego County was settled, the pioneers had to clear timber from most of the land. Only small areas were free of trees.

Most forested areas probably have been cut over at least two or three times. Consequently, most of the present vegetation consists of second and third-growth species of trees. A common method used by the early settlers to clear land of trees was burning.

The Eastern Ontario Plain is the most extensive region in the county and parallels Lake Ontario. The forests are principally beech and hard maple on the better drained soils and elm and soft maple on the more poorly drained soils. Stands of hemlock are also fairly common in these forests, especially along streams and near other moist areas.

The Oneida Plain, which occurs along the southern boundary of the county, includes a zone of swamp forest where elm, soft maple, and black ash predominate. The forest predominantly is elm and soft maple on wet soils. Hard maple and beech grow where drainage is more favorable. There are also scattered patches of aspen. Pitch pine, black oak, white oak, red oak, black gum, and yellow-poplar also grow near Oneida Lake.

The Tug Hill region extends from the Oneida Plain north and east to the county line. Interstate Route 81 forms the approximate western boundary. This region has the heaviest forest cover in the county. The northern hardwood associates—hard maple, yellow birch, and beech—are the principal trees in cutover stands in the interior. Young volunteer hardwoods, especially aspen, red maple, and black cherry, are common in the fringe areas. Red spruce and balsam fir, which once grew near the hardwoods, are restricted to the poorly drained areas where they have less competition from hardwoods.

The original forests consisted of a mixture of beech, yellow birch, and sugar maple on ridges and of a varying density of softwoods, largely red spruce, balsam fir, hemlock, and tamarack, on lower slopes and on the edge of grassy swamps. There was only a scattering of white pine. The present forests are chiefly pure stands of hardwoods that consist of remnants from earlier logging. In a few local areas there are nearly pure stands of hemlock and red spruce, especially in ravines and along streams, and white pine and aspen are in some places (*7*).

Transportation

Oswego County is served by rail, waterways, air, and numerous highways. Two railroads, the Penn Central and the Erie-Lackawanna, serve the county with freight transportation. They provide piggyback service and fast through-freight service.

The Port of Oswego connects the St. Lawrence Seaway and the Great Lakes with the New York State Barge Canal System. It is the first port of call on the Great Lakes off the Seaway.

Oswego County is served by two airports. The Syracuse Municipal Airport, Hancock Field, is a large airport within a thirty-minute drive of most of the major centers of Oswego County. Passenger and air-freight service is offered by three major airlines. The Oswego County Airport is near the city of Fulton. It has several all-weather paved runways and offers freight and passenger charter service to the northeastern part of the United States.

Highway transportation is supplied by roads that provide routes from any part of Oswego County to the principal consumer and industrial markets. Two companies provide bus service to the cities and villages of Oswego County. A 31-mile section of Interstate Route 81 crosses the county from north to south. U.S. Highway 104, which originates at Interstate Route 81, provides access to Rochester and all points west. Interstate Route 481, which extends from Fulton to Interstate 81 at a point near North Syracuse, provides the Oswego Valley a ready access to Hancock Field Airport and downtown Syracuse. New York State Routes 57 and 48 and U.S. Highway 11 are other important north-south highways and provide access to the New York State Thruway at three interchanges. Nearly all major markets can be reached by truck or bus on Interstate 81 and the Thruway and on their connecting highways.

References

(1) American Associaton of State Highway [and Transportation] Officials. 1970. Standard specifications for highway materials and methods of sampling and testing. Ed. 10, 2 vol., illus.

(2) American Society for Testing and Materials. 1974. Method for classification of soils for engineering purposes. ASTM Stand. D 2487-69. *In* 1974 Annual Book of ASTM Standards, Part 19, 464 pp., illus.

(3) Broughton, John G., Fisher, Donald W., Isachsen, Yngvar W., and Rickard, Lawrence W. 1962. The geology of New York State. N.Y. State Mus. and Sci. Serv. Geol. Surv., Map and Chart Ser. 5, 42 pp., illus.

(4) Cline, Marlin G. 1953. Major kinds of profiles and their relationships in New York. Soil Sci. Soc. Am. Proc. 17: pp. 123-27.

(5) Fenneman, N. M. 1938. Physiography of Eastern United States. 714 pp., illus.

(6) Kawtrowitz, I. H. 1975. Ground water resources in the Eastern Oswego River Basin, New York. Basins Plann. Rep. ORB-2, 129 pp., illus.

(7) Stout, Neil J. 1958. Atlas of forestry in New York. State Univ. Coll. For., Syracuse Univ., Bull. 41, 95 pp., illus.

(8) United States Department of Agriculture. 1951. Soil survey manual. U.S. Dep. Agric. Handb. 18, 503 pp., illus. [Supplements replacing pp. 173-188 issued May 1962]

(9) United States Department of Agriculture. 1967. Preliminary forest survey statistcs by counties and units, New York. Forest Serv., Northeast Forest Exp. Stn., 39 tables.

(10) United States Department of Agriculture. 1970. The timber resources of New York. For. Serv. Resour. Bull. NE-20, 193 pp., illus.

(11) United States Department of Agriculture. 1975. Soil taxonomy. U.S. Dep. Agric. Handb. 436, 754 pp., illus.

(12) Wang, C. and Arnold, R. W. 1973. Quantifying pedogenesis for soils with discontinuities. Soil Sci. Soc. Am. Proc. 37: pp. 271-78.

Glossary

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim. An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 40-inch profile or to a limiting layer is expressed as—

	Inches
Very low	less than 2.4
Low	2.4 to 3.2
Moderate	3.2 to 5.2
High	More than 5.2

Basal till. Compact glacial till deposited beneath the ice.

Base saturation. The degree to which material having base exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the exchange capacity.

Bedding. Plowing, grading, or otherwise elevating the surface of fields into a series of parallel beds, or "lands," separated by shallow surface drains.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Blowout. A shallow depression from which all or most of the soil material has been removed by wind. A blowout has a flat or irregular floor formed by a resistant layer or by an accumulation of pebbles or cobbles. In some blowouts the water table is exposed.

Bottom land. The normal flood plain of a stream, subject to frequent flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Calcareous soil. A soil containing enough calcium carbonate (commonly with magnesium carbonate) to effervesce (fizz) visibly when treated with cold, dilute hydrochloric acid. A soil having measurable amounts of calcium carbonate or magnesium carbonate.

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 coat, clay skin.

Coarse fragments. Mineral or rock particles up to 3 inches (2 millimeters to 7.5 centimeters) in diameter.

Coarse textured (light 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.

Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures is difficult.

Complex, soil. A mapping unit of two or more kinds of soil occurring in such an intricate pattern that they cannot be shown separately on a soil map at the selected scale of mapping and publication.

Compressible. Excessive decrease in volume of soft soil under load.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Contour stripcropping (or contour farming). Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is 40 or 80 inches (1 or 2 meters).

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.

Cut and fill land. Areas from which the original soil has been stripped or removed, or areas in which the original soil has been covered with soil material from another location to a depth of 3 feet or more.

Cutbanks cave. Unstable walls of cuts made by earthmoving equipment. The soil sloughs easily.

Delta. An alluvial deposit, commonly triangular in shape, formed largely beneath water and deposited at the mouth of a river or stream.

Depth to rock. Bedrock at a depth that adversely affects 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 for long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients, as for example in "hillpeats" and "climatic moors."

Drainage, surface. Runoff, or surface flow of water, from an area.

Drumlin. A low, smooth, elongated oval hill, mound, or ridge of compact glacial till. The longer axis is parallel to the path of the glacier and commonly has a blunt nose pointing in the direction from which the ice approached.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Erosion. The wearing away of the land surface by running 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 a bare 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. Excess silt and clay. The soil does not provide a source of gravel or sand for construction purposes.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grains are grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fast intake. The rapid movement of water into the soil.

Favorable. Favorable soil features for the specified use.

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.*

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Fine textured (heavy 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.

Flooding. The temporary covering of soil with water from overflowing streams, runoff from adjacent slopes, and tides. Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *occasional* that it occurs on an average of once or less in 2 years; and *frequent* that it occurs on an average of more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; *November-May*, for example, means that flooding can occur during the period November through May. Water standing for short periods after rainfall or commonly covering swamps and marshes is not considered flooding.

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.

Forage. Plant material used as feed by domestic animals. Forage can be grazed or cut for hay.

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. Freezing and thawing of soil moisture. Frost action can damage structures and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Glacial drift (geology). Pulverized and other rock material transported by glacial ice and then deposited. Also the assorted and unassorted material deposited by streams flowing from glaciers.

Glacial outwash (geology). Gravel, sand, and silt, commonly stratified, deposited by melt water as it flows from glacial ice.

Glacial till (geology). Unassorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

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 by water originating mainly from the melting of glacial ice. Many are interbedded or laminated.

Gleyed soil. A soil having one or more neutral gray horizons as a result of waterlogging and lack of oxygen. The term "gleyed" also designates gray horizons and horizons having yellow and gray mottles as a result of intermittent waterlogging.

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 from 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 (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, which is the upper limit of saturation.

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.

Habitat. The natural abode of a plant or animal; refers to the kind of environment in which a plant or animal normally lives, as opposed to the range or geographical distribution.

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.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric and the more decomposed sapric material.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. The major horizons of mineral soil are as follows:

O horizon.—An organic layer, fresh and decaying plant residue, at the surface of a mineral soil.

A horizon.—The mineral horizon, formed or forming 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.

A2 horizon.—A mineral horizon, mainly a residual concentration of sand and silt high in content of resistant minerals as a result of the loss of silicate clay, iron, aluminum, or a combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or a combination of these; (2) by prismatic or blocky structure; (3) by redder or browner colors than those in the A horizon; or (4) by a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil lacks 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 from which the solum is presumed to have formed. If the material is known to differ from that in the solum the Roman numeral II precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Hummocky. Refers to a landscape of hillocks, separated by low sags, having sharply rounded tops and steep sides. Hummocky relief resembles rolling or undulating relief, but the tops of ridges are narrower and the sides are shorter and less even.

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. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

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 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.

Kame (geology). An irregular, short ridge or hill of stratified 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.

Large stones. Rock fragments 10 inches (25 centimeters) or more across. Large stones adversely affect the specified use.

Leaching. The removal of soluble material from soil or other material by percolating water.

Light textured soil. Sand and loamy sand.

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. Inadequate strength for supporting loads.

Made land. Areas that have been filled with trash and earth and smoothed. These areas are used as sanitary landfills.

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 greater than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Moderately coarse textured (moderately light textured) soil. Sandy loam and fine sandy loam.

Moderately fine textured (moderately heavy textured) soil. Clay loam, sandy clay loam, and silty clay loam.

Moraine (geology). An accumulation of earth, stones, and other debris deposited by a glacier. Types are terminal, lateral, medial, and ground.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few*, *common*, and *many*; size—*fine*, *medium*, and *coarse*; and contrast—*faint*, *distinct*, and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Muck. Dark colored, finely divided, well decomposed organic soil material mixed with mineral soil material. The content of organic matter is more than 20 percent.

Munsell notation. A designation of color by degrees of the three single 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.

Nutrient, plant. Any element taken in by a plant, essential to its growth, and used by it in the production of food and tissue. Plant nutrients are nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, zinc, and perhaps other elements obtained from the soil; and carbon, hydrogen, and oxygen obtained largely from the air and water.

Outwash plain. A land form 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. A pan impedes the movement of water and the growth of roots. The word "pan" is commonly combined with other words that more explicitly indicate the nature of the layer; for example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan.*

Parent material. The great variety of unconsolidated organic and mineral material in which soil forms. Consolidated bedrock is not yet parent material by this concept.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture.

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. The slow movement of water through the soil adversely affecting the specified use.

Permeability. The quality that enables the soil to transmit water or air, measured as the number of inches per hour that water moves through the soil. Terms describing permeability are *very slow* (less than 0.06 inch), *slow* (0.06 to 0.20 inch), *moderately slow* (0.2 to 0.6 inch), *moderate* (0.6 to 2.0 inches), *moderately rapid* (2.0 to 6.0 inches), *rapid* (6.0 to 20 inches), and *very rapid* (more than 20 inches).

Phase, soil. A subdivision of a soil series or other unit in the soil classification system based on differences in the soil that affect its management. A soil series, for example, may be divided into phases on the bases of differences in slope, stoniness, thickness, or some other characteristic that affects management. These differences are too small to justify separate series.

pH value. (See Reaction, soil). A numerical designation of acidity and alkalinity in soil.

Piping. Moving water of subsurface tunnels or pipelike cavities in 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 a semisolid to a plastic state.

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

Polypedon. A volume of soil having properties within the limits of a soil series, the lowest and most homogeneous category of soil taxonomy. A "soil individual."

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

Poor outlets. Surface or subsurface drainage outlets difficult or expensive to install.

Productivity (soil). The capability of a soil for producing a specified plant or sequence of plants under a specified system of management. Productivity is measured in terms of output, or harvest, in relation to input.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. The degree 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 accumulates over disintegrating rock.

Rill. A steep sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth. Shallow root zone. The soil is shallow over a layer that greatly restricts roots. See Root zone.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged in stream channels from a drainage area. The water that flows off the land surface without sinking in is called surface runoff; that which enters the ground 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. The rapid movement of water through the soil. Seepage adversely affects the specified use.

Series, soil. A group of soils, formed from a particular type of parent material, having horizons that, except for the texture of the A or surface horizon, are similar in all profile characteristics and in arrangement in the soil profile. Among these characteristics are color, texture, structure, reaction, consistence, and mineralogical and chemical composition.

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 runoff water.

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.

Silica-sesquioxide ratio. The ratio of the number of molecules of silica to the number of molecules of alumina and iron oxide. The more highly weathered soils or their clay fractions in warm-temperate, humid regions, and especially those in the tropics, generally have a low ratio.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slick spot. Locally, a small area of soil having a puddled, crusted, or smooth surface and an excess of exchangeable sodium. The soil is generally silty or clayey, is slippery when wet, and is low in productivity.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

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. The slow movement of water into the soil.

Slow refill. The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones. Rock fragments 3 to 10 inches (7.5 to 25 centimeters) in diameter. Small stones adversely affect the specified use.

Soil. A natural, three-dimensional body at the earth's surface that 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: *very coarse sand* (2.0 millimeters to 1.0 millimeter); *coarse sand* (1.0 to 0.5 millimeter); *medium sand* (0.5 to 0.25 millimeter); *fine sand* (0.25 to 0.10 millimeter); *very fine sand* (0.10 to 0.05 millimeter); *silt* (0.005 to 0.002 millimeter); and *clay* (less than 0.002 millimeter).

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in mature 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 other plant and animal life characteristics of the soil 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.

Stratified. Arranged in strata, or layers. The term refers to geologic material. Layers in soils that result from the processes of soil formation are called horizons; those inherited from the parent material are called strata.

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 that are separated from adjoining aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

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 soil. 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 or management.

Terminal moraine. A belt of thick glacial drift that generally marks the termination of important glacial advances.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that it can soak into the soil or flow slowly to a prepared outlet without harm. A terrace in a field is generally built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea. A stream terrace is frequently called a second bottom, in contrast with a flood plain, and is seldom subject to overflow. A marine terrace, generally wide, was deposited by the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt, silt loam, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer. Otherwise suitable soil material too thin for the specified use.

Till plain. An extensive flat to undulating area underlain by glacial till.

Tilth, soil. The condition of the soil, especially the soil structure, as related to the growth of plants. Good tilth refers to the friable state and is associated with high noncapillary porosity and stable structure. A soil in poor tilth is nonfriable, hard, nonaggregated, and difficult to till.

Toeslope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topsoil (engineering). Presumably a fertile soil or soil material, or one that responds to fertilization, ordinarily rich in organic matter, used to topdress roadbanks, lawns, and gardens.

Trace elements. The chemical elements in soils, in only extremely small amounts, essential to plant growth. Examples are zinc, cobalt, manganese, copper, and iron.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Unstable fill. Risk of caving or sloughing in banks of fill material.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial melt water. In nonglaciated regions, alluvium deposited by heavily loaded streams emerging from hills or mountains and spreading sediments onto the lowland as a series of adjacent alluvial fans.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new series name, but the limited geographic soil area does not justify creation of a new series.

Varve. A sedimentary layer or a lamina or sequence of laminae deposited in a body of still water within 1 year; specifically, a thin pair of graded glaciolacustrine layers seasonally deposited, usually by meltwater streams, in a glacial lake or other body of still water in front of a glacier.

Water table. The upper limit of the soil or underlying rock material that is wholly saturated with water.

Water table, apparent. A thick zone of free water in the soil. An apparent water table is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil.

Water table, artesian. A water table under hydrostatic head, generally beneath an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole.

Water table, perched. A water table standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

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 a soil or soil material consisting of particles well distributed over a wide range in size or diameter. Such a 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.

Illustrations

Figure 1.—Sodus, moderately steep, is on the drumlinlike hill. Raynham-Canandaigua, nearly level, is in the foreground.

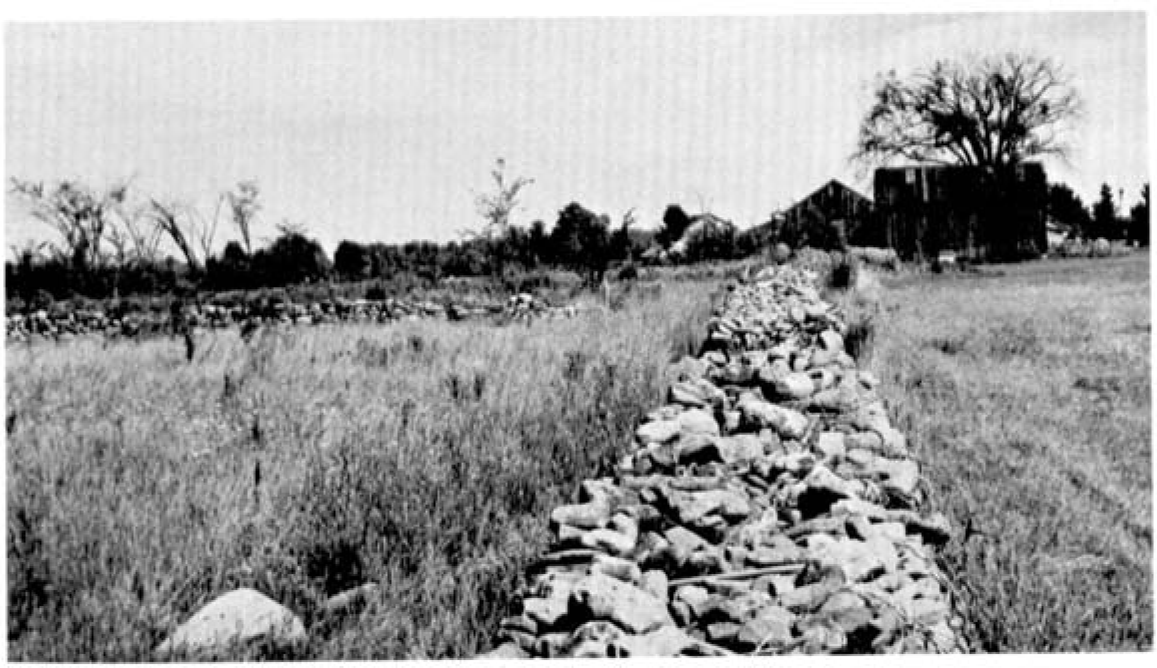


Figure 2.—These stone fences in an area of Scriba-Ira, gently sloping, were constructed when the fields were cleared for cultivation.

Figure 3.—Westbury-Dannemora, very stony, gently sloping, typically has a plant cover of sedges, grass, and thornapple.

Figure 4.—This drained area of Rifle-Carlisle, level, is well suited to vegetable crops.

Figure 5.—This area of Humaquepts-Fibrists, level, provides habitat for beaver, muskrat, and other water-loving animals and for waterfowl.

Figure 6.—Beach grass helps to control erosion in this area of Adams-Windsor complex, rolling.

Figure 7.—These kettle-kames (small hills that have irregular slopes) are in an area of Colton-Hinckley complex, rolling.

Figure 8.—Sand and gravel have been excavated from the front of this kame terrace in an area of Hinckley soils.

Figure 9.—Surface and subsurface drainage systems are installed to make this area of very poorly drained Palms muck suited to vegetable and root crops. The homesite is on moderately well drained Ira gravelly fine sandy loam, 3 to 8 percent slopes.

Figure 10.—This area of Scriba very stony soils, gently sloping, is in pasture. The soils are too stony for tillage practices.

Figure 11.—Tree seedlings and beach grass have been planted to prevent soil blowing in this area of Windsor loamy fine sand, undulating.

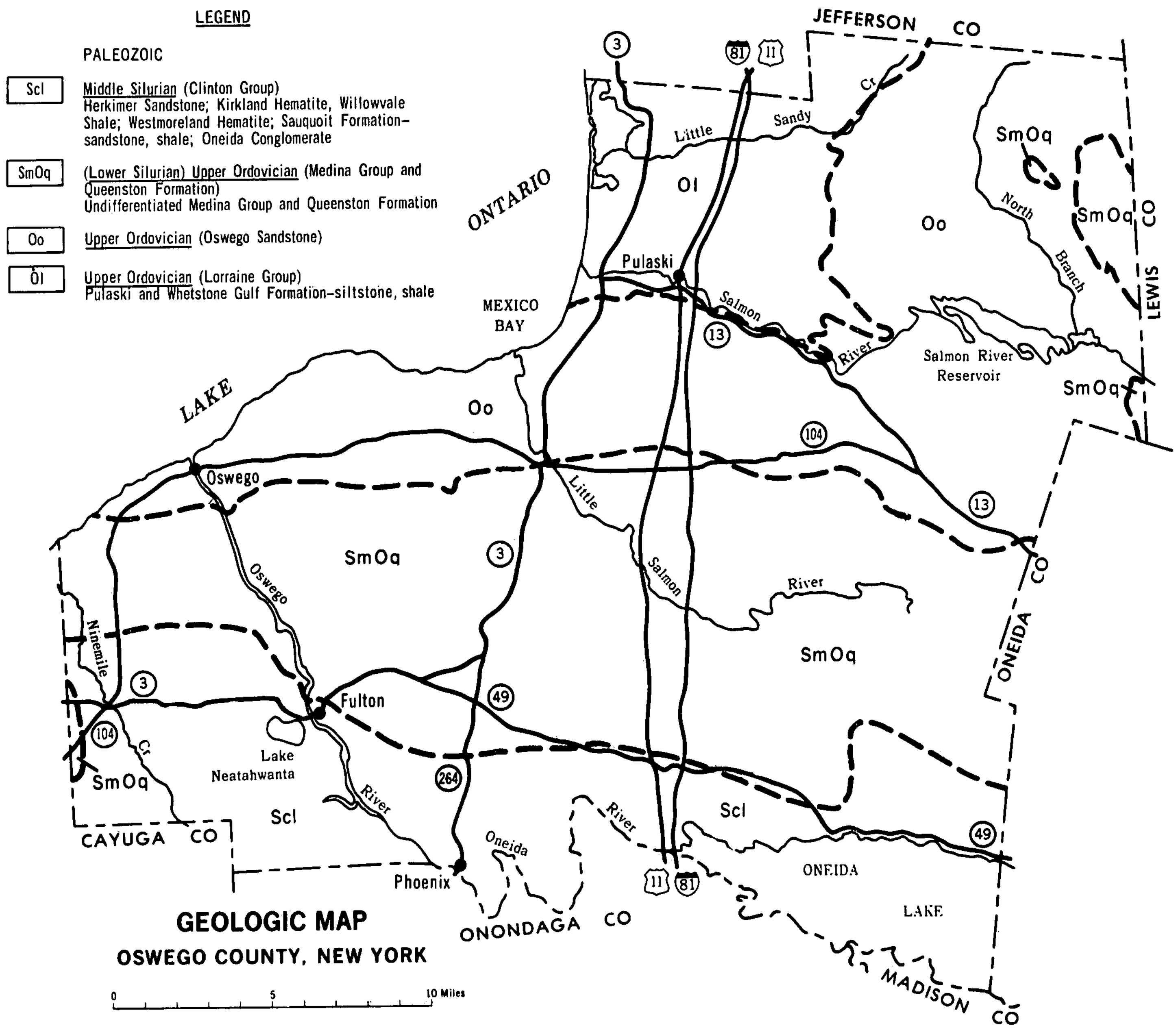


Figure 12.—This geologic map shows the location of the kinds of bedrock in Oswego County.

Tables

TABLE 1.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
AAC	Adams-Windsor complex, rolling	10,086	1.6
AAD	Adams-Windsor complex, moderately steep	719	0.1
AgA	Alton gravelly fine sandy loam, 0 to 3 percent slopes	3,933	0.6
AgB	Alton gravelly fine sandy loam, 3 to 8 percent slopes	10,901	1.8
AgC	Alton gravelly fine sandy loam, rolling	1,695	0.3
AkC	Alton cobbly silt loam, rolling	399	0.1
AoB	Alton gravelly silt loam, 3 to 8 percent slopes	1,932	0.3
AvB	Amboy very fine sandy loam, 2 to 6 percent slopes	4,268	0.7
AvC3	Amboy very fine sandy loam, 6 to 12 percent slopes, severely eroded	918	0.1
AwC3	Amboy-Williamson complex, rolling, severely eroded	6,605	1.1
AyD3	Amboy soils, hilly, severely eroded	442	0.1
AyE3	Amboy soils, steep, severely eroded	263	(1)
BC	Beaches	1,408	0.2
BrB	Brockport silty clay loam, 0 to 6 percent slopes	765	0.1
CAB	Canaan-Rock outcrop association, gently sloping	1,845	0.3
Cd	Canandaigua silt loam	13,347	2.2
Ce	Carlisle muck	16,352	2.6
CHC	Colton-Hinckley complex, rolling	28,916	4.7
CHD	Colton-Hinckley complex, moderately steep	6,935	1.1
CHE	Colton-Hinckley complex, steep	2,637	0.4
DeB	Deerfield loamy fine sand, 0 to 6 percent slopes	3,439	0.5
EmB	Elmwood fine sandy loam, 2 to 6 percent slopes	360	0.1
EpB	Empeyville gravelly fine sandy loam, 3 to 8 percent slopes	7,218	1.2
EpC	Empeyville gravelly fine sandy loam, 8 to 15 percent slopes	251	(1)
FA	Fluvaquents and Udifluvents, frequently flooded	6,924	1.1
Fn	Fonda mucky silt loam	1,794	0.3
Fr	Fredon gravelly fine sandy loam	2,923	0.5
Gr	Granby loamy fine sand	711	0.1
Ha	Halsey gravelly loam	1,075	0.2
HeB	Herkimer shaly silt loam, 2 to 8 percent slopes	396	0.1
HeC	Herkimer shaly silt loam, 8 to 15 percent slopes	112	(1)
HkB	Hinckley gravelly loamy sand, 3 to 8 percent slopes	12,984	2.1
HkC	Hinckley gravelly loamy sand, 8 to 15 percent slopes	6,219	1.0
HuB	Hudson silt loam, 2 to 6 percent slopes	641	0.1
HuC	Hudson silt loam, 6 to 12 percent slopes	677	0.1
HuCK	Hudson silt loam, rolling	421	0.1
HW	Humaquepts and Fibrists, ponded	6,535	1.1
IrA	Ira gravelly fine sandy loam, 0 to 3 percent slopes	2,773	0.4
IrB	Ira gravelly fine sandy loam, 3 to 8 percent slopes	34,247	5.5
IrC	Ira gravelly fine sandy loam, 8 to 15 percent slopes	3,048	0.5
IsC	Ira-Sodus gravelly fine sandy loams, rolling	9,358	1.5
IUD	Ira and Sodus very stony soils, moderately steep	16,676	2.7
Lf	Lamson very fine sandy loam	6,687	1.1
Ma	Madalin silt loam	5,585	0.9
Me	Massena silt loam	163	(1)
Mf	Middlebury loam	1,043	0.2
Mn	Minoa very fine sandy loam	7,321	1.2
MoB	Minoa fine sandy loam, moderately well drained variant, 0 to 6 percent slopes	1,587	0.3
Na	Naumburg loamy fine sand	2,713	0.4
NDB	Naumburg-Duane complex, gently sloping	2,279	0.4
NGB	Naumburg-Granby complex, gently sloping	14,675	2.4
OaB	Oakville loamy fine sand, 0 to 6 percent slopes	6,543	1.1
Pa	Palms muck	5,857	0.9
RaB	Raynham silt loam, 0 to 6 percent slopes	23,409	3.8
RhA	Rhinebeck silt loam, 0 to 2 percent slopes	5,106	0.8
RhB	Rhinebeck silt loam, 2 to 6 percent slopes	7,988	1.3
RM	Rifle muck	24,158	3.9
RU	Rumney loam	3,360	0.5
ScB	Scriba gravelly fine sandy loam, 0 to 8 percent slopes	33,759	5.4
ScC	Scriba gravelly fine sandy loam, 8 to 15 percent slopes	252	(1)
SDB	Scriba very stony soils, gently sloping	13,287	2.1
SgB	Sodus gravelly fine sandy loam, 3 to 8 percent slopes	5,963	1.0
SgC	Sodus gravelly fine sandy loam, 8 to 15 percent slopes	3,767	0.6
SgD	Sodus gravelly fine sandy loam, 15 to 25 percent slopes	2,548	0.4
SHF	Sodus soils, very steep	1,735	0.3
Su	Sun loam	2,374	0.4
Sw	Swanton fine sandy loam	920	0.1
UB	Urban land	2,595	0.4
Wa	Wallkill silt loam	172	(1)
WbB	Westbury gravelly fine sandy loam, 0 to 8 percent slopes	1,722	0.3

See footnote at end of table.

TABLE 1.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Acres	Percent
WDB	Westbury-Dannemora complex, very stony, gently sloping	19,100	3.1
WEB	Westbury-Dannemora complex, extremely stony, gently sloping	1,586	0.3
W1A	Williamson very fine sandy loam, 0 to 2 percent slopes	2,078	0.3
W1B	Williamson very fine sandy loam, 2 to 6 percent slopes	19,391	3.1
W1C	Williamson very fine sandy loam, 6 to 12 percent slopes	733	0.1
WnB	Windsor loamy fine sand, undulating	7,928	1.3
WnC	Windsor loamy fine sand, rolling	3,298	0.5
WoB	Worth gravelly fine sandy loam, 3 to 8 percent slopes	4,957	0.8
WoC	Worth gravelly fine sandy loam, 8 to 15 percent slopes	1,244	0.2
WoCK	Worth gravelly fine sandy loam, rolling	2,505	0.4
WRE	Worth soils, steep	2,106	0.3
WSC	Worth and Empeyville very stony soils, sloping	117,446	19.0
WSD	Worth and Empeyville very stony soils, moderately steep	3,877	0.6
WYD	Worth and Empeyville extremely stony soils, moderately steep	7,115	1.1
	Cut and fill land	2,190	0.4
	Gravel pits	1,654	0.3
	Made land	314	0.1
	Sand dunes	316	0.1
	Water	966	0.2
	Total	619,520	100.0

[1]Less than 0.1 percent.

TABLE 2.--CAPABILITY CLASSES AND SUBCLASSES

[Miscellaneous areas are excluded. Dashes indicate no acreage]

Class	Total acreage	Major management concerns (Subclass)			
		Erosion (e)	Wetness (w)	Soil problem (s)	Climate (c)
		Acres	Acres	Acres	Acres
I	---	---	---	---	---
II	101,688	77,441	7,481	16,766	---
III	163,877	12,178	130,787	20,912	---
IV	135,284	22,355	57,867	55,062	---
V	6,924	---	6,924	---	---
VI	150,046	2,548	---	147,498	---
VII	44,137	1,998	---	42,139	---
VIII	8,121	---	6,535	1,586	---

TABLE 3.--YIELDS PER ACRE OF CROPS AND PASTURE

[Yields are those that can be expected under a high level of management. The estimates were made in 1973. 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	Corn silage	Corn	Oats	Wheat	Alfalfa hay	Trefoil-grass hay	Pasture
	Ton	Bu	Bu	Bu	Ton	Ton	AUM[1]
Adams:							
[2]AAC	11	55	60	30	3.0	2.5	5.5
[2]AAD	---	---	---	---	2.5	2.5	4.5
Alton:							
AgA	20	100	80	45	4.5	4.0	8.5
AgB, AoB	20	100	80	45	4.5	4.0	8.5
AgC, AkC	18	90	75	40	4.5	4.0	8.5
Amboy:							
AvB	21	105	80	45	4.5	4.0	8.5
AvC3	18	90	65	30	4.0	3.5	7.5
[2]AwC3	17	85	60	30	3.7	3.5	7.1
[2]AyD3	---	---	---	---	---	---	---
[2]AyE3	---	---	---	---	---	---	---
Beaches:							
BC	---	---	---	---	---	---	---
Brockport:							
BrB	18	90	80	60	3.0	3.5	6.5
Canaan:							
[2]CAB:							
Canaan part	14	---	---	---	2.5	---	5.0
Rock outcrop part.							
Canandaigua:							
Cd	17	80	65	40	---	3.5	6.5
Carlisle:							
Ce	18	100	80	45	---	3.0	---
Colton:							
[2]CHC	10	50	50	30	2.5	2.0	4.5
[2]CHD	---	---	---	---	2.0	2.0	3.5
[2]CHE	---	---	---	---	---	---	---
Deerfield:							
DeB	16	80	60	35	3.5	3.5	6.5
Elmwood:							
EmB	22	110	80	45	4.0	4.0	7.5
Empeyville:							
EpB	15	70	55	30	3.0	3.5	6.5
EpC	15	70	55	30	3.0	3.5	6.5
Fluvaquents and Udifluvents:							
[2]FA	---	---	---	---	---	2.0	3.5
Fonda:							
Fn	14	70	55	30	---	3.0	5.5

See footnotes at end of table.

TABLE 3.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn silage	Corn	Oats	Wheat	Alfalfa hay	Trefoil-grass hay	Pasture
	Ton	Bu	Bu	Bu	Ton	Ton	AUM[1]
Fredon:							
Fr	20	100	70	40	4.0	4.0	7.5
Granby:							
Gr	13	65	55	35	---	3.0	5.5
Halsey:							
Ha	18	90	65	35	---	3.5	6.5
Herkimer:							
HeB	25	125	85	60	5.0	4.5	9.5
HeC	22	110	75	55	4.5	4.0	8.5
Hinckley:							
HkB	12	60	50	30	2.5	2.0	4.5
HkC	10	50	45	25	2.0	2.0	3.5
Hudson:							
HuB	24	120	80	55	5.0	4.5	9.5
HuC, HuCK	22	110	75	50	4.5	4.0	8.5
Humaquepts and Fibrists:							
[2]HW	---	---	---	---	---	---	---
Ira:							
IrA	17	85	70	40	3.5	3.5	6.5
IrB	17	85	70	40	3.5	3.5	6.5
IrC	16	65	65	40	3.5	3.5	6.5
[2]IsC	16	65	65	40	3.5	3.5	6.5
[2]IUD	---	---	---	---	---	2.5	4.0
Lamson:							
Lf	18	90	60	35	---	3.5	6.5
Madalin:							
Ma	14	70	60	30	---	3.0	5.5
Massena:							
Me	19	95	70	40	3.5	3.5	6.5
Middlebury:							
Mf	24	120	80	45	4.5	4.0	8.5
Minoa:							
Mn	19	95	80	45	3.0	3.5	6.5
Minoa variant:							
MoB	20	100	80	55	4.0	3.5	7.0
Naumburg:							
Na	16	80	70	40	---	3.0	5.5
[2]NDB	14	70	65	35	---	2.5	4.5
[2]NGB	14	70	65	35	---	2.5	4.5
Oakville:							
OaB	8	50	48	25	3.0	2.0	5.0
Palms:							
Pa	17	90	75	40	---	3.0	---

See footnotes at end of table.

TABLE 3.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn silage	Corn	Oats	Wheat	Alfalfa hay	Trefoil-grass hay	Pasture
	Ton	Bu	Bu	Bu	Ton	Ton	AUM[1]
Raynham:							
RaB	18	90	75	40	---	3.0	5.5
Rhinebeck:							
RhA	17	85	65	30	3.0	3.5	6.5
RhB	17	85	65	30	3.0	3.5	6.5
Rifle:							
RM	---	---	---	---	---	---	---
Rumney:							
RU	19	90	75	40	---	3.5	6.5
Scriba:							
ScB	11	---	45	25	---	3.0	5.5
ScC	11	---	45	25	---	3.0	5.5
[2]SDB	---	---	---	---	---	---	4.0
Sodus:							
SgB	19	95	75	45	4.0	3.5	7.5
SgC	18	90	70	40	4.0	3.5	7.5
SgD	17	85	65	35	3.5	3.0	7.0
[2]SHF	---	---	---	---	---	---	---
Sun:							
Su	16	75	60	30	---	3.0	5.5
Swanton:							
Sw	18	85	75	40	---	3.0	5.5
Urban land:							
UB	---	---	---	---	---	---	---
Wallkill:							
Wa	19	95	75	40	---	3.5	6.5
Westbury:							
WbB	12	---	55	25	---	3.0	5.5
[2]WDB	---	---	---	---	---	---	3.5
[2]WEB	---	---	---	---	---	---	3.0
Williamson:							
WlA	19	95	75	45	4.0	3.5	7.5
WlB	19	95	75	45	4.0	3.5	7.5
WlC	18	90	65	40	4.0	3.5	7.5
Windsor:							
WnB	14	70	65	35	3.0	3.0	5.5
WnC	12	60	60	30	3.0	3.0	5.5

See footnotes at end of table.

TABLE 3.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn silage	Corn	Oats	Wheat	Alfalfa hay	Trefoil-grass hay	Pasture
	Ton	Bu	Bu	Bu	Ton	Ton	AUM[1]
Worth:							
WoB	17	80	60	40	3.5	3.5	6.5
WoC, WoCK	16	75	60	35	3.5	3.5	6.5
[2]WRE	---	---	---	---	---	---	---
[2]WSC	---	---	---	---	---	---	3.5
[2]WSD	---	---	---	---	---	---	3.0
[2]WYD	---	---	---	---	---	---	2.5

[1]Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for a period of 30 days.

[2]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior of the whole map unit.

TABLE 4.--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: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Important trees	Potential productivity: Site index	Trees to plant
Adams:								
[1]AAC:								
Adams part	5s	Slight	Slight	Severe	Slight	Eastern white pine Red pine Sugar maple	55 55 47	Eastern white pine, red pine, European larch.
Windsor part	5s	Slight	Slight	Severe	Slight	Eastern white pine Northern red oak Red pine Sugar maple	57 52 61 55	Eastern white pine, red pine.
[1]AAD:								
Adams part	5s	Slight	Moderate	Severe	Slight	Eastern white pine Red pine Sugar maple	55 55 47	Eastern white pine, red pine, European larch.
Windsor part	5s	Slight	Moderate	Severe	Slight	Eastern white pine Northern red oak Red pine Sugar maple	57 52 61 55	Eastern white pine, red pine.
Alton:								
AgA, AgB, AgC, AkC, AoB	3o	Slight	Slight	Slight	Slight	Sugar maple Northern red oak	60 70	Eastern white pine, red pine, European larch.
Amboy:								
AvB	3o	Slight	Slight	Slight	Slight	Eastern white pine Sugar maple	75 65	Eastern white pine, red pine, European larch, Norway spruce, white spruce.
AvC3	3r	Moderate	Slight	Slight	Slight	Eastern white pine Sugar maple	75 65	Eastern white pine, red pine, European larch, Norway spruce, white spruce.
[1]AwC3:								
Amboy part	3r	Moderate	Slight	Slight	Slight	Eastern white pine Sugar maple	75 65	Eastern white pine, red pine, European larch, Norway spruce, white spruce.
Williamson part	3r	Moderate	Slight	Slight	Slight	Eastern white pine Sugar maple	75 65	Eastern white pine, red pine, European larch, Norway spruce, white spruce, black locust.
[1]AyD3, [1]AyE3	3r	Severe	Moderate	Slight	Slight	Eastern white pine Sugar maple	75 65	Eastern white pine, red pine, European larch, Norway spruce, white spruce.
Brockport:								
BrB	3w	Slight	Moderate	Moderate	Moderate	Northern red oak Sugar maple	70 60	Eastern white pine, white spruce, Norway spruce.

See footnote at end of table.

TABLE 4.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Important trees	Site index	Trees to plant
Canaan:								
[1]CAB:								
Canaan part	4d	Slight	Slight	Severe	Moderate	White spruce Balsam fir Sugar maple	55 55 55	White spruce, eastern white pine.
Rock outcrop part.								
Canandaigua:								
Cd	4w	Slight	Severe	Severe	Severe	Red maple Eastern white pine	65 65	Eastern white pine, white spruce.
Carlisle:								
Ce	5w	Slight	Severe	Severe	Severe	Red maple	46	Generally unplantable.
Colton:								
[1]CHC:								
Colton part	4s	Slight	Slight	Severe	Slight	Eastern white pine Red pine Sugar maple	62 52 61	Eastern white pine, red pine.
Hinckley part	5s	Slight	Slight	Severe	Slight	Northern red oak Eastern white pine Red pine Sugar maple	49 60 58 57	Eastern white pine, red pine, European larch.
[1]CHD:								
Colton part	4s	Slight	Moderate	Severe	Slight	Eastern white pine Red pine Sugar maple	62 52 61	Eastern white pine, red pine.
Hinckley part	5s	Slight	Moderate	Severe	Slight	Northern red oak Eastern white pine Red pine Sugar maple	49 60 58 57	Eastern white pine, red pine, European larch.
[1]CHE:								
Colton part	4s	Slight	Moderate	Severe	Slight	Eastern white pine Red pine Sugar maple	62 52 61	Eastern white pine, red pine.
Hinckley part	5s	Slight	Moderate	Severe	Slight	Northern red oak Eastern white pine Red pine Sugar maple	49 60 58 57	Eastern white pine, red pine, European larch.
Deerfield:								
DeB	4s	Slight	Slight	Moderate	Slight	Eastern white pine Northern red oak	65 55	Eastern white pine, red pine, European larch.
Elmwood:								
EmB	3o	Slight	Slight	Slight	Slight	Eastern white pine	75	Eastern white pine, red pine, white spruce, European larch.
Empeyville:								
EpB, EpC	4o	Slight	Slight	Slight	Slight	Eastern white pine Northern red oak Sugar maple	65 60 60	Eastern white pine, red pine, white spruce, European larch.
Fonda:								
Fn	5w	Slight	Severe	Severe	Severe	Red maple Eastern white pine	50 55	Northern white-cedar.

See footnote at end of table.

TABLE 4.--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	Important trees	Site index	
Fredon:								
Fr	3w	Slight	Severe	Severe	Severe	Northern red oak	70	Yellow-poplar, eastern white pine, white spruce, Norway spruce.
						Yellow-poplar	80	
						Eastern white pine	70	
						Red maple	75	
Granby:								
Gr	5w	Slight	Severe	Severe	Severe	Red maple	55	Eastern white pine, white spruce, northern white-cedar.
Halsey:								
Ha	5w	Slight	Severe	Severe	Severe	Red maple	55	Eastern white pine, white spruce.
Herkimer:								
HeB, HeC	2o	Slight	Slight	Slight	Slight	Sugar maple	69	Eastern white pine, red pine, Norway spruce, European larch.
						White ash	80	
						Eastern white pine	85	
Hinckley:								
HkB, HkC	5s	Slight	Slight	Severe	Slight	Northern red oak	49	Eastern white pine, red pine, European larch.
						Eastern white pine	60	
						Red pine	58	
						Sugar maple	57	
Hudson:								
HuB	2o	Slight	Slight	Slight	Slight	Northern red oak	80	Eastern white pine, yellow-poplar, black cherry, black walnut.
						Sugar maple	70	
HuC, HuCK	2r	Moderate	Slight	Slight	Slight	Northern red oak	80	Eastern white pine, yellow-poplar, black cherry, black walnut.
						Sugar maple	70	
Ira:								
IrA, IrB, IrC	3o	Slight	Slight	Slight	Slight	Northern red oak	65	Eastern white pine, red pine, white spruce, Norway spruce, European larch.
						Sugar maple	65	
						Black cherry	75	
[1]IsC:								
Ira part	3o	Slight	Slight	Slight	Slight	Northern red oak	65	Eastern white pine, red pine, white spruce, Norway spruce, European larch.
						Sugar maple	65	
						Black cherry	75	
Sodus part	3o	Slight	Slight	Slight	Slight	Sugar maple	65	Eastern white pine, red pine, white spruce, Norway spruce, European larch.
						Black cherry	80	
						Northern red oak	65	
[1]IUD:								
Ira part	3r	Slight	Moderate	Slight	Slight	Northern red oak	65	Eastern white pine, red pine, white spruce, Norway spruce, European larch.
						Sugar maple	65	
						Black cherry	75	
Sodus part	3r	Slight	Moderate	Slight	Slight	Sugar maple	65	Eastern white pine, red pine, white spruce, Norway spruce, European larch.
						Black cherry	80	
						Northern red oak	65	

See footnote at end of table.

TABLE 4.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordi-nation symbol	Management concerns: Erosion hazard	Equip-ment limita-tion	Seedling mortal-ity	Wind-throw hazard	Potential productivity: Important trees	Site index	Trees to plant
Lamson:								
Lf	4w	Slight	Severe	Severe	Severe	Eastern white pine Red maple	65 50	Northern white-cedar.
Madalin:								
Ma	5w	Slight	Severe	Severe	Severe	Red maple White ash	50 50	Eastern white pine, northern white-cedar, white spruce.
Massena:								
Me	3w	Slight	Moderate	Moderate	Moderate	Eastern white pine Northern red oak Red maple	65 60 75	Eastern white pine, white spruce, northern white-cedar.
Middlebury:								
Mf	1o	Slight	Slight	Slight	Slight	Northern red oak Sugar maple Yellow poplar	85 75 95	Eastern white pine, yellow poplar, Norway spruce, European larch, black walnut, black cherry.
Minoa:								
Mn	3w	Slight	Moderate	Moderate	Moderate	Sugar maple White ash Northern red oak	60 69 70	Eastern white pine, Norway spruce, European larch, white spruce.
Minoa variant:								
MoB	3o	Slight	Slight	Slight	Slight	Eastern white pine Sugar maple	75 65	Eastern white pine, Norway spruce, red pine.
Naumburg:								
Na	4w	Slight	Moderate	Severe	Moderate	Sugar maple Eastern white pine	55 65	Eastern white pine, Norway spruce, white spruce.
[1]NDB:								
Naumburg part	4w	Slight	Moderate	Severe	Moderate	Sugar maple Eastern white pine	55 65	Eastern white pine, Norway spruce, white spruce.
Duane part	4o	Slight	Slight	Slight	Slight	Eastern white pine Red pine Northern red oak White spruce	65 65 60 55	Eastern white pine, red pine, white spruce, European larch.
[1]NGB:								
Naumburg part	4w	Slight	Moderate	Severe	Moderate	Sugar maple Eastern white pine	55 65	Eastern white pine, Norway spruce, white spruce.
Granby part	5w	Slight	Severe	Severe	Severe	Red maple	55	Eastern white pine, white spruce, northern white-cedar.
Oakville:								
OaB	4s	Slight	Slight	Severe	Slight	Eastern white pine Norhtern red oak	62 49	Eastern white pine, red pine.
Palms:								
Pa	5w	Slight	Severe	Severe	Severe	Red maple	46	Generally unplantable.
Raynham:								
RaB	4w	Slight	Severe	Severe	Severe	Eastern white pine White spruce	65 55 45	Eastern white pine, white spruce, northern white-cedar.

See footnote at end of table.

TABLE 4.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Important trees	Potential productivity: Site index	Trees to plant
Rhinebeck:								
RhA, RhB	3w	Slight	Moderate	Slight	Slight	Sugar maple Northern red oak	65 70	Eastern white pine, Norway spruce, European larch.
Rifle:								
RM	5w	Slight	Severe	Severe	Severe	Red maple	46	Generally unplantable.
Rumney:								
RU	4w	Slight	Severe	Severe	Severe	Eastern white pine Red maple	59 65	Eastern white pine, white spruce.
Scriba:								
ScB, ScC, [1]SDB	3w	Slight	Moderate	Moderate	Moderate	Northern red oak Sugar maple Black cherry	75 60 65	Eastern white pine, white spruce, Norway spruce.
Sodus:								
SgB, SgC	3o	Slight	Slight	Slight	Slight	Sugar maple Black cherry Northern red oak	65 80 65	Eastern white pine, red pine, white spruce, Norway spruce, European larch.
SgD	3r	Slight	Moderate	Slight	Slight	Sugar maple Black cherry Northern red oak	65 80 65	Eastern white pine, red pine, white spruce, Norway spruce, European larch.
[1]SHF	3r	Moderate	Severe	Slight	Slight	Sugar maple Black cherry Northern red oak	65 80 65	Eastern white pine, red pine, white spruce, Norway spruce, European larch.
Sun:								
Su	4w	Slight	Severe	Severe	Severe	Red maple	65	Northern white-cedar.
Swanton:								
Sw	5w	Slight	Severe	Severe	Severe	Eastern white pine Sugar maple Red maple	57 55 55	Eastern white pine, white spruce, northern white-cedar.
Wallkill:								
Wa	4w	Slight	Severe	Severe	Severe	Eastern hemlock Red maple	65 65	Northern white-cedar, white spruce.
Westbury:								
WbB	4w	Slight	Moderate	Moderate	Moderate	Northern red oak Sugar maple	60 60	Eastern white pine, white spruce, Norway spruce.
[1]WDB:								
Westbury part	4w	Slight	Moderate	Moderate	Moderate	Northern red oak Sugar maple	60 60	Eastern white pine, white spruce, Norway spruce.
Dannemora part	5w	Slight	Severe	Severe	Severe	Red maple Eastern white pine	50 55	Eastern white pine, white spruce.
[1]WEB:								
Westbury part	4x	Slight	Moderate	Moderate	Moderate	Northern red oak Sugar maple	60 60	Eastern white pine, white spruce, Norway spruce.
Dannemora part	5x	Slight	Severe	Severe	Severe	Red maple Eastern white pine	50 55	Eastern white pine, white spruce.

See footnote at end of table.

TABLE 4.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Important trees	Potential productivity: Site index	Trees to plant
Williamson:								
WlA, WlB	3o	Slight	Slight	Slight	Slight	Eastern white pine Sugar maple	75 65	Eastern white pine, red pine, European larch, Norway spruce, white spruce, black locust.
WlC	3r	Moderate	Slight	Slight	Slight	Eastern white pine Sugar maple	75 65	Eastern white pine, red pine, European larch, Norway spruce, white spruce, black locust.
Windsor:								
WnB, WnC	5s	Slight	Slight	Severe	Slight	Eastern white pine Northern red oak Red pine Sugar maple	57 52 61 55	Eastern white pine, red pine.
Worth:								
WoB, WoC, WoCK	3o	Slight	Slight	Slight	Slight	Sugar maple Northern red oak Black cherry Yellow poplar	70 70 70 80	Eastern white pine, red pine, black cherry, European larch, Norway spruce.
[1]WRE	3r	Slight	Moderate	Slight	Slight	Sugar maple Northern red oak Black cherry Yellow poplar	70 70 70 80	Eastern white pine, red pine, black cherry, European larch, Norway spruce.
[1]WSC:								
Worth part	3o	Slight	Slight	Slight	Slight	Sugar maple Northern red oak Black cherry Yellow poplar	70 70 70 80	Eastern white pine, red pine, black cherry, European larch, Norway spruce.
Empeyville part	4o	Slight	Slight	Slight	Slight	Eastern white pine Northern red oak Sugar maple	65 60 60	Eastern white pine, red pine, white spruce, European larch.
[1]WSD:								
Worth part	3r	Slight	Moderate	Slight	Slight	Sugar maple Northern red oak Black cherry Yellow poplar	70 70 70 80	Eastern white pine, red pine, black cherry, European larch, Norway spruce.
Empeyville part	4r	Slight	Moderate	Slight	Slight	Eastern white pine Northern red oak Sugar maple	65 60 60	Eastern white pine, red pine, white spruce, European larch.
[1]WYD:								
Worth part	3x	Slight	Moderate	Slight	Slight	Sugar maple Northern red oak Black cherry Yellow poplar	70 70 70 80	Eastern white pine, red pine, black cherry, European larch, Norway spruce.
Empeyville part	4x	Slight	Moderate	Slight	Slight	Eastern white pine Northern red oak Sugar maple	65 60 60	Eastern white pine, red pine, white spruce, European larch.

[1]This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

TABLE 5.--WILDLIFE HABITAT POTENTIALS

[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	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Adams:										
[1]AAC:										
Adams part	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Windsor part	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
[1]AAD:										
Adams part	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Windsor part	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Alton:										
AgA, AgB, AgC, AkC, AoB	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Amboy:										
AvB	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
AvC3	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
[1]AwC3:										
Amboy part	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Williamson part	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
[1]AyD3	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
[1]AyE3	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Beaches:										
BC	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
Brockport:										
BrB	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Canaan:										
[1]CAB:										
Canaan part	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Rock outcrop part.										
Canandaigua:										
Cd	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Very poor.	Poor	Good.
Carlisle:										
Ce	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.

See footnote at end of table.

TABLE 5.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Colton:										
[1]CHC:										
Colton part	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
Hinckley part	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
[1]CHD:										
Colton part	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
Hinckley part	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
[1]CHE:										
Colton part	Very poor.	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Hinckley part	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Deerfield:										
DeB	Poor	Fair	Fair	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.
Elmwood:										
EmB	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Empeyville:										
EpB	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
EpC	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
Fluvaquents and Udifluvents:										
[1]FA	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Poor	Fair	Poor	Poor	Fair.
Fonda:										
Fn	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Fredon:										
Fr	Poor	Fair	Fair	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.
Granby:										
Gr	Poor	Fair	Fair	Fair	Fair	Fair	Good	Fair	Fair	Fair.
Halsey:										
Ha	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Herkimer:										
HeB	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
HeC	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Hinckley:										
HkB, HkC	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.

See footnote at end of table.

TABLE 5.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Hudson:										
HuB	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
HuC, HuCK	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Humaquepts and Fibrists:										
[1]HW	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
Ira:										
IrA	Fair	Good	Good	Fair	Fair	Poor	Poor	Good	Fair	Poor.
IrB	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
IrC	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
[1]IsC:										
Ira part	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
Sodus part	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
[1]IUD:										
Ira part	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Sodus part	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Lamson:										
Lf	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Madalin:										
Ma	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Massena:										
Me	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Middlebury:										
Mf	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Minoa:										
Mn	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Minoa variant:										
MoB	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Naumburg:										
Na	Poor	Fair	Fair	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.
[1]NDB:										
Naumburg part	Poor	Fair	Fair	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.
Duane part	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
[1]NGB:										
Naumburg part	Poor	Fair	Fair	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.

See footnote at end of table.

TABLE 5.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Naumburg: Granby part	Poor	Fair	Fair	Fair	Fair	Fair	Good	Fair	Fair	Fair.
Oakville: OaB	Poor	Poor	Fair	Fair	Fair	Poor	Very poor.	Poor	Fair	Very poor.
Palms: Pa	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Raynham: RaB	Poor	Fair	Fair	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.
Rhinebeck: RhA	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
RhB	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Rifle: RM	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Rumney: RU	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
Scriba: ScB	Fair	Fair	Fair	Poor	Poor	Poor	Very poor.	Fair	Poor	Very poor.
ScC	Fair	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
[1]SDB	Very poor.	Poor	Fair	Poor	Poor	Poor	Very poor.	Poor	Poor	Very poor.
Sodus: SgB	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
SgC	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
SgD	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
[1]SHF	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Sun: Su	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Swanton: Sw	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
Urban land: UB.										
Wallkill: Wa	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Westbury: WbB	Fair	Fair	Fair	Poor	Poor	Poor	Very poor.	Fair	Poor	Very poor.

See footnote at end of table.

TABLE 5.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Westbury:										
[1]WDB:										
Westbury part	Very poor.	Poor	Fair	Poor	Poor	Poor	Very poor.	Poor	Poor	Very poor.
Dannemora part	Very poor.	Poor	Fair	Fair	Fair	Poor	Very poor.	Poor	Fair	Very poor.
[1]WEB:										
Westbury part	Very poor.	Very poor.	Fair	Poor	Poor	Poor	Very poor.	Poor	Poor	Very poor.
Dannemora part	Very poor.	Very poor.	Fair	Fair	Fair	Poor	Very poor.	Poor	Fair	Very poor.
Williamson:										
WlA	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
WlB	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
WlC	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Windsor:										
WnB, WnC	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Worth:										
WoB	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
WoC, WoCK	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
[1]WRE	Very poor.	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
[1]WSC:										
Worth part	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Empeyville part	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
[1]WSD:										
Worth part	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Empeyville part	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
[1]WYD:										
Worth part	Very poor.	Very poor.	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Empeyville part	Very poor.	Very poor.	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.

[1]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior of the whole map unit.

TABLE 6.--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
Adams:				
[1]AAC:				
Adams part	Moderate: too sandy.	Moderate: too sandy.	Severe: slope, too sandy.	Moderate: too sandy.
Windsor part	Moderate: too sandy.	Moderate: too sandy.	Severe: slope, too sandy.	Moderate: too sandy.
[1]AAD:				
Adams part	Severe: slope.	Severe: slope.	Severe: slope, too sandy.	Moderate: slope, too sandy.
Windsor part	Severe: slope.	Severe: slope.	Severe: slope, too sandy.	Moderate: too sandy.
Alton:				
AgA, AgB, AoB	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.
AgC	Moderate: small stones.	Moderate: small stones.	Severe: slope, small stones.	Moderate: small stones.
AkC	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Severe: small stones.
Amboy:				
AvB	Moderate: percs slowly.	Slight	Moderate: percs slowly.	Slight.
AvC3	Moderate: percs slowly.	Moderate: slope.	Severe: slope.	Slight.
[1]AwC3:				
Amboy part	Moderate: percs slowly.	Moderate: slope.	Severe: slope.	Slight.
Williamson part	Moderate: percs slowly.	Moderate: slope.	Severe: slope.	Slight.
[1]AyD3	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
[1]AyE3	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Beaches:				
BC.				
Brockport:				
BrB	Moderate: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.
Canaan:				
[1]CAB:				
Canaan part	Moderate: small stones.	Moderate: small stones.	Severe: depth to rock, small stones.	Moderate: small stones.
Rock outcrop part.				

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Canandaigua:				
Cd	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Carlisle:				
Ce	Severe: wetness, excess humus, floods.	Severe: wetness, excess humus, floods.	Severe: wetness, excess humus, floods.	Severe: wetness, excess humus.
Colton:				
[1]CHC:				
Colton part	Moderate: small stones.	Moderate: small stones.	Severe: slope, small stones.	Moderate: small stones.
Hinckley part	Moderate: too sandy, small stones.	Moderate: too sandy, small stones.	Severe: slope, small stones.	Moderate: too sandy, small stones.
[1]CHD:				
Colton part	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: small stones.
Hinckley part	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: too sandy, small stones.
[1]CHE:				
Colton part	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Hinckley part	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Deerfield:				
DeB	Moderate: too sandy.	Moderate: too sandy.	Severe: too sandy.	Severe: too sandy.
Elmwood:				
EmB	Moderate: percs slowly, wetness.	Slight	Moderate: slope.	Slight.
Empeyville:				
EpB	Moderate: percs slowly, small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.
EpC	Moderate: percs slowly, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: small stones.
Fluvaquents and Udifluvents:				
[1]FA	Severe: floods.	Severe: wetness.	Severe: floods.	Severe: wetness.
Fonda:				
Fn	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Fredon:				
Fr	Moderate: wetness, small stones.	Moderate: wetness, small stones.	Severe: wetness.	Moderate: wetness, small stones.
Granby:				
Gr	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Halsey:				
Ha	Severe: wetness.	Severe: wetness.	Severe: wetness, small stones.	Severe: wetness.
Herkimer:				
HeB	Slight	Slight	Moderate: small stones.	Slight.
HeC	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Hinckley:				
HkB	Moderate: too sandy, small stones.	Moderate: too sandy, small stones.	Severe: small stones.	Moderate: too sandy, small stones.
HkC	Moderate: too sandy, small stones.	Moderate: too sandy, small stones.	Severe: slope, small stones.	Moderate: too sandy, small stones.
Hudson:				
HuB	Moderate: percs slowly.	Slight	Moderate: percs slowly.	Slight.
HuC, HuCK	Moderate: percs slowly.	Moderate: slope.	Severe: slope.	Slight.
Humaquepts and Fibrists:				
[1]HW	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Ira:				
IrA, IrB	Moderate: percs slowly, small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.
IrC	Moderate: percs slowly, small stones.	Moderate: small stones.	Severe: slope, small stones.	Moderate: small stones.
[1]IsC:				
Ira part	Moderate: percs slowly, small stones.	Moderate: small stones.	Severe: slope, small stones.	Moderate: small stones.
Sodus part	Moderate: percs slowly, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: small stones.
[1]IUD:				
Ira part	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: large stones, slope.
Sodus part	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: large stones, slope.
Lamson:				
Lf	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Madalin:				
Ma	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Massena:				
Me	Moderate: percs slowly, wetness.	Slight	Severe: percs slowly, wetness.	Slight.
Middlebury:				
Mf	Severe: floods.	Moderate: floods.	Moderate: floods.	Slight.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Minoa:				
Mn	Moderate: wetness.	Moderate: wetness.	Severe: wetness.	Slight.
Minoa variant:				
MoB	Slight	Slight	Moderate: slope.	Slight.
Naumburg:				
Na	Severe: wetness.	Severe: wetness.	Severe: slope, wetness.	Severe: wetness.
[1]NDB:				
Naumburg part	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Duane part	Severe: small stones, too sandy.	Severe: small stones, too sandy.	Severe: small stones.	Severe: too sandy, small stones.
[1]NGB:				
Naumburg part	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Granby part	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Oakville:				
OaB	Moderate: too sandy, soil blowing.	Moderate: too sandy, soil blowing.	Severe: too sandy, soil blowing.	Severe: too sandy, slope.
Palms:				
Pa	Severe: wetness, floods, excess humus.	Severe: wetness, floods, excess humus.	Severe: wetness, floods, excess humus.	Severe: wetness, floods, excess humus.
Raynham:				
RaB	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Rhinebeck:				
RhA, RhB	Severe: percs slowly, wetness.	Moderate: wetness.	Severe: percs slowly, wetness.	Moderate: wetness.
Rifle:				
RM	Severe: wetness, floods, excess humus.	Severe: wetness, floods, excess humus.	Severe: wetness, floods, excess humus.	Severe: wetness, excess humus.
Rumney:				
RU	Severe: floods, wetness.	Severe: wetness, floods.	Severe: floods, wetness.	Severe: wetness.
Scriba:				
ScB	Moderate: wetness, percs slowly, small stones.	Moderate: wetness, small stones.	Severe: small stones, wetness.	Moderate: wetness, small stones.
ScC	Moderate: wetness, percs slowly, small stones.	Moderate: wetness, small stones.	Severe: slope, small stones.	Moderate: wetness, small stones.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Scriba:				
[1]SDB	Moderate: wetness, large stones.	Moderate: wetness, large stones.	Severe: wetness.	Moderate: wetness, large stones.
Sodus:				
SgB	Moderate: percs slowly, small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.
SgC	Moderate: percs slowly, small stones, slope.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: small stones.
SgD	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: small stones.
SHF	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Sun:				
Su	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Swanton:				
Sw	Severe: wetness.	Severe: wetness.	Severe: wetness	Severe: wetness.
Urban land: UB.				
Wallkill:				
Wa	Severe: floods, wetness.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness.
Westbury:				
WbB	Moderate: wetness, percs slowly, small stones.	Moderate: wetness, small stones.	Severe: small stones, wetness.	Moderate: wetness, small stones.
[1]WDB:				
Westbury part	Moderate: wetness, large stones.	Moderate: wetness.	Severe: small stones, wetness.	Moderate: wetness, large stones.
Dannemora part	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
[1]WEB:				
Westbury part	Severe: large stones.	Moderate: wetness, large stones.	Severe: large stones.	Severe: large stones.
Dannemora part	Severe: wetness, large stones.	Severe: wetness.	Severe: wetness, large stones.	Severe: wetness, large stones.
Williamson:				
WlA, WlB	Moderate: percs slowly.	Slight	Moderate: percs slowly.	Slight.
WlC	Moderate: percs slowly.	Moderate: slope.	Severe: slope.	Slight.
Windsor:				
WnB	Moderate: too sandy.	Moderate: too sandy.	Severe: too sandy.	Moderate: too sandy.
WnC	Moderate: slope, too sandy.	Moderate: slope, too sandy.	Severe: slope, too sandy.	Moderate: too sandy.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Worth:				
WoB	Moderate: percs slowly, small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.
WoC, WoCK	Moderate: percs slowly, slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: small stones.
[1]WRE	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
[1]WSC:				
Worth part	Moderate: percs slowly, large stones.	Moderate: slope.	Severe: slope.	Moderate: large stones.
Empeyville part	Moderate: percs slowly, large stones.	Moderate: slope.	Severe: slope.	Moderate: large stones.
[1]WSD:				
Worth part	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: large stones.
Empeyville part	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: large stones.
[1]WYD:				
Worth part	Severe: slope, large stones.	Severe: slope.	Severe: slope, large stones.	Severe: large stones.
Empeyville part	Severe: slope, large stones.	Severe: slope.	Severe: slope, large stones.	Severe: large stones.

[1]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior of the whole map unit.

TABLE 7.--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
Adams:					
[1]AAC:					
Adams part	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
Windsor part	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope	Severe: slope.	Moderate: slope.
[1]AAD:					
Adams part	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Windsor part	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Alton:					
AgA	Moderate: small stones.	Slight	Slight	Slight	Slight.
AgB, AoB	Moderate: small stones.	Slight	Slight	Moderate: slope.	Slight.
AgC, AkC	Moderate: small stones, slopes.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
Amboy:					
AvB	Moderate: wetness.	Moderate: frost action, wetness.	Severe: wetness.	Moderate: frost action, wetness, slope.	Moderate: frost action.
AvC3	Moderate: wetness.	Moderate: frost action, wetness.	Severe: wetness.	Severe: slope.	Moderate: frost action.
[1]AwC3:					
Amboy part	Moderate: wetness.	Moderate: frost action, wetness.	Severe: wetness.	Severe: slope.	Moderate: frost action.
Williamson part	Severe: wetness.	Severe: frost action.	Severe: wetness.	Severe: slope.	Severe: frost action.
[1]AyD3, [1]AyE3	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Beaches:					
BC.					
Brockport:					
BrB	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness, shrink-swell.
Canaan:					
[1]CAB:					
Canaan part	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.
Rock outcrop part.					
Canandaigua:					
Cd	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Carlisle:					
Ce	Severe: floods, wetness, cutbanks cave.	Severe: wetness, excess humus, floods.	Severe: wetness, excess humus, floods.	Severe: wetness, excess humus, floods.	Severe: wetness, frost action, excess humus.
Colton:					
[1]CHC:					
Colton part	Severe: small stones, cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
Hinckley part	Severe: small stones, cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
[1]CHD:					
Colton part	Severe: slope, small stones, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Hinckley part	Severe: slope, small stones, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
[1]CHE:					
Colton part	Severe: slope, small stones, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope
Hinckley part	Severe: slope, small stones, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Deerfield:					
DeB	Severe: cutbanks cave.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: frost action.
Elmwood:					
EmB	Severe: wetness.	Severe: frost action.	Severe: wetness.	Severe: frost action.	Severe: frost action.
Empeyville:					
EpB	Severe: wetness.	Moderate: frost action, wetness.	Severe: wetness.	Moderate: frost action.	Moderate: frost action.
EpC	Severe: wetness.	Moderate: frost action, wetness, slope.	Severe: wetness.	Severe: slope.	Moderate: frost action, slope.
Fluvaquents and Udifluvents:					
[1]FA	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
Fonda:					
Fn	Severe: wetness, too clayey.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, low strength.
Fredon:					
Fr	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness, frost action.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Granby:					
Gr	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Halsey:					
Ha	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness, frost action.
Herkimer:					
HeB	Moderate: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: slope, wetness.	Moderate: frost action.
HeC	Moderate: slope, wetness.	Moderate: slope, wetness.	Severe: wetness.	Severe: slope.	Moderate: slope, frost action.
Hinckley:					
HkB	Severe: small stones, cutbanks cave.	Slight	Slight	Moderate: slope.	Slight.
HkC	Severe: small stones, cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
Hudson:					
HuB	Severe: too clayey.	Severe: low strength.	Severe: wetness, low strength.	Severe: low strength.	Severe: low strength.
HuC, HuCK	Severe: too clayey.	Severe: low strength.	Severe: wetness, low strength.	Severe: slope, low strength.	Severe: low strength.
Humaquepts and Fibrists:					
[1]Hw	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Ira:					
IrA, IrB	Severe: wetness.	Moderate: frost action, wetness.	Severe: wetness.	Moderate: frost action, slope.	Moderate: frost action.
IrC	Severe: wetness.	Moderate: frost action, wetness, slope.	Severe: wetness.	Severe: slope.	Moderate: frost action.
[1]IsC:					
Ira part	Severe: wetness.	Moderate: frost action, slope.	Severe: wetness.	Severe: slope.	Moderate: frost action, slope.
Sodus part	Moderate: wetness, slope.	Moderate: frost action, slope.	Moderate: wetness, slope.	Severe: slope.	Moderate: frost action, slope.
[1]IuD:					
Ira part	Severe: slope, wetness.	Severe: slope.	Severe: slope, wetness.	Severe: slope.	Severe: slope.
Sodus part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Lamson:					
Lf	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness, frost action.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Madalin: Ma	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, low strength.
Massena: Me	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.	Severe: wetness, frost action.	Severe: frost action.
Middlebury: Mf	Severe: floods, wetness.	Severe: floods.	Severe: floods, wetness.	Severe: floods.	Moderate: floods, frost action.
Minoa: Mn	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.	Severe: wetness, frost action.	Severe: frost action.
Minoa variant: MoB	Severe: wetness.	Moderate: wetness, frost action.	Severe: wetness.	Moderate: wetness, slope, frost action.	Moderate: frost action.
Naumburg: Na	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
[1]NDB: Naumburg part	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Duane part	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: slope, wetness.	Slight.
[1]NGB: Naumburg part	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Granby part	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Oakville: OaB	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight.
Palms: Pa	Severe: wetness, excess humus, cutbanks cave.	Severe: wetness, excess humus, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, low strength, floods.
Raynham: RaB	Severe: wetness.	Severe: frost action, wetness.	Severe: wetness.	Severe: frost action, wetness.	Severe: frost action, wetness.
Rhinebeck: RhA, RhB	Severe: wetness.	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: low strength.
Rifle: RM	Severe: wetness, excess humus, cutbanks cave.	Severe: wetness, excess humus, floods.	Severe: wetness, excess humus, floods.	Severe: wetness, excess humus, floods.	Severe: wetness, low strength, floods.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Rumney:					
RU	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness, frost action.
Scriba:					
ScB, [1]SDB	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.	Severe: wetness, frost action.	Severe: frost action.
ScC	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.	Severe: slope, wetness, frost action.	Severe: frost action.
Sodus:					
SgB	Moderate: wetness.	Moderate: frost action.	Moderate: wetness.	Moderate: frost action.	Moderate: frost action.
SgC	Moderate: wetness, slope.	Moderate: frost action, slope.	Moderate: wetness, slope.	Severe: slope.	Moderate: frost action, slope.
SgD, [1]SHF	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Sun:					
Su	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness, frost action.
Swanton:					
Sw	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness, frost action.
Urban land:					
UB.					
Wallkill:					
Wa	Severe: wetness, floods.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: wetness, floods, low strength.
Westbury:					
WbB	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.	Severe: wetness, frost action.	Severe: frost action.
[1]WDB:					
Westbury part	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.	Severe: wetness, frost action.	Severe: frost action.
Dannemora part	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness, frost action.
[1]WEB:					
Westbury part	Severe: wetness, large stones.	Severe: wetness, large stones, frost action.	Severe: wetness, large stones.	Severe: wetness, large stones.	Severe: frost action.
Dannemora part	Severe: wetness, large stones.	Severe: wetness, large stones, frost action.	Severe: wetness, large stones.	Severe: wetness, large stones, frost action.	Severe: wetness, frost action.
Williamson:					
WlA, WlB	Severe: wetness.	Severe: frost action.	Severe: wetness.	Severe: frost action.	Severe: frost action.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Williamson:					
WlC	Severe: wetness.	Severe: frost action.	Severe: wetness.	Severe: slope, frost action.	Severe: frost action.
Windsor:					
WnB	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight.
WnC	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
Worth:					
WoB	Moderate: wetness.	Moderate: frost action.	Moderate: wetness.	Moderate: frost action, slope.	Moderate: frost action.
WoC, WoCK	Moderate: wetness, slope.	Moderate: frost action, slope.	Moderate: wetness, slope.	Severe: slope.	Moderate: frost action, slope.
[1]WRE	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
[1]WSC:					
Worth part	Moderate: large stones, wetness, slope.	Moderate: frost action, slope, large stones.	Moderate: large stones, wetness, slope.	Severe: slope.	Moderate: frost action, slope.
Empeyville part	Severe: wetness.	Moderate: frost action, slope, large stones.	Severe: wetness.	Severe: slope.	Moderate: frost action, slope.
[1]WSD:					
Worth part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Empeyville part	Severe: slope, wetness.	Severe: slope.	Severe: slope, wetness.	Severe: slope.	Severe: slope.
[1]WYD:					
Worth part	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope.
Empeyville part	Severe: slope, large stones, wetness.	Severe: slope, large stones.	Severe: slope, wetness, large stones.	Severe: slope, large stones.	Severe: slope, large stones.

[1]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior of the whole map unit.

TABLE 8.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good" and "fair." 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
Adams:					
[1]AAC:					
Adams part	[2]Moderate: slope.	Severe: slope, seepage.	Severe: seepage.	Severe: seepage.	Poor: too sandy.
Windsor part	[2]Moderate: slope.	Severe: slope, seepage.	Severe: seepage.	Severe: seepage.	Poor: too sandy.
[1]AAD:					
Adams part	[2]Severe: slope.	Severe: slope, seepage.	Severe: seepage.	Severe: slope, seepage.	Poor: slope, too sandy.
Windsor part	[2]Severe: slope.	Severe: slope, seepage.	Severe: seepage.	Severe: slope, seepage.	Poor: slope, too sandy.
Alton:					
AgA, AgB, AoB	[2]Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: small stones, thin layer.
AgC	[2]Moderate: slope.	Severe: slope, seepage.	Severe: seepage.	Severe: seepage.	Fair: small stones, thin layer, slope.
AkC	[2]Moderate: slope.	Severe: slope, seepage.	Severe: seepage.	Severe: seepage.	Poor: small stones.
Amboy:					
AvB	Severe: percs slowly.	Severe: seepage, wetness.	Severe: seepage.	Slight	Good.
AvC3	Severe: percs slowly.	Severe: slope, seepage.	Severe: seepage.	Moderate: slope.	Fair: slope.
[1]AwC3:					
Amboy part	Severe: percs slowly.	Severe: slope.	Severe: seepage.	Moderate: slope.	Fair: slope.
Williamson part	Severe: percs slowly.	Severe: slope.	Severe: wetness.	Severe: wetness.	Fair: slope.
[1]AyD3	Severe: slope, percs slowly.	Severe: slope.	Severe: seepage.	Severe: slope.	Poor: slope.
[1]AyE3	Severe: slope, percs slowly.	Severe: slope.	Severe: slope, seepage.	Severe: slope.	Poor: slope.
Beaches:					
BC.					
Brockport:					
BrB	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock, wetness.	Moderate: wetness.	Fair: thin layer.

See footnotes at end of table.

TABLE 8.--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
Canaan:					
[1]CAB:					
Canaan part	Severe: depth to rock.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Severe: seepage.	Poor: thin layer, area reclaim.
Rock outcrop part.					
Canandaigua:					
Cd	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Carlisle:					
Ce	Severe: floods, wetness.	Severe: wetness, excess humus, seepage.	Severe: floods, wetness, seepage.	Severe: floods, wetness, seepage.	Poor: excess humus, wetness, hard to pack.
Colton:					
[1]CHC:					
Colton part	[2]Moderate: slope.	Severe: slope, seepage.	Severe: seepage.	Severe: seepage.	Poor: small stones.
Hinckley part	[2]Moderate: slope.	Severe: slope, seepage.	Severe: seepage.	Severe: seepage.	Poor: small stones.
[1]CHD:					
Colton part	[2]Severe: slope.	Severe: slope, seepage.	Severe: seepage.	Severe: slope, seepage.	Poor: slope, small stones.
Hinckley part	[2]Severe: slope.	Severe: slope, seepage.	Severe: seepage.	Severe: slope, seepage.	Poor: slope, small stones.
[1]CHE:					
Colton part	[2]Severe: slope.	Severe: slope, seepage.	Severe: slope, seepage.	Severe: slope, seepage.	Poor: slope, small stones.
Hinckley part	[2]Severe: slope.	Severe: slope, seepage.	Severe: slope, seepage.	Severe: slope, seepage.	Poor: slope, small stones.
Deerfield:					
DeB	[2]Severe: wetness.	Severe: seepage.	Severe: seepage, wetness.	Severe: seepage.	Fair: too sandy.
Elmwood:					
EmB	Severe: percs slowly.	Moderate: slope.	Severe: wetness.	Moderate: wetness.	Fair: thin layer.
Empeyville:					
EpB	Severe: percs slowly.	Moderate: slope.	Severe: wetness.	Moderate: wetness.	Fair: small stones.
EpC	Severe: percs slowly.	Severe: slope.	Severe: wetness, slope.	Moderate: wetness, slope.	Fair: small stones, slope.
Fluvaquents and Udifluvents:					
[1]FA	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods.	Poor: wetness.

See footnotes at end of table.

TABLE 8.--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
Fonda:					
Fn	Severe: wetness, percs slowly.	Slight	Severe: wetness.	Severe: wetness.	Poor: wetness, too clayey.
Fredon:					
Fr	Severe: wetness.	Severe: wetness, seepage.	Severe: slope.	Severe: wetness, seepage.	Poor: wetness.
Granby:					
Gr	Severe: wetness.	Severe: wetness, seepage.	Severe: wetness, seepage.	Severe: wetness, seepage.	Poor: wetness, too sandy.
Halsey:					
Ha	Severe: wetness.	Severe: wetness, seepage.	Severe: wetness, seepage.	Severe: wetness, seepage.	Poor: wetness.
Herkimer:					
HeB	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: small stones.
HeC	Severe: wetness.	Severe: slope, wetness.	Severe: wetness.	Severe: wetness.	Fair: small stones, slope.
Hinckley:					
HkB	[2]Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: small stones.
HkC	[2]Moderate: slope.	Severe: slope, seepage.	Severe: seepage.	Severe: seepage.	Poor: small stones.
Hudson:					
HuB	Severe: percs slowly.	Moderate: slope.	Severe: wetness, too clayey.	Moderate: wetness.	Poor: too clayey.
HuC, HuCK	Severe: percs slowly.	Severe: slope.	Severe: wetness, too clayey.	Moderate: wetness, slope.	Poor: too clayey.
Humaquepts and Fibrists:					
[1]Hw	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Ira:					
IrA, IrB	Severe: percs slowly.	Moderate: slope.	Severe: wetness.	Moderate: wetness.	Fair: small stones.
IrC	Severe: percs slowly.	Severe: slope.	Severe: wetness.	Moderate: wetness, slope.	Fair: small stones, slope.
[1]IsC:					
Ira part	Severe: percs slowly.	Severe: slope.	Severe: wetness.	Moderate: wetness, slope.	Fair: small stones, slope.
Sodus part	Severe: percs slowly.	Severe: slope.	Moderate: wetness.	Moderate: slope.	Fair: small stones, slope.
[1]IUD:					
Ira part	Severe: slope, percs slowly.	Severe: slope.	Severe: wetness.	Severe: slope.	Poor: slope.

See footnotes at end of table.

TABLE 8.--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
Ira:					
Sodus part	Severe: slope, percs slowly.	Severe: slope.	Severe: wetness.	Severe: slope.	Poor: slope.
Lamson:					
Lf	Severe: wetness.	Severe: wetness, seepage.	Severe: wetness, seepage.	Severe: wetness, seepage.	Poor: wetness.
Madalin:					
Ma	Severe: percs slowly, wetness.	Slight	Severe: wetness.	Severe: wetness.	Poor: wetness.
Massena:					
Me	Severe: percs slowly, wetness.	Moderate: small stones.	Severe: wetness.	Moderate: wetness.	Fair: small stones.
Middlebury:					
Mf	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods.	Good.
Minoa:					
Mn	Severe: wetness.	Severe: wetness, seepage.	Severe: wetness.	Severe: wetness.	Good.
Minoa variant:					
Mob	Severe: wetness.	Severe: seepage.	Severe: wetness.	Moderate: wetness.	Good.
Naumburg:					
Na	Severe: wetness.	Severe: wetness, seepage.	Severe: wetness, seepage.	Severe: wetness, seepage.	Poor: wetness.
[1]NDB:					
Naumburg part	Severe: wetness.	Severe: wetness, seepage.	Severe: wetness, seepage.	Severe: wetness, seepage.	Poor: wetness.
Duane part	Severe: wetness.	Severe: wetness, seepage.	Severe: wetness, seepage.	Severe: seepage.	Poor: thin layer, small stones.
[1]NGB:					
Naumburg part	Severe: wetness.	Severe: wetness, seepage.	Severe: wetness, seepage.	Severe: wetness, seepage.	Poor: wetness, area reclaim.
Granby part	Severe: wetness.	Severe: wetness, seepage.	Severe: wetness, seepage, too sandy.	Severe: wetness, seepage.	Poor: wetness, too sandy.
Oakville:					
Oab	[2]Slight	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: too sandy.
Palms:					
Pa	Severe: wetness, floods.	Severe: wetness, excess humus, seepage.	Severe: wetness, floods, seepage.	Severe: wetness, floods, seepage.	Poor: excess humus, hard to pack, wetness.

See footnotes at end of table.

TABLE 8.--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
Raynham:					
RaB	Severe: percs slowly, wetness.	Moderate: slope.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Rhinebeck:					
RhA	Severe: percs slowly, wetness.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey.
RhB	Severe: percs slowly, wetness.	Moderate: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey.
Rifle:					
RM	Severe: floods, wetness.	Severe: wetness, excess humus, seepage.	Severe: wetness, seepage, excess humus.	Severe: floods, wetness, seepage.	Poor: excess humus, wetness, hard to pack.
Rumney:					
RU	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Poor: wetness.
Scriba:					
ScB	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness.	Severe: wetness.	Fair: small stones.
ScC	Severe: wetness, percs slowly.	Severe: slope.	Severe: wetness.	Severe: wetness.	Fair: small stones.
[1]SDB	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness.	Severe: wetness.	Fair: large stones.
Sodus:					
SgB	Severe: percs slowly.	Moderate: slope.	Slight	Slight	Fair: small stones.
SgC	Severe: percs slowly.	Severe: slope.	Slight	Moderate: slope.	Fair: small stones, slope.
SgD	Severe: slope, percs slowly.	Severe: slope.	Moderate: slope.	Severe: slope.	Poor: slope.
[1]SHF	Severe: slope, percs slowly.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Sun:					
Su	Severe: wetness, percs slowly.	Slight	Severe: wetness.	Severe: wetness.	Poor: wetness.
Swanton:					
Sw	Severe: percs slowly, wetness.	Slight	Severe: wetness.	Severe: wetness.	Poor: wetness.
Urban land: UB.					
Wallkill:					
Wa	Severe: floods, wetness.	Severe: floods, seepage, wetness.	Severe: floods, wetness, seepage.	Severe: floods, wetness, seepage.	Poor: wetness.
Westbury:					
WbB	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness.	Moderate: wetness.	Fair: small stones.

See footnotes at end of table.

TABLE 8.--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
Westbury:					
[1]WDB:					
Westbury part	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness.	Moderate: wetness.	Fair: large stones.
Dannemora part	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness.	Severe: wetness.	Poor: wetness.
[1]WEB:					
Westbury part	Severe: wetness, percs slowly, large stones.	Moderate: large stones.	Severe: wetness, large stones.	Moderate: wetness.	Poor: large stones.
Dannemora part	Severe: wetness, percs slowly, large stones.	Moderate: large stones.	Severe: wetness, large stones.	Severe: wetness.	Poor: wetness, large stones.
Williamson:					
WlA, WlB	Severe: percs slowly.	Moderate: slope.	Severe: wetness.	Moderate: wetness.	Good.
WlC	Severe: percs slowly.	Severe: slope.	Severe: wetness.	Moderate: wetness, slope.	Fair: slope.
Windsor:					
WnB	[2]Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: too sandy.
WnC	[2]Moderate: slope.	Severe: slope, seepage.	Severe: seepage.	Severe: seepage.	Poor: too sandy.
Worth:					
WoB	Severe: percs slowly.	Moderate: slope.	Slight:	Slight:	Fair: small stones.
WoC, WoCK	Severe: percs slowly.	Severe: slope.	Slight:	Moderate: slope.	Fair: small stones.
[1]WRE	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
[1]WSC:					
Worth part	Severe: percs slowly.	Severe: slope.	Moderate: large stones.	MOderate: slope.	Fair: large stones.
Empeyville part	Severe: percs slowly.	Severe: slope.	Severe: wetness.	Moderate: slope.	Fair: large stones.
[1]WSD:					
Worth part	Severe: slope, percs slowly.	Severe: slope.	Moderate: slope, large stones.	Severe: slope.	Poor: slope.
Empeyville part	Severe: slope, percs slowly.	Severe: slope.	Severe: wetness.	Severe: slope.	Poor: slope.
[1]WYD:					
Worth part	Severe: slope, large stones, percs slowly.	Severe: slope.	Severe: large stones.	Severe: slope.	Poor: large stones, slope.
Empeyville part	Severe: slope, large stones, percs slowly.	Severe: slope.	Severe: wetness, large stones.	Severe: slope.	Poor: large stones, slope.

[1]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior of the whole map unit.

[2]Excessive permeability may cause pollution of ground water.

TABLE 9.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and "poor." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Adams:				
[1]AAC:				
Adams part	Good	Good	Unsuited: excess fines.	Poor: too sandy.
Windsor part	Good	Good	Unsuited: excess fines.	Poor: too sandy.
[1]AAD:				
Adams part	Fair: slope.	Good	Unsuited: excess fines.	Poor: slope, too sandy.
Windsor part	Fair: slope.	Good	Unsuited: excess fines.	Poor: slope, too sandy.
Alton:				
AgA, AgB, AgC, AkC, AoB	Good	Fair: small stones.	Good	Poor: small stones.
Amboy:				
AvB	Fair: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
AvC3	Fair: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope.
[1]AwC3:				
Amboy part	Fair: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope.
Williamson part	Poor: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope.
[1]AyD3	Fair: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
[1]AyE3	Poor: slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
Beaches:				
BC.				
Brockport:				
BrB	Fair: wetness, shrink-swell, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer, too clayey.
Canaan:				
[1]CAB:				
Canaan part	Poor: thin layer, area reclaim.	Unsuited: thin layer.	Unsuited: thin layer, excess fines.	Poor: thin layer, small stones, area reclaim.
Rock outcrop part.				
Canandaigua:				
Cd	Poor: wetness, low strength, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Carlisle:				
Ce	Poor: frost action, excess humus, low strength.	Unsuited: excess humus.	Unsuited: excess humus.	Poor: wetness.
Colton:				
[1]CHC:				
Colton part	Good	Fair: small stones.	Good	Poor: small stones, area reclaim, too sandy.
Hinckley part	Good	Fair: small stones.	Good	Poor: small stones, area reclaim, too sandy.
[1]CHD:				
Colton part	Fair: slope.	Fair: small stones.	Good	Poor: slope, small stones, area reclaim.
Hinckley part	Fair: slope.	Fair: small stones.	Good	Poor: slope, small stones, area reclaim.
[1]CHE:				
Colton part	Poor: slope.	Fair: small stones.	Good	Poor: slope, small stones, area reclaim.
Hinckley part	Poor: slope.	Fair: small stones.	Good	Poor: slope, small stones, area reclaim.
Deerfield:				
Deb	Fair: frost action.	Good	Unsuited: excess fines.	Poor: too sandy.
Elmwood:				
EmB	Poor: thin layer, frost action.	Poor: excess fines, thin layer.	Unsuited: excess fines.	Good.
Empeyville:				
EpB, EpC	Fair: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones.
Fluvaquents and Udifluvents:				
[1]FA	Poor: wetness, area reclaim.	Poor: excess fines.	Poor: excess fines.	Poor: wetness, small stones.
Fonda:				
Fn	Poor: wetness, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
Fredon:				
Fr	Poor: wetness, frost action.	Poor: excess fines, small stones.	Fair: excess fines.	Poor: wetness, small stones.
Granby:				
Gr	Poor: wetness.	Good	Unsuited: excess fines.	Poor: wetness, too sandy.
Halsey:				
Ha	Poor: wetness, frost action.	Fair: excess fines, small stones.	Fair: excess fines.	Poor: wetness.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Herkimer:				
HeB, HeC	Fair: frost action.	Unsuited: excess fines, small stones.	Poor: excess fines.	Poor: small stones.
Hinckley:				
HkB, HkC	Good	Fair: small stones.	Good	Poor: too sandy, area reclaim.
Hudson:				
HuB, HuC, HuCK	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
Humaquepts and Fibrists:				
[1]Hw	Poor: wetness.	Unsuited: excess humus.	Unsuited: excess humus.	Poor: wetness.
Ira:				
IrA, IrB, IrC	Fair: frost action.	Unsuited: excess fines, small stones.	Unsuited: excess fines.	Poor: small stones.
[1]IsC:				
Ira part	Fair: frost action.	Unsuited: excess fines, small stones.	Unsuited: excess fines.	Poor: small stones.
Sodus part	Fair: frost action.	Poor: excess fines, small stones.	Poor: excess fines.	Poor: small stones.
[1]IUD:				
Ira part	Fair: frost action, slope.	Unsuited: excess fines, large stones.	Unsuited: excess fines, large stones.	Poor: slope, large stones.
Sodus part	Fair: frost action, slope.	Unsuited: excess fines, large stones.	Unsuited: excess fines, large stones.	Poor: slope, large stones.
Lamson:				
Lf	Poor: wetness, frost action.	Poor: excess fines.	Unsuited: excess fines.	Poor: wetness.
Madalin:				
Ma	Poor: low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
Massena:				
Me	Poor: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer.
Middlebury:				
Mf	Fair: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
Minoa:				
Mn	Poor: frost action.	Poor: excess fines.	Unsuited: excess fines.	Good.
Minoa variant:				
MoB	Fair: frost action, excess fines.	Fair: excess fines.	Unsuited: excess fines.	Good.
Naumburg:				
Na	Poor: wetness, area reclaim.	Fair: excess fines.	Unsuited: excess fines.	Poor: wetness, too sandy.
[1]NDB:				
Naumburg part	Poor: wetness, area reclaim.	Fair: excess fines.	Unsuited: excess fines.	Poor: wetness, too sandy.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Naumburg:				
Duane part	Good	Fair: small stones.	Good	Poor: small stones, too sandy, area reclaim.
[1]NGB:				
Naumburg part	Poor: wetness, area reclaim.	Fair: excess fines.	Unsuited: excess fines.	Poor: wetness, too sandy.
Granby part	Poor: wetness.	Good	Unsuited: excess fines.	Poor: wetness, too sandy.
Oakville:				
OaB	Good	Good	Unsuited: excess fines.	Poor: too sandy.
Palms:				
Pa	Poor: excess humus, frost action, low strength.	Unsuited: excess humus.	Unsuited: excess humus.	Poor: wetness.
Raynham:				
RaB	Poor: frost action, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
Rhinebeck:				
RhA, RhB	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
Rifle:				
RM	Poor: frost action, excess humus, low strength.	Unsuited: excess humus.	Unsuited: excess humus.	Poor: wetness.
Rumney:				
RU	Poor: wetness, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
Scriba:				
ScB, ScC	Poor: frost action.	Unsuited: excess fines, small stones.	Unsuited: excess fines.	Poor: small stones.
[1]SDB	Poor: frost action.	Unsuited: excess fines, large stones.	Unsuited: excess fines, large stones.	Poor: large stones.
Sodus:				
SgB, SgC	Fair: frost action.	Poor: excess fines, small stones.	Poor: excess fines.	Poor: small stones.
SgD	Fair: frost action, slope.	Poor: excess fines, small stones.	Poor: excess fines.	Poor: slope, small stones.
[1]SHF	Poor: slope.	Unsuited: excess fines, small stones.	Poor: excess fines.	Poor: slope, small stones.
Sun:				
Su	Poor: wetness, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
Swanton:				
Sw	Poor: wetness, frost action.	Poor: excess fines, thin layer.	Unsuited: excess fines.	Poor: wetness.
Urban land:				
Ub.				

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Wallkill:				
Wa	Poor: low strength, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
Westbury:				
WbB	Poor: frost action.	Unsuited: excess fines, small stones.	Unsuited: excess fines.	Poor: small stones.
[1]WDB:				
Westbury part	Poor: frost action.	Unsuited: excess fines, large stones.	Unsuited: excess fines, large stones.	Poor: large stones.
Dannemora part	Poor: wetness, frost action.	Unsuited: excess fines, large stones.	Unsuited: excess fines, large stones.	Poor: wetness, large stones.
[1]WEB:				
Westbury part	Poor: frost action.	Unsuited: excess fines, large stones.	Unsuited: excess fines, large stones.	Poor: large stones.
Dannemora part	Poor: wetness, frost action.	Unsuited: excess fines, large stones.	Unsuited: excess fines, large stones.	Poor: wetness, large stones.
Williamson:				
WlA, WlB	Poor: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
WlC	Poor: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope.
Windsor:				
WnB, WnC	Good	Good	Unsuited: excess fines.	Poor: too sandy.
Worth:				
WoB, WoC, WoCK	Fair: frost action.	Poor: small stones, excess fines.	Poor: excess fines.	Poor: small stones.
[1]WRE	Poor: slope.	Poor: small stones, excess fines.	Poor: excess fines.	Poor: slope, small stones.
[1]WSC:				
Worth part	Fair: frost action.	Unsuited: excess fines, large stones.	Unsuited: large stones.	Poor: large stones.
Empeyville part	Fair: frost action.	Unsuited: excess fines, large stones.	Unsuited: excess fines, large stones.	Poor: large stones.
[1]WSD:				
Worth part	Fair: frost action, slope.	Unsuited: excess fines, large stones.	Unsuited: large stones.	Poor: large stones, slope.
Empeyville part	Fair: frost action, slope.	Unsuited: excess fines, large stones.	Unsuited: excess fines, large stones.	Poor: slope, large stones.
[1]WYD:				
Worth part	Fair: large stones, frost action, slope.	Unsuited: excess fines, large stones.	Unsuited: large stones.	Poor: slope, large stones.
Empeyville part	Fair: frost action, large stones, slope.	Unsuited: excess fines, large stones.	Unsuited: excess fines, large stones.	Poor: slope, large stones.

[1]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior of the whole map unit.

TABLE 10.--WATER MANAGEMENT

[Some terms that describe restrictive soil features are defined in the Glossary. Absence of an entry indicates that the soil was not evaluated]

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
Adams:						
[1]AAC:						
Adams part	Slope, seepage.	Seepage, piping.	No water	Not needed, slope.	Too sandy, complex slope, piping.	Droughty, slope.
Windsor part	Seepage, slope.	Seepage, piping.	No water	Not needed	Piping, complex slope, too sandy.	Droughty, slope.
[1]AAD:						
Adams part	Slope, seepage.	Seepage, piping.	No water	Not needed	Too sandy, slope, piping.	Droughty, slope.
Windsor part	Seepage, slope.	Seepage, piping.	No water	Not needed	Piping, slope, too sandy.	Droughty, slope.
Alton:						
AgA, AgB, AgC, AkC, AoB	Seepage	Seepage, piping.	No water	Not needed	Complex slope, piping.	Droughty, slope.
Amboy:						
AvB, AvC3, [1]AyD3, [1]AyE3	Slope	Piping, low strength.	Deep to water	Not needed	Percs slowly, erodes easily, slope.	Percs slowly, slope, erodes easily.
[1]AwC3:						
Amboy part	Slope	Piping, low strength.	Deep to water	Not needed	Percs slowly, erodes easily, complex slope.	Percs slowly, slope, erodes easily.
Williamson part	Slope	Piping, low strength.	Deep to water	Percs slowly, slope.	Percs slowly, erodes easily, complex slope.	Percs slowly, slope, erodes easily.
Beaches:						
BC.						
Brockport:						
BrB	Depth to rock, slope.	Low strength, thin layer.	Deep to water	Wetness, depth to rock, percs slowly.	Depth to rock, percs slowly.	Wetness, percs slowly, rooting depth.
Canaan:						
[1]CAB:						
Canaan part	Slope, depth to rock, seepage.	Thin layer, seepage.	No water, depth to rock.	Not needed	Slope, depth to rock, rooting depth.	Slope, droughty, rooting depth.
Rock outcrop part.						
Canandaigua:						
Cd	Favorable	Low strength, unstable fill.	Slow refill	Poor outlets, cutbanks cave.	Not needed	Wetness.
Carlisle:						
Ce	Seepage	Excess humus, unstable fill, low strength.	Favorable	Wetness, cutbanks cave, poor outlets.	Not needed	Not needed.
Colton:						
[1]CHC:						
Colton part	Seepage, slope.	Seepage, piping.	No water	Not needed	Complex slope, piping.	Droughty, slope.

See footnote at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
Colton:						
Hinckley part	Slope, seepage.	Piping, seepage.	No water	Not needed	Slope, piping.	Slope, droughty.
[1]CHD:						
Colton part	Slope, seepage.	Seepage, piping.	No water	Not needed	Slope, piping.	Droughty, slope.
Hinckley part	Slope, seepage.	Piping, seepage.	No water	Not needed	Slope, piping.	Slope, droughty.
[1]CHE:						
Colton part	Slope, seepage.	Seepage, piping.	No water	Not needed	Slope, piping.	Droughty, slope.
Hinckley part	Slope, seepage.	Piping, seepage.	No water	Not needed	Slope, piping.	Slope, droughty.
Deerfield:						
DeB	Seepage	Seepage, unstable fill.	Deep to water	Cutbanks cave	Too sandy	Droughty.
Elmwood:						
EmB	Favorable	Favorable	Deep to water	Percs slowly, frost action, cutbanks cave.	Percs slowly, wetness.	Percs slowly, wetness.
Empeyville:						
EpB, EpC	Slope	Favorable	Deep to water	Percs slowly, slope.	Percs slowly, slope.	Percs slowly, slope.
Fluvaquents and Udifluvents:						
[1]FA	Seepage	Piping, low strength.	Favorable	Floods, wetness, cutbanks cave.	Not needed	Not needed.
Fonda:						
Fn	Favorable	Low strength, compressible, hard to pack.	Favorable	Wetness, percs slowly, poor outlets.	Not needed	Not needed.
Fredon:						
Fr	Seepage	Seepage, low strength.	Favorable	Frost action	Not needed	Wetness.
Granby:						
Gr	Seepage	Seepage, piping.	Favorable	Wetness, cutbanks cave.	Not needed	Not needed.
Halsey:						
Ha	Seepage	Seepage, low strength.	Favorable	Wetness, poor outlets.	Not needed	Not needed.
Herkimer:						
HeB, HeC	Seepage, slope.	Favorable	Deep to water	Favorable	Favorable, slope.	Favorable, slope.
Hinckley:						
HkB, HkC	Slope, seepage.	Piping, seepage.	No water	Not needed	Slope, piping.	Slope, droughty.
Hudson:						
HuB, HuC, HuCK	Slope	Low strength, compressible.	Deep to water	Percs slowly	Slope, percs slowly.	Slope, percs slowly, erodes easily.
Humaquepts and Fibrists:						
[1]HW	Excess humus	Compressible	Favorable	Poor outlets	Not needed	Not needed.

See footnote at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
Ira:						
IrA, IrB, IrC----	Favorable------	Favorable------	Deep to water	Percs slowly, slope.	Percs slowly, slope.	Percs slowly, slope.
[1]IsC:						
Ira part--------	Slope----------	Favorable------	Deep to water	Percs slowly, slope.	Percs slowly, slope.	Percs slowly, slope.
Sodus part------	Slope----------	Favorable------	No water-------	Not needed-----	Percs slowly, slope.	Percs slowly, slope.
[1]IUD:						
Ira part--------	Slope----------	Large stones---	Deep to water, large stones.	Percs slowly, slope, large stones.	Percs slowly, slope, large stones.	Percs slowly, slope, large stones.
Sodus part------	Slope----------	Large stones---	No water, large stones.	Not needed-----	Large stones, percs slowly, slope.	Large stones, percs slowly, slope.
Lamson:						
Lf--------------	Seepage--------	Piping, unstable fill.	Favorable------	Wetness, poor outlets.	Not needed-----	Not needed.
Madalin:						
Ma--------------	Favorable------	Low strength, piping.	Favorable------	Wetness, percs slowly, poor outlets.	Not needed-----	Not needed.
Massena:						
Me--------------	Favorable------	Favorable------	Deep to water	Wetness, percs slowly, slope.	Wetness, percs slowly.	Wetness, percs slowly, slope.
Middlebury:						
Mf--------------	Favorable------	Piping, low strength.	Deep to water	Floods, wetness.	Not needed-----	Not needed.
Minoa:						
Mn--------------	Seepage--------	Seepage, piping, low strength.	Cutbanks cave	Cutbanks cave	Not needed-----	Wetness.
Minoa variant:						
MoB-------------	Seepage--------	Seepage, piping.	Deep to water	Cutbanks cave	Erodes easily	Erodes easily.
Naumburg:						
Na--------------	Seepage--------	Piping, seepage.	Cutbanks cave	Cutbanks cave, wetness.	Not needed-----	Not needed.
[1]NDB:						
Naumburg part---	Seepage--------	Piping, seepage.	Cutbanks cave	Cutbanks cave, wetness.	Not needed-----	Not needed.
Duane part------	Seepage--------	Seepage, hard to pack, piping.	Deep to water, cutbanks cave.	Cutbanks cave	Not needed-----	Not needed.
[1]NGB:						
Naumburg part---	Seepage--------	Piping, seepage.	Cutbanks cave	Cutbanks cave, wetness.	Not needed-----	Not needed.
Granby part-----	Seepage--------	Seepage, piping.	Cutbanks cave	Wetness, cutbanks cave.	Not needed-----	Not needed.
Oakville:						
OaB-------------	Seepage--------	Piping, erodes easily.	No water-------	Not needed-----	Too sandy, soil blowing.	Droughty, soil blowing.

See footnote at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
Palms:						
Pa	Seepage	Excess humus, low strength, unstable fill.	Favorable	Wetness, floods, cutbanks cave, poor outlets.	Not needed	Not needed.
Raynham:						
RaB	Favorable	Piping, low strength.	Favorable	Wetness, percs slowly.	Wetness, percs slowly.	Wetness, percs slowly, erodes easily.
Rhinebeck:						
RhA, RhB	Favorable	Low strength	Slow refill	Percs slowly	Percs slowly	Percs slowly, slope.
Rifle:						
RM	Seepage	Excess humus, unstable fill, low strength.	Favorable	Wetness, cutbanks cave, floods, poor outlets.	Not needed	Not needed.
Rumney:						
RU	Favorable	Piping	Favorable	Wetness, floods.	Not needed	Wetness.
Scriba:						
ScB, ScC	Favorable	Favorable	Favorable	Percs slowly	Wetness, percs slowly.	Wetness, percs slowly.
[1]SDB	Favorable	Large stones	Large stones	Percs slowly, large stones.	Wetness, large stones, percs slowly.	Wetness, large stones, percs slowly.
Sodus:						
SgB, SgC, SgD, [1]SHF	Favorable	Favorable	No water	Not needed	Percs slowly, slope.	Percs slowly, slope.
Sun:						
Su	Favorable	Favorable	Favorable	Wetness, percs slowly, poor outlets.	Not needed	Not needed.
Swanton:						
Sw	Favorable	Piping, low strength.	Favorable	Wetness, percs slowly, cutbanks cave.	Not needed	Wetness, percs slowly.
Urban land:						
UB.						
Wallkill:						
Wa	Seepage	Low strength	Favorable	Wetness, poor outlets.	Not needed	Not needed.
Westbury:						
WbB	Favorable	Favorable	Favorable	Wetness, percs slowly.	Wetness, percs slowly.	Wetness, percs slowly.
[1]WDB:						
Westbury part	Favorable	Large stones	Large stones	Wetness, percs slowly.	Wetness, large stones, percs slowly.	Wetness, large stones, percs slowly.
Dannemora part	Favorable	Large stones	Large stones	Wetness, percs slowly.	Large stones, wetness, percs slowly.	Large stones, wetness, percs slowly.
[1]WEB:						
Westbury part	Favorable	Large stones	Large stones	Wetness, percs slowly.	Wetness, large stones, percs slowly.	Wetness, large stones, percs slowly.

See footnote at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
Westbury: Dannemora part	Favorable	Large stones	Large stones	Wetness, percs slowly.	Large stones, wetness, percs slowly.	Large stones, wetness, percs slowly.
Williamson: WlA, WlB, WlC	Favorable	Piping, low strength.	Deep to water	Percs slowly, slope.	Percs slowly, erodes easily, slope.	Percs slowly, slope, erodes easily.
Windsor: WnB, WnC	Seepage, slope.	Seepage, piping.	No water	Not needed	Piping, slope, too sandy.	Droughty, slope.
Worth: WoB, WoC, WoCK, [1]WRE	Favorable, slope.	Favorable	No water	Not needed	Percs slowly, slope.	Percs slowly, slope.
[1]WSC: Worth part	Slope	Large stones	No water, large stones.	Not needed	Percs slowly, slope, large stones.	Percs slowly, slope, large stones.
Empeyville part	Slope	Large stones	Deep to water, large stones.	Percs slowly, slope, large stones.	Percs slowly, slope, large stones.	Percs slowly, slope, large stones.
[1]WSD: Worth part	Slope	Large stones	No water, large stones.	Not needed	Percs slowly, slope, large stones.	Percs slowly, slope, large stones.
Empeyville part	Slope	Large stones	Deep to water, large stones.	Percs slowly, slope, large stones.	Percs slowly, slope, large stones.	Percs slowly, slope, large stones.
[1]WYD: Worth part	Slope	Large stones	No water, large stones.	Not needed	Percs slowly, slope, large stones.	Percs slowly, slope, large stones.
Empeyville part	Slope	Large stones	Deep to water, large stones.	Percs slowly, slope, large stones.	Percs slowly, slope, large stones.	Percs slowly, slope, large stones.

[1]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior of the whole map unit.

TABLE 11.--ENGINEERING PROPERTIES AND CLASSIFICATIONS

[The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated. NP means nonplastic]

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
Adams:											
[1]AAC:											
Adams part--------	0-11	Loamy fine sand	SM	A-1, A-2	0	95-100	95-100	45-85	15-35	---	NP
	11-23	Loamy sand, sand, loamy fine sand.	SM, SP-SM	A-1, A-2, A-3, A-4	0	95-100	95-100	45-85	5-40	---	NP
	23-60	Sand-------------	SP-SM, SW-SM, SM	A-1, A-2, A-3	0-1	90-100	70-100	40-70	5-15	---	NP
Windsor part-----	0-9	Loamy fine sand	SM	A-2, A-1	0	95-100	90-100	45-95	15-35	---	NP
	9-21	Loamy sand, loamy fine sand, sand.	SW-SM, SM	A-1, A-2, A-3	0	95-100	85-100	45-95	5-30	---	NP
	21-63	Sand, fine sand	SP-SM, SM, SP	A-1, A-2, A-3	0	90-100	85-100	40-80	3-35	---	NP
[1]AAD:											
Adams part--------	0-11	Loamy fine sand	SM	A-1, A-2	0	95-100	95-100	45-85	15-35	---	NP
	11-23	Loamy sand, sand, loamy fine sand.	SM, SP-SM	A-1, A-2, A-4	0	95-100	95-100	45-85	15-45	---	NP
	23-60	Sand-------------	SP-SM, SW-SM, SM	A-1, A-2, A-3	0-1	90-100	70-100	40-70	5-15	---	NP
Windsor part-----	0-9	Loamy fine sand	SM	A-2, A-1	0	95-100	90-100	45-100	15-35	---	NP
	9-21	Loamy sand, loamy fine sand, sand.	SW-SM, SM	A-2, A-3, A-1	0	95-100	90-100	45-100	5-30	---	NP
	21-63	Sand, fine sand	SP-SM, SM, SP	A-1, A-2, A-3	0	90-100	85-100	40-100	3-35	---	NP
Alton:											
AgA, AgB, AgC-----	0-8	Gravelly fine sandy loam.	SM, GM	A-1, A-2, A-4	0-5	60-75	50-70	40-60	20-40	<10	NP-5
	8-36	Gravelly loam, very gravelly sandy loam.	GM, SM	A-1, A-2, A-4	0-20	50-80	45-70	30-65	15-50	<10	NP-5
	36-62	Very gravelly sand, very gravelly loamy sand.	GP, GM, SM, SP	A-1	10-25	45-60	40-50	20-40	2-15	---	NP
AkC---------------	0-8	Cobbly silt loam.	ML	A-4	15-30	75-95	70-90	65-90	50-80	<10	NP-5
	8-36	Gravelly loam, very gravelly sandy loam.	GM, SM	A-1, A-2, A-4	0-20	50-80	45-70	30-65	15-50	<10	NP-5
	36-62	Very gravelly sand, very gravelly loamy sand.	GP, GM, SM, SP	A-1	10-25	45-60	40-50	20-40	2-15	---	NP
AoB---------------	0-8	Gravelly silt loam.	ML, GM	A-4	0-5	65-75	60-70	55-65	45-60	<10	NP-5
	8-36	Gravelly loam, very gravelly sandy loam.	GM, SM	A-1, A-2, A-4	0-20	50-80	45-70	30-65	15-50	<10	NP-5
	36-62	Very gravelly sand, very gravelly loamy sand.	GP, GM, SM, SP	A-1	10-25	45-60	40-50	20-40	2-15	---	NP

See footnote at end of table.

TABLE 11.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Amboy:											
AvB, AvC3, [1]AyD3, [1]AyE3	0-4	Very fine sandy loam, silt loam.	ML	A-4	0	95-100	90-100	80-100	50-90	20-30	1-6
	4-21	Very fine sandy loam, silt loam.	ML	A-4	0	100	95-100	90-100	50-90	10-20	1-6
	21-51	Very fine sandy loam, silt loam.	ML	A-4	0	100	95-100	90-100	50-90	10-20	1-6
	51-60	Loamy fine sand, gravelly loamy fine sand.	SM, SW-SM	A-1, A-2	0-5	75-100	75-95	40-75	12-30	---	NP
[1]AwC3:											
Amboy part	0-4	Very fine sandy loam.	ML	A-4	0	95-100	90-100	80-95	50-65	20-30	1-6
	4-21	Very fine sandy loam, silt loam.	ML	A-4	0	100	95-100	90-100	50-90	10-20	1-6
	21-51	Very fine sandy loam, silt loam.	ML	A-4	0	100	95-100	90-100	50-90	10-20	1-6
	51-60	Loamy fine sand, gravelly loamy fine sand.	SM, SW-SM, SP-SM	A-1, A-2	0-5	75-100	75-95	40-75	12-30	---	NP
Williamson part	0-9	Very fine sandy loam.	ML, SM	A-4	0	95-100	90-100	80-95	45-65	20-30	1-6
	9-20	Silt loam, very fine sandy loam.	ML, CL-ML	A-4	0	100	95-100	80-100	50-90	10-20	1-6
	20-44	Silt loam, very fine sandy loam.	ML, CL-ML	A-4	0	100	95-100	80-100	50-90	10-20	1-6
	44-50	Stratified silt to very fine sandy loam.	ML, SM	A-4	0	95-100	90-100	65-95	40-90	<15	NP-3
Beaches: BC.											
Brockport:											
BrB	0-8	Silty clay loam	CL, CL-ML	A-7, A-4, A-6	0	95-100	95-100	90-100	80-95	23-43	7-18
	8-30	Clay, clay loam, heavy silty clay loam, silty clay.	ML, CL, MH	A-7, A-6	0-5	90-95	85-95	80-90	75-90	35-55	11-20
	30	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Canaan:											
[1]CAB: Canaan part	0-3	Channery fine sandy loam.	SM, GM	A-1, A-2, A-4	5-20	65-85	55-80	40-65	20-40	---	NP
	3-19	Very gravelly fine sandy loam, very channery sandy loam.	GM, GP-GM	A-1, A-2	10-30	30-50	25-45	15-35	10-25	---	NP
	19	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop part.											

See footnote at end of table.

TABLE 11.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Canandaigua:											
Cd	0-7	Silt loam	ML, MH, OL	A-4, A-5, A-6, A-7	0	95-100	95-100	90-100	80-100	35-55	5-15
	7-33	Silt loam, very fine sandy loam, silty clay loam.	CL, ML CL-ML	A-4, A-5, A-6, A-7	0	95-100	95-100	90-100	70-95	20-45	5-15
	33-50	Silt loam, very fine sandy loam.	CL, ML, CL-ML	A-4, A-5	0	95-100	95-100	90-100	70-95	20-30	3-10
Carlisle:											
Ce	0-56	Sapric material	Pt	A-8	---	---	---	---	---	---	---
Colton:											
[1]CHC:											
Colton part	0-8	Gravelly loamy sand.	SM, SP-SM	A-1, A-2	5-15	65-80	55-75	25-60	10-25	---	NP
	8-34	Gravelly loamy sand, very gravelly sand, cobbly sand.	SM, GM, SP, GP	A-1	5-20	45-75	40-60	20-50	2-20	---	NP
	34-60	Very gravelly loamy sand, very cobbly sand.	GP, SP, GW	A-1	10-45	30-65	20-40	10-30	0-10	---	NP
Hinckley part	0-7	Gravelly loamy sand.	SM, SP-SM	A-1, A-2	0-15	60-90	40-80	25-60	10-25	---	NP
	7-33	Gravelly loamy sand, gravelly loamy fine sand, very gravelly loamy coarse sand.	SM, GM, GP-GM, GP	A-1, A-2	0-15	50-95	30-85	15-70	5-25	---	NP
	33-62	Stratified very gravelly loamy fine sand to very cobbly coarse sand.	SP, SP-SM, GP, GP-GM	A-1	10-45	40-75	20-50	10-40	0-20	---	NP
[1]CHD:											
Colton part	0-8	Gravelly loamy sand.	SM, SP-SM	A-1, A-2	5-15	65-80	55-75	25-60	10-25	---	NP
	8-34	Gravelly loamy sand, very gravelly sand, cobbly sand.	SM, GM, SP, GP	A-1	5-20	45-75	40-60	20-50	2-20	---	NP
	34-60	Very gravelly loamy sand, very cobbly sand.	GP, SP, GW	A-1	10-45	30-65	20-40	10-30	0-10	---	NP
Hinckley part	0-7	Gravelly loamy sand.	SM, SP-SM	A-1, A-2	0-15	60-90	40-80	25-60	10-25	---	NP
	7-33	Gravelly loamy sand, gravelly loamy fine sand, very gravelly loamy coarse sand.	SM, GM, GP-GM, GP	A-1, A-2	0-15	50-95	30-85	15-70	5-25	---	NP
	33-62	Stratified very gravelly loamy fine sand to very cobbly coarse sand.	SP, SP-SM, GP, GP-GM	A-1	10-45	40-75	20-50	10-40	0-20	---	NP

See footnote at end of table.

TABLE 11.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Colton:											
[1]CHE:											
Colton part------	0-8	Gravelly loamy sand.	SM, SP-SM	A-1, A-2	5-15	65-80	55-75	25-60	10-25	---	NP
	8-34	Gravelly loamy sand, very gravelly sand, cobbly sand.	SM, GM, SP, GP	A-1	5-20	45-75	40-60	20-50	2-20	---	NP
	34-60	Very gravelly loamy sand, very cobbly sand.	GP, SP, GW	A-1	10-45	30-65	20-40	10-30	0-10	---	NP
Hinckley part----	0-7	Gravelly loamy sand.	SM, SP-SM	A-1, A-2	0-15	60-90	40-80	25-60	10-25	---	NP
	7-33	Gravelly loamy sand, gravelly loamy fine sand, very gravelly loamy coarse sand.	SM, GM, GP-GM, GP	A-1, A-2	0-15	50-95	30-85	15-70	5-25	---	NP
	33-62	Stratified very gravelly loamy fine sand to very cobbly coarse sand.	SP, SP-SM, GP, GP-GM	A-1	10-45	40-75	20-50	10-40	0-20	---	NP
Deerfield:											
DeB---------------	0-9	Loamy fine sand	SM	A-2, A-4	0	95-100	80-100	65-85	20-45	---	NP
	9-16	Loamy sand, fine sandy loam, sand.	SM, SP-SM	A-2, A-3, A-4	0	95-100	80-100	65-95	5-40	---	NP
	16-50	Sand, loamy sand, coarse sand.	SP, SM	A-1, A-2, A-3	0	95-100	80-100	40-95	0-20	---	NP
	50-72	Sand, fine sand, coarse sand.	SP, SM	A-1, A-2, A-3	0	95-100	80-100	40-95	0-20	---	NP
Elmwood:											
EmB---------------	0-8	Fine sandy loam	SM, ML	A-4	0	100	95-100	80-95	40-55	<33	<5
	8-24	Fine sandy loam, sandy loam.	SM	A-2, A-4	0	100	95-100	80-95	30-50	---	---
	24-50	Silty clay loam, silty clay.	CL, ML	A-6, A-7	0	100	100	100	85-100	35-45	15-20
Empeyville:											
EpB, EpC----------	0-9	Gravelly fine sandy loam.	SM, GM	A-1, A-2, A-4	2-5	55-80	50-75	30-75	15-40	20-30	NP-5
	9-17	Loam, sandy loam, gravelly sandy loam.	ML, SM, CL-ML, SM-SC	A-1, A-2, A-4	0-5	60-95	55-90	35-85	15-65	15-25	NP-5
	17-60	Gravelly loam, gravelly fine sandy loam, very gravelly sandy loam.	SM, ML, GM, GM-GC	A-1, A-2, A-4	5-10	50-85	45-75	25-70	15-55	15-25	NP-5
Fluvaquents and Udifluvents:											
[1]FA---------------	0-60	Variable--------	---	---	0-35	---	---	---	---	---	---
Fonda:											
Fn----------------	0-6	Mucky silt loam	ML, MH, OL, OH	A-6, A-7	0	95-100	95-100	85-100	70-90	35-55	10-20
	6-50	Silty clay, clay, silty clay loam.	CL, MH	A-6, A-7	0	95-100	95-100	90-100	70-95	38-61	15-28

See footnote at end of table.

TABLE 11.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Fredon:											
Fr	0-12	Gravelly fine sandy loam.	GM, SM	A-1, A-2, A-4	0	60-90	50-80	35-65	20-45	20-30	NP-10
	12-30	Gravelly fine sandy loam, loam, gravelly loam, gravelly sandy loam.	SM, SC, ML, CL	A-1, A-2, A-4	0	60-100	50-90	30-85	15-70	20-30	NP-10
	30-50	Very gravelly sandy loam, very gravelly sand.	GP, GM, GW, GW-GM	A-1, A-2	0-5	40-55	35-50	20-40	0-20	---	NP
Granby:											
Gr	0-11	Loamy fine sand	SM	A-2, A-4	0	100	100	60-85	15-45	---	NP
	11-60	Sand, loamy sand	SP, SM, SW-SM	A-3, A-2	0	100	95-100	50-85	5-30	---	NP
Halsey:											
Ha	0-9	Gravelly loam	ML, CL, SM	A-2, A-4	0-2	60-90	50-80	45-75	30-60	20-30	5-10
	9-31	Loam, gravelly fine sandy loam.	SM, SC, ML, CL	A-2, A-4	0-2	60-100	50-95	35-90	20-70	20-30	5-10
	31-50	Gravelly sand, very gravelly sand.	SP, GP, GP-GM, SW-SM	A-1, A-3	5-10	30-75	20-70	10-55	0-10	---	NP
Herkimer:											
HeB, HeC	0-9	Shaly silt loam	ML, SM, GM	A-4, A-7	0-10	60-80	55-75	50-75	35-65	35-45	10-15
	9-28	Gravelly loam, shaly silt loam, gravelly fine sandy loam.	ML, SM, GM, GC	A-4, A-2	0-10	60-100	55-80	45-80	35-70	25-35	5-10
	28-64	Very shaly loam, shaly loam, gravelly silt loam.	GM, ML, SM, GC	A-4, A-2	0-15	40-70	40-70	35-65	25-55	10-20	5-10
Hinckley:											
HkB, HkC	0-7	Gravelly loamy sand.	SM, SP-SM	A-1, A-2	0-15	60-95	40-85	25-60	10-25	---	NP
	7-33	Gravelly loamy sand, gravelly loamy fine sand, very gravelly loamy coarse sand.	SM, GM, GP-GM, GP	A-1, A-2	0-15	50-95	30-85	15-70	5-25	---	NP
	33-62	Stratified very gravelly loamy fine sand to very cobbly coarse sand.	SP, SP-SM, GP, GP-GM	A-1	10-45	40-75	20-50	10-40	0-20	---	NP
Hudson:											
HuB, HuC, HuCK	0-6	Silt loam	ML, CL-ML	A-4, A-6, A-7	0	95-100	95-100	85-100	65-90	25-45	5-20
	6-38	Silty clay, clay, silty clay loam.	CL	A-7	0	95-100	95-100	85-100	70-95	45-65	25-35
	38-50	Silty clay, silt loam, clay.	CL,	A-6, A-7	0	95-100	90-100	80-100	60-95	35-65	20-35
Humaquepts and Fibrists:											
[1]HW	0-60	Variable	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 11.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Ira:											
IrA, IrB, IrC-----	0-8	Gravelly fine sandy loam.	SM, GM	A-1, A-2, A-4	0-5	55-80	55-70	40-65	20-40	<15	NP-2
	8-20	Fine sandy loam, gravelly loam, gravelly sandy loam.	SM, ML, GM	A-1, A-2, A-4	0-5	55-90	55-85	35-80	15-60	<15	NP-2
	20-40	Gravelly fine sandy loam, gravelly loam, loam.	GM, ML, SM	A-1, A-2, A-4	0-5	60-90	60-85	40-80	25-60	<15	NP-2
	40-50	Gravelly fine sandy loam, gravelly loam, very gravelly fine sandy loam.	GM, GW-GM, SM, SW-SM	A-2, A-4, A-1	5-10	45-75	25-70	25-60	10-45	<15	NP-2
[1]IsC:											
Ira part---------	0-8	Gravelly fine sandy loam.	SM, GM	A-1, A-2, A-4	0-5	55-80	55-70	40-65	20-40	<15	NP-2
	8-20	Fine sandy loam, gravelly loam, gravelly sandy loam.	SM, GM, ML	A-1, A-2, A-4	0-5	55-90	55-85	35-80	15-60	<15	NP-2
	20-40	Gravelly fine sandy loam, gravelly loam, loam.	GM, ML, SM	A-1, A-2, A-4	0-5	60-90	60-85	40-80	25-60	<15	NP-2
	40-50	Gravelly fine sandy loam, gravelly loam, very gravelly fine sandy loam.	GM, GW-GM, SM, SW-SM	A-2, A-4, A-1	5-10	45-75	25-70	25-60	10-45	<15	NP-2
Sodus part-------	0-7	Gravelly fine sandy loam.	SM	A-1, A-2, A-4	0-5	70-90	60-80	40-70	25-45	<15	NP-2
	7-20	Very fine sandy loam, loam, gravelly fine sandy loam.	SM, ML	A-1, A-2, A-4	0-5	70-95	60-90	40-85	25-65	<15	NP-2
	20-60	Gravelly very fine sandy loam, gravelly loam, very gravelly fine sandy loam, gravelly fine sandy loam.	GM, SM	A-2, A-4, A-1	0-10	50-70	40-60	30-55	15-45	<15	NP-2
[1]IUD:											
Ira part---------	0-8	Very stony fine sandy loam.	SM, GM	A-1, A-2, A-4	5-15	55-80	55-70	40-65	20-40	<15	NP-2
	8-20	Fine sandy loam, gravelly loam, gravelly sandy loam.	SM, ML, GM	A-1, A-2, A-4	0-5	55-90	55-85	35-80	15-60	<15	NP-2
	20-40	Gravelly fine sandy loam, gravelly loam, loam.	GM, ML, SM	A-1, A-2, A-4	0-5	60-90	60-85	40-80	25-60	<15	NP-2
	40-50	Gravelly fine sandy loam, gravelly loam, very gravelly fine sandy loam.	GM, GW-GM, SM, SW-SM	A-2, A-4, A-1	5-10	45-75	25-70	25-60	10-45	<15	NP-2

See footnote at end of table.

TABLE 11.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification Unified	Classification AASHTO	Frag-ments > 3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
Ira:											
Sodus part--------	0-7	Very stony fine sandy loam, very stony loam.	SM, ML	A-1, A-2, A-4	5-15	70-90	60-80	40-75	25-60	<15	NP-2
	7-20	Very fine sandy loam, loam, gravelly fine sandy loam.	SM, ML	A-1, A-2, A-4	0-5	70-95	60-90	40-85	25-65	<15	NP-2
	20-60	Gravelly very fine sandy loam, gravelly loam, very gravelly fine sandy loam.	GM, SM	A-1, A-2, A-4	0-10	50-70	40-60	30-55	15-45	<15	NP-2
Lamson:											
Lf----------------	0-9	Very fine sandy loam.	SM, ML	A-4	0	95-100	90-100	70-90	40-65	<20	NP-4
	9-50	Fine sandy loam, very fine sandy loam.	SM, ML	A-4	0	95-100	90-100	65-90	40-55	<20	NP-4
	50-60	Stratified fine sand to very fine sand.	SM	A-2, A-4	0	95-100	90-100	60-90	20-50	---	NP
Madalin:											
Ma----------------	0-6	Silt loam--------	ML, MH	A-6	0	95-100	95-100	85-100	65-90	35-50	10-20
	6-42	Silty clay, clay, silty clay loam.	MH, CH, CL	A-7	0	95-100	95-100	85-100	70-95	45-65	25-35
	42-50	Silty clay, clay	CL, CH	A-7	0	95-100	95-100	85-100	70-95	45-65	25-35
Massena:											
Me----------------	0-7	Silt loam--------	CL	A-6, A-7	0	80-95	75-90	65-90	55-80	35-45	12-20
	7-27	Gravelly fine sandy loam, gravelly sandy loam, loam.	SM, SC, GC, CL, ML	A-4, A-6, A-2, A-1	0-5	55-95	55-90	35-85	15-65	15-25	5-15
	27-50	Gravelly fine sandy loam, gravelly loam, very gravelly sandy loam.	GC, CL, SC, CL-ML	A-4, A-6, A-2, A-1	0-5	50-75	40-70	25-65	10-55	15-25	5-15
Middlebury:											
Mf----------------	0-13	Loam------------	ML, SM	A-4	0	85-100	75-100	65-95	45-75	<20	NP-4
	13-60	Silt loam, loam, gravelly fine sandy loam.	ML, SM	A-4, A-2	0	80-100	70-100	50-100	30-85	<20	NP-4
Minoa:											
Mn----------------	0-8	Very fine sandy loam.	ML, SM	A-4, A-2	0	95-100	90-100	80-95	30-65	<20	NP-4
	8-31	Loamy very fine sand, silt loam, fine sandy loam.	ML, SM	A-4, A-2	0	95-100	90-100	65-95	25-85	<20	NP-4
	31-60	Loamy very fine sand, loamy fine sand, silt loam.	SM, ML	A-2, A-4	0	95-100	90-100	65-95	25-80	---	NP
Minoa variant:											
MoB---------------	0-9	Fine sandy loam	ML, SM	A-4	0	95-100	90-100	65-85	40-55	<20	NP-4
	9-38	Fine sandy loam, loamy fine sand, sandy loam.	ML, SM	A-4, A-2	0	95-100	90-100	55-85	20-55	<20	NP-4
	38-54	Loamy fine sand	SM	A-4, A-2	0	95-100	90-100	65-85	20-40	---	NP

See footnote at end of table.

TABLE 11.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Naumburg:											
Na	0-8	Loamy fine sand	SM	A-1, A-2, A-4	0	95-100	95-100	50-85	20-45	---	NP
	8-38	Loamy fine sand, fine sand, sand.	SM, SW-SM, SP-SM	A-1, A-2, A-3	0	90-100	90-100	45-85	5-35	---	NP
	38-50	Sand, fine sand, loamy fine sand.	SM, SW-SM, SP-SM	A-1, A-2, A-3	0	90-100	90-100	45-80	5-35	---	NP
[1]NDB:											
Naumburg part	0-8	Loamy fine sand	SM	A-1, A-2, A-4	0	95-100	95-100	50-85	20-45	---	NP
	8-38	Loamy fine sand, fine sand, sand.	SM, SW-SM, SP-SM	A-1, A-2, A-3	0	90-100	90-100	45-85	5-35	---	NP
	38-50	Sand, fine sand, loamy fine sand.	SM, SW-SM, SP-SM	A-1, A-2, A-3	0	90-100	90-100	45-80	5-35	---	NP
Duane part	0-14	Very gravelly sand.	GP, SP-GM, SP, SP-SM	A-1	5-25	40-65	35-55	20-40	2-10	---	NP
	14-38	Very gravelly sand, very cobbly sand, gravelly loamy fine sand.	GM, SM, SP, GP	A-1, A-2, A-3	10-50	40-90	35-85	20-60	2-30	---	NP
	38-52	Very gravelly sand, very cobbly sand.	GP, SP, GW, SW-SM	A-1	10-50	45-60	40-55	20-40	2-10	---	NP
[1]NGB:											
Naumburg part	0-8	Loamy fine sand	SM	A-1, A-2, A-4	0	95-100	95-100	50-85	20-45	---	NP
	8-38	Loamy fine sand, fine sand, sand.	SM, SW-SM, SP-SM	A-1, A-2, A-3	0	90-100	90-100	45-85	5-35	---	NP
	38-50	Sand, fine sand, loamy fine sand.	SM, SW-SM, SP-SM	A-1, A-2, A-3	0	90-100	90-100	45-80	5-35	---	NP
Granby part	0-11	Loamy sand	SM	A-2, A-4	0	100	100	60-85	15-45	---	NP
	11-60	Sand, loamy sand	SP, SM, SW-SM	A-3, A-2	0	100	95-100	50-85	5-30	---	NP
Oakville:											
OaB	0-7	Loamy fine sand	SM	A-2	0	100	100	70-85	20-35	---	NP
	7-55	Fine sand	SM	A-2	0	100	95-100	70-85	15-25	---	NP
Palms:											
Pa	0-26	Sapric material	Pt	A-8	---	---	---	---	---	---	---
	26-55	Clay loam, silt loam, fine sandy loam.	CL-ML, CL, SM-SC	A-4, A-6, A-2	0	85-100	80-100	60-95	35-80	<30	5-15
Raynham:											
RaB	0-9	Silt loam	ML	A-4	0	100	95-100	90-100	70-90	---	NP
	9-36	Silt loam	ML	A-4	0	100	95-100	90-100	70-90	---	NP
	36-60	Silt loam	ML	A-4	0	100	95-100	90-100	70-90	---	NP
Rhinebeck:											
RhA, RhB	0-8	Silt loam	ML, CL	A-6, A-7, A-4	0	95-100	95-100	85-100	65-95	30-50	10-20
	8-39	Silty clay loam, silty clay, clay.	CH, CL	A-7	0	95-100	95-100	85-100	70-95	45-65	25-35
	39-53	Silty clay loam, silty clay.	CH, CL	A-7	0	95-100	95-100	85-100	80-95	45-65	25-35

See footnote at end of table.

TABLE 11.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification Unified	Classification AASHTO	Fragments > 3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
Rifle:											
RM	0-15	Fibric material	Pt	A-8	0	---	---	---	---	---	---
	15-55	Hemic material	Pt	A-8	0	---	---	---	---	---	---
Rumney:											
RU	0-8	Loam	ML	A-4	0	90-100	80-100	70-95	50-75	---	NP
	8-36	Fine sandy loam, loam.	SM, ML	A-2, A-4	0	85-100	80-100	55-95	30-75	---	NP
	36-50	Sandy loam, loam.	SM, ML	A-1, A-2, A-4	0	85-100	80-100	50-95	25-75	---	NP
Scriba:											
ScB, ScC	0-14	Gravelly fine sandy loam.	SM, GM	A-1, A-2, A-4	0-5	55-80	50-75	40-65	20-45	<15	NP-4
	14-36	Gravelly fine sandy loam, very gravelly sandy loam, gravelly silt loam.	GM, ML, SM	A-1, A-2, A-4	0-5	35-75	30-75	20-65	15-60	<15	NP-4
	36-50	Gravelly fine sandy loam, very gravelly sandy loam, gravelly silt loam.	GM, ML, SM	A-1, A-2, A-4	5-15	35-75	40-75	20-65	15-60	<15	NP-4
[1]SDB	0-14	Very stony loam, very stony fine sandy loam.	SM, GM, ML	A-1, A-2, A-4	3-10	55-80	55-80	40-70	20-60	<15	NP-4
	14-36	Gravelly fine sandy loam, very gravelly sandy loam, gravelly silt loam.	GM, ML, SM	A-1, A-2, A-4	0-5	35-75	30-75	20-65	15-60	<15	NP-4
	36-50	Gravelly fine sandy loam, very gravelly sandy loam, gravelly silt loam.	GM, ML, SM	A-1, A-2, A-4	5-15	35-75	40-75	20-65	15-60	<15	NP-4
Sodus:											
SgB, SgC, SgD, [1]SHF	0-7	Gravelly loam, cobbly fine sandy loam, gravelly fine sandy loam.	SM, ML	A-2, A-4	0-20	70-90	60-80	45-80	25-60	<15	NP-2
	7-20	Very fine sandy loam, loam, gravelly fine sandy loam.	SM, ML	A-1, A-2, A-4	0-5	70-95	60-90	40-85	25-65	<15	NP-2
	20-60	Gravelly very fine sandy loam, gravelly loam, very gravelly fine sandy loam, gravelly fine sandy loam.	GM, SM	A-1, A-2, A-4	0-10	50-70	40-60	30-55	15-45	<15	NP-2
Sun:											
Su	0-9	Loam	ML, CL, SM	A-4, A-6	0-2	80-100	75-100	65-90	45-70	35-40	10-15
	9-36	Gravelly fine sandy loam, sandy loam, gravelly loam.	GM, ML, SM, SM-SC	A-1, A-2, A-4, A-6	0-5	55-95	50-90	30-85	15-65	15-25	5-15
	36-40	Gravelly fine sandy loam, gravelly loam, very gravelly sandy loam.	GM, SM, GM-GC, SM-SC	A-1, A-2, A-4, A-6	0-5	45-75	40-70	25-65	15-50	15-25	5-15

See footnote at end of table.

TABLE 11.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Swanton:											
Sw----------------	0-10	Fine sandy loam	SM, ML	A-4	0	100	95-100	65-85	40-55	---	NP
	10-19	Fine sandy loam, sandy loam, very fine sandy loam.	SM, ML	A-4, A-2	0	100	95-100	60-95	30-70	---	NP
	19-60	Silty clay loam, silty clay, clay.	CL	A-6, A-7	0	100	100	95-100	75-100	30-45	13-22
Urban land: UB.											
Wallkill:											
Wa----------------	0-8	Silt loam--------	ML	A-4, A-5, A-6	0	95-100	90-100	75-100	65-90	40-50	5-15
	8-24	Silt loam, loam	CL-ML, CL	A-4	0	95-100	90-100	75-100	55-90	15-25	5-10
	24-40	Sapric material, hemic material.	Pt	A-8	0	-	-	-	-	---	---
Westbury:											
WbB---------------	0-8	Gravelly fine sandy loam.	SM, GM	A-2, A-4, A-1	0-5	55-80	50-80	35-75	20-50	<25	NP-3
	8-20	Gravelly loam, gravelly silt loam, gravelly sandy loam.	SM, GM	A-2, A-4, A-1	0-5	55-80	50-75	30-70	15-50	<25	NP-3
	20-50	Gravelly sandy loam, very gravelly fine sandy loam.	SM, GM	A-1, A-2, A-4	0-5	45-75	40-75	25-70	15-40	<15	NP-3
[1]WDB:											
Westbury part----	0-8	Very stony fine sandy loam.	SM, GM	A-2, A-4	3-10	60-90	55-80	40-75	25-50	<25	NP-3
	8-20	Gravelly loam, gravelly silt loam, gravelly sandy loam.	SM, GM	A-2, A-4, A-1	0-5	55-80	50-75	30-70	15-50	<25	NP-3
	20-50	Gravelly sandy loam, very gravelly fine sandy loam.	SM, GM	A-1, A-2, A-4	0-5	45-75	40-75	25-70	15-40	<15	NP-3
Dannemora part---	0-9	Very stony fine sandy loam.	SM, GM	A-2, A-4, A-1	10-15	65-90	60-80	45-70	25-40	20-30	NP-5
	9-17	Gravelly fine sandy loam, gravelly sandy loam, silt loam.	SM, ML	A-2, A-4, A-1	5-10	65-90	55-85	35-85	15-75	<25	NP-3
	17-60	Gravelly sandy loam, very gravelly loam.	SM, GM, ML	A-2, A-4, A-1	5-15	50-80	45-70	30-65	15-55	<25	NP-3
[1]WEB:											
Westbury part----	0-8	Extremely stony fine sandy loam.	SM, GM	A-2, A-4	5-15	65-90	60-80	45-75	25-50	<25	NP-3
	8-20	Gravelly loam, gravelly silt loam, gravelly sandy loam.	SM, GM	A-2, A-4, A-1	0-5	55-80	50-75	30-70	15-50	<25	NP-3
	20-50	Gravelly sandy loam, very gravelly fine sandy loam.	SM, GM	A-1, A-2, A-4	0-5	45-75	40-75	25-70	15-40	<15	NP-3

See footnote at end of table.

TABLE 11.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Westbury:											
Dannemora part---	0-9	Extremely stony fine sandy loam.	SM, GM	A-2, A-4, A-1	15-20	65-90	60-85	40-65	25-40	20-30	NP-3
	9-17	Gravelly fine sandy loam, gravelly sandy loam, silt loam.	SM, ML	A-2, A-4, A-1	5-10	65-90	55-85	35-85	15-75	15-25	NP-4
	17-60	Gravelly sandy loam, very gravelly loam.	SM, GM, ML	A-2, A-4, A-1	5-15	50-80	45-70	30-65	15-55	15-25	NP-4
Williamson:											
WlA, WlB, WlC-----	0-9	Very fine sandy loam.	ML, SM	A-4	0	95-100	90-100	80-95	45-65	20-30	1-6
	9-20	Silt loam, very fine sandy loam.	ML, CL-ML	A-4	0	100	95-100	80-100	50-90	10-20	1-6
	20-44	Silt loam, very fine sandy loam.	ML, CL-ML	A-4	0	100	95-100	80-100	50-90	10-20	1-6
	44-50	Stratified silt to very fine sandy loam.	ML, SM	A-4	0	95-100	90-100	65-95	40-90	<15	NP-3
Windsor:											
WnB, WnC----------	0-9	Loamy fine sand	SM	A-2, A-1	0	95-100	90-100	45-100	15-35	---	NP
	9-21	Loamy sand, loamy fine sand, sand.	SW-SM, SM	A-2, A-3, A-1	0	95-100	90-100	45-100	5-30	---	NP
	21-63	Sand, fine sand	SP-SM, SM, SP	A-1, A-2, A-3	0	90-100	85-100	40-100	3-35	---	NP
Worth:											
WoB, WoC, WoCK, [1]WRE---------------	0-7	Gravelly fine sandy loam, gravelly loam, cobbly fine sandy loam.	SM, ML	A-1, A-2, A-4	0-20	60-85	55-80	35-75	25-60	20-30	NP-5
	7-27	Gravelly fine sandy loam, gravelly loam.	SM, ML, GM, CL-ML	A-1, A-2, A-4	0-2	55-85	55-80	40-75	20-60	15-25	NP-5
	27-48	Gravelly fine sandy loam, gravelly loam, very gravelly fine sandy loam.	GM, GM-GC	A-1, A-2, A-4	0-2	45-70	40-65	25-60	20-50	15-25	NP-5
	48-62	Gravelly fine sandy loam, very gravelly loam, gravelly fine sandy loam.	GM, GM-GC	A-1, A-2, A-4	0-2	45-70	40-65	25-60	20-50	15-25	NP-5
[1]WSC:											
Worth part-------	0-7	Very stony loam, very stony fine sandy loam.	SM, ML	A-1, A-2, A-4	5-20	70-90	60-80	45-75	20-60	20-30	NP-5
	7-27	Gravelly fine sandy loam, gravelly loam.	SM, ML, GM, CL-ML	A-1, A-2, A-4	5-10	65-85	65-80	40-75	20-60	15-25	NP-5
	27-48	Gravelly fine sandy loam, gravelly loam, very gravelly fine sandy loam.	GM, GM-GC	A-1, A-2, A-4	5-10	55-70	50-65	35-60	20-50	15-25	NP-5
	48-62	Gravelly fine sandy loam, gravelly loam, very gravelly fine sandy loam.	GM, GM-GC	A-1, A-2, A-4	5-10	55-70	50-65	35-60	20-50	15-25	NP-5

See footnote at end of table.

TABLE 11.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Worth:											
Empeyville part--	0-9	Very stony fine sandy loam, very stony loam.	ML, SM	A-1, A-2, A-4	10-20	65-95	55-90	35-85	25-65	25-35	NP-5
	9-17	Loam, sandy loam, gravelly loam.	ML, SM, SM-SC, CL-ML	A-2, A-4, A-1	0-5	60-95	55-90	35-85	15-65	15-25	NP-5
	17-60	Gravelly loam, gravelly fine sandy loam, very gravelly sandy loam.	SM, ML, GM, GM-GC	A-2, A-4, A-1	5-10	50-85	45-75	25-70	15-55	15-25	NP-5
[1]WSD:											
Worth part-------	0-7	Very stony loam, very stony fine sandy loam.	SM, ML	A-1, A-2, A-4	5-20	70-90	60-80	45-75	20-60	20-30	NP-5
	7-27	Gravelly fine sandy loam, gravelly loam.	SM, ML, GM, CL-ML	A-1, A-2, A-4	5-10	65-85	55-80	40-75	20-60	15-25	NP-5
	27-48	Gravelly fine sandy loam, gravelly loam, very gravelly fine sandy loam.	GM, GM-GC	A-1, A-2, A-4	5-10	55-70	50-65	35-60	20-50	15-25	NP-5
	48-62	Gravelly fine sandy loam, gravelly loam, very gravelly fine sandy loam.	GM, GM-GC	A-1, A-2, A-4	5-10	55-70	50-65	35-60	20-50	15-25	NP-5
Empeyville part--	0-9	Very stony fine sandy loam, very stony loam.	ML, SM	A-1, A-2, A-4	10-20	65-95	55-90	35-85	25-65	25-35	NP-5
	9-17	Loam, sandy loam, gravelly loam.	ML, SM, SM-SC, CL-ML	A-2, A-4, A-1	0-5	60-95	55-90	35-85	15-65	15-25	NP-5
	17-60	Gravelly loam, gravelly fine sandy loam, very gravelly sandy loam.	SM, ML, GM, GM-GC	A-2, A-4, A-1	5-10	50-85	45-75	25-70	15-55	15-25	NP-5
[1]WYD:											
Worth part-------	0-7	Extremely stony fine sandy loam, extremely stony loam.	ML, SM	A-1, A-2, A-4	10-20	70-95	60-85	45-80	25-60	20-30	NP-5
	7-27	Gravelly fine sandy loam, gravelly loam.	SM, ML, GM, CL-ML	A-1, A-2, A-4	5-10	55-85	65-80	40-75	20-60	20-30	NP-5
	27-48	Gravelly fine sandy loam, gravelly loam, very gravelly fine sandy loam.	GM, GM-GC	A-1, A-2, A-4	5-10	55-70	50-65	35-60	20-50	15-25	NP-5
	48-62	Gravelly fine sandy loam, gravelly loam, very gravelly fine sandy loam.	GM, GM-GC	A-1, A-2, A-4	5-10	55-70	50-65	35-60	20-50	15-25	NP-5

See footnote at end of table.

TABLE 11.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification Unified	Classification AASHTO	Fragments > 3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
Worth:											
Empeyville part--	0-9	Extremely stony loam, extremely stony fine sandy loam.	SM, ML	A-2, A-4	10-20	65-95	55-90	35-85	25-65	20-30	NP-5
	9-17	Loam, sandy loam, gravelly loam.	ML, SM, GM, SM-SC	A-2, A-4, A-1	0-5	60-95	55-90	35-85	15-65	15-25	NP-5
	17-60	Gravelly loam, gravelly fine sandy loam, very gravelly sandy loam.	SM, ML, GM, GM-GC	A-2, A-4, A-1	5-10	50-85	45-75	25-70	15-55	15-25	NP-5

[1]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior of the whole map unit.

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS

[Dashes indicate that data were not available. The symbol < means less than; > means more than. The erosion tolerance factor (T) is for the entire profile. Absence of an entry indicates that data were not estimated]

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Risk of corrosion		Erosion factors	
						Uncoated steel	Concrete	K	T
	In	In/hr	In/in	pH					
Adams:									
1AAC:									
Adams part--------	0-11	6.0-20	0.05-0.10	4.5-5.5	Low--------	Low--------	High-------	0.17	5
	11-23	6.0-20	0.04-0.08	4.5-5.5	Low--------	Low--------	High-------	0.17	
	23-60	>20	0.03-0.04	4.5-6.0	Low--------	Low--------	High-------	0.17	
Windsor part------	0-9	6.0-20	0.08-0.12	4.5-6.0	Low--------	Low--------	High-------	0.17	5
	9-21	6.0-20	0.02-0.12	4.5-6.0	Low--------	Low--------	High-------	0.17	
	21-63	6.0-20	0.01-0.08	4.5-6.5	Low--------	Low--------	High-------	0.17	
1AAD:									
Adams part--------	0-11	6.0-20	0.05-0.10	4.5-5.5	Low--------	Low--------	High-------	0.17	5
	11-23	6.0-20	0.04-0.08	4.5-5.5	Low--------	Low--------	High-------	0.17	
	23-60	>20	0.03-0.04	4.5-6.0	Low--------	Low--------	High-------	0.17	
Windsor part------	0-9	6.0-20	0.08-0.12	4.5-6.0	Low--------	Low--------	High-------	0.17	5
	9-21	6.0-20	0.02-0.12	4.5-6.0	Low--------	Low--------	High-------	0.17	
	21-63	6.0-20	0.01-0.08	4.5-6.5	Low--------	Low--------	High-------	0.17	
Alton:									
AgA, AgB, AgC------	0-8	2.0-6.0	0.04-0.14	5.6-7.3	Low--------	Low--------	Moderate	0.17	3
	8-36	2.0-6.0	0.07-0.09	5.6-7.3	Low--------	Low--------	Moderate	0.17	
	36-62	6.0-20	0.02-0.04	6.1-7.8	Low--------	Low--------	Low--------	0.17	
AkC----------------	0-8	2.0-6.0	0.04-0.14	5.6-7.3	Low--------	Low--------	Moderate	0.17	3
	8-36	2.0-6.0	0.07-0.09	5.6-7.3	Low--------	Low--------	Moderate	0.17	
	36-62	6.0-20	0.02-0.04	6.1-7.8	Low--------	Low--------	Low--------	0.17	
AoB----------------	0-8	2.0-6.0	0.06-0.14	5.6-7.3	Low--------	Low--------	Moderate	0.17	3
	8-36	2.0-6.0	0.07-0.09	5.6-7.3	Low--------	Low--------	Moderate	0.17	
	36-62	6.0-20	0.02-0.04	6.1-7.8	Low--------	Low--------	Low--------	0.17	
Amboy:									
AvB, AvC3, 1AyD3, 1AyE3--------------	0-4	0.6-2.0	0.18-0.20	4.5-6.0	Low--------	Low--------	Moderate	0.49	3
	4-21	0.6-2.0	0.18-0.20	4.5-6.5	Low--------	Low--------	Moderate	0.64	
	21-51	0.2-0.6	0.10-0.14	4.5-6.5	Low--------	Low--------	Moderate	0.64	
	51-60	6.0-20	0.03-0.07	5.1-7.3	Low--------	Low--------	Moderate	0.17	
1AwC3:									
Amboy part--------	0-4	0.6-2.0	0.18-0.20	4.5-6.0	Low--------	Low--------	Moderate	0.49	3
	4-21	0.6-2.0	0.18-0.20	4.5-6.5	Low--------	Low--------	Moderate	0.64	
	21-51	0.2-0.6	0.10-0.14	4.5-6.5	Low--------	Low--------	Moderate	0.64	
	51-60	6.0-20	0.03-0.07	5.1-7.3	Low--------	Low--------	Moderate	0.17	
Williamson part---	0-9	0.6-2.0	0.18-0.20	4.5-6.5	Low--------	Moderate	Moderate	0.49	3
	9-20	0.6-2.0	0.18-0.20	4.5-6.5	Low--------	Moderate	Moderate	0.64	
	20-44	0.06-0.2	0.10-0.14	5.1-6.5	Low--------	Moderate	Moderate	0.64	
	44-60	0.06-0.2	0.10-0.14	5.1-6.5	Low--------	Moderate	Moderate	0.64	
Beaches:									
BC.									
Brockport:									
BrB----------------	0-8	0.2-0.6	0.16-0.21	5.6-7.8	Moderate	High-------	Low--------	0.43	3
	8-30	0.06-0.2	0.11-0.14	5.6-7.8	Moderate	High-------	Low--------	0.28	
	30	---	---	---	-----------	-----------	-----------	---	
Canaan:									
1CAB:									
Canaan part-------	0-3	2.0-20	0.06-0.16	4.5-6.0	Low--------	Low--------	Moderate	0.20	2
	3-19	2.0-20	0.02-0.12	4.5-6.0	Low--------	Low--------	Moderate	0.17	
	19	---	---	---	-----------	-----------	-----------	---	

See footnote at end of table.

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permea- bility	Available water capacity	Soil reaction	Shrink- swell potential	Risk of corrosion		Erosion factors	
						Uncoated steel	Concrete	K	T
	In	In/hr	In/in	pH					
Canaan:									
Rock outcrop part.									
Canandaigua:									
Cd----------------	0-7	0.6-2.0	0.20-0.35	6.1-7.8	Low--------	High------	Low--------	0.49	3
	7-33	0.2-0.6	0.19-0.20	6.1-7.8	Low--------	High------	Low--------	0.49	
	33-50	0.2-0.6	0.19-0.20	6.6-8.4	Low--------	High------	Low--------	0.49	
Carlisle:									
Ce----------------	0-56	6.0-20	0.35-0.45	5.6-7.3	----------	High------	Low--------	---	---
Colton:									
[1]CHC:									
Colton part------	0-8	>6.0	0.03-0.07	4.5-5.5	Low--------	Low--------	High------	0.17	3
	8-34	>6.0	0.02-0.05	4.5-5.5	Low--------	Low--------	High------	0.17	
	34-60	>6.0	0.01-0.02	4.5-6.0	Low--------	Low--------	High------	0.17	
Hinckley part----	0-7	>6.0	0.03-0.23	3.6-6.0	Low--------	Low--------	High------	0.17	3
	7-33	>6.0	0.01-0.11	3.6-6.0	Low--------	Low--------	High------	0.17	
	33-62	>6.0	0.01-0.06	3.6-6.0	Low--------	Low--------	High------	0.15	
[1]CHD:									
Colton part------	0-8	>6.0	0.03-0.07	4.5-5.5	Low--------	Low--------	High------	0.17	3
	8-34	>6.0	0.02-0.05	4.5-5.5	Low--------	Low--------	High------	0.17	
	34-60	>20	0.01-0.02	4.5-6.0	Low--------	Low--------	High------	0.17	
Hinckley part----	0-7	>6.0	0.03-0.23	3.6-6.0	Low--------	Low--------	High------	0.17	3
	7-33	>6.0	0.01-0.11	3.6-6.0	Low--------	Low--------	High------	0.17	
	33-62	>6.0	0.01-0.06	3.6-6.0	Low--------	Low--------	High------	0.15	
[1]CHE:									
Colton part------	0-8	>6.0	0.03-0.07	4.5-5.5	Low--------	Low--------	High------	0.17	3
	8-34	>6.0	0.02-0.05	4.5-5.5	Low--------	Low--------	High------	0.17	
	34-60	>20	0.01-0.02	4.5-6.0	Low--------	Low--------	High------	0.17	
Hinckley part----	0-7	6.0-20	0.03-0.23	3.6-6.0	Low--------	Low--------	High------	0.17	3
	7-33	6.0-20	0.01-0.11	3.6-6.0	Low--------	Low--------	High------	0.17	
	33-62	>20	0.01-0.06	3.6-6.0	Low--------	Low--------	High------	0.15	
Deerfield:									
DeB---------------	0-9	2.0-20	0.07-0.23	4.5-6.0	Low--------	Low--------	Moderate	0.17	5
	9-16	2.0-20	0.01-0.18	4.5-6.0	Low--------	Low--------	Moderate	0.17	
	16-50	6.0-20.0	0.01-0.13	4.5-6.0	Low--------	Low--------	Moderate	0.15	
	50-72	>20.0	0.01-0.08	4.5-6.0	Low--------	Low--------	Moderate	0.15	
Elmwood:									
EmB---------------	0-8	0.6-6.0	0.11-0.25	5.1-6.5	Low--------	Moderate	Moderate	0.32	3
	8-24	2.0-6.0	0.09-0.18	5.1-6.5	Low--------	Moderate	Moderate	0.32	
	24-50	<0.06	0.10-0.18	6.1-7.3	Moderate	Moderate	Moderate	0.43	
Empeyville:									
EpB, EpC----------	0-9	0.6-2.0	0.08-0.12	4.5-6.5	Low--------	Low--------	Moderate	0.17	3
	9-17	0.6-2.0	0.08-0.15	4.5-6.5	Low--------	Low--------	Moderate	0.28	
	17-60	0.06-0.2	0.03-0.07	4.5-6.5	Low--------	Low--------	Moderate	0.28	
Fluvaquents and Udifluvents:									
[1]FA----------------	0-60	---	---	---	----------	----------	----------	---	---
Fonda:									
Fn----------------	0-6	0.6-2.0	0.14-0.21	6.0-7.3	Low--------	High------	Low--------	0.49	3
	6-50	<0.2	0.12-0.17	6.6-7.8	Moderate	High------	Low--------	0.28	

See footnote at end of table.

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permea- bility	Available water capacity	Soil reaction	Shrink- swell potential	Risk of corrosion		Erosion factors	
						Uncoated steel	Concrete	K	T
	In	In/hr	In/in	pH					
Fredon:									
Fr	0-12	0.6-2.0	0.12-0.20	5.6-7.3	Low	High	Moderate	0.24	3
	12-30	0.6-2.0	0.12-0.20	5.6-7.3	Low	High	Low	0.24	
	30-50	2.0-20	0.02-0.06	6.6-7.8	Low	High	Low	0.17	
Granby:									
Gr	0-11	6.0-20	0.10-0.12	5.6-7.3	Low	High	Low	---	---
	11-60	6.0-20	0.05-0.09	5.6-8.4	Low	High	Low	---	
Halsey:									
Ha	0-9	0.6-6.0	0.14-0.24	5.6-6.5	Low	High	Moderate	---	---
	9-31	0.6-6.0	0.12-0.18	5.6-6.5	Low	High	Moderate	---	
	31-50	6.0-20	0.02-0.07	6.6-7.8	Low	High	Moderate	---	
Herkimer:									
HeB, HeC	0-9	0.6-2.0	0.10-0.16	5.1-7.3	Low	Moderate	Low	0.28	3
	9-28	0.6-2.0	0.09-0.20	5.1-7.3	Low	Moderate	Low	0.24	
	28-64	0.6-2.0	0.09-0.20	6.6-7.8	Low	Moderate	Low	0.24	
Hinckley:									
HkB, HkC	0-7	>6.0	0.03-0.23	3.6-6.0	Low	Low	High	0.17	3
	7-33	>6.0	0.01-0.11	3.6-6.0	Low	Low	High	0.17	
	33-62	>6.0	0.01-0.06	3.6-6.0	Low	Low	High	0.15	
Hudson:									
HuB, HuC, HuCK	0-6	0.2-0.6	0.16-0.21	5.6-7.3	Moderate	High	Low	0.49	3
	6-38	0.06-0.2	0.12-0.13	5.6-7.3	Moderate	High	Low	0.28	
	38-50	0.06-0.2	0.12-0.16	6.6-7.8	Moderate	High	Low	0.28	
Humaquepts and Fibrists:									
[1]HW	0-60	---	---	---	---------	---------	---------	---	---
Ira:									
IrA, IrB, IrC	0-8	0.6-2.0	0.09-0.14	4.5-5.5	Low	Moderate	High	0.17	3
	8-20	0.6-2.0	0.08-0.14	5.1-6.0	Low	Moderate	Moderate	0.43	
	20-40	0.06-0.2	0.02-0.04	5.6-7.3	Low	Moderate	Moderate	0.28	
	40-50	0.06-0.2	0.02-0.04	6.1-7.8	Low	Moderate	Low	0.28	
[1]IsC:									
Ira part	0-8	0.6-2.0	0.09-0.14	4.5-5.5	Low	Moderate	High	0.17	3
	8-20	0.6-2.0	0.08-0.14	5.1-6.0	Low	Moderate	Moderate	0.43	
	20-40	0.06-0.2	0.02-0.04	5.6-7.3	Low	Moderate	Moderate	0.28	
	40-50	0.06-0.2	0.02-0.04	6.1-7.8	Low	Moderate	Low	0.28	
Sodus part	0-7	0.6-2.0	0.10-0.18	5.1-7.3	Low	Low	Moderate	0.17	3
	7-20	0.6-2.0	0.10-0.15	5.1-7.3	Low	Low	Moderate	0.43	
	20-60	0.06-0.2	0.02-0.04	5.6-7.8	Low	Low	Moderate	0.28	
[1]IUD:									
Ira part	0-8	0.60-2.0	0.09-0.14	4.5-5.5	Low	Moderate	High	0.17	3
	8-20	0.60-2.0	0.08-0.14	5.1-6.0	Low	Moderate	Moderate	0.43	
	20-40	0.06-0.2	0.02-0.04	5.6-7.3	Low	Moderate	Moderate	0.28	
	40-50	0.06-0.2	0.02-0.04	6.1-7.8	Low	Moderate	Low	0.28	
Sodus part	0-7	0.6-2.0	0.13-0.19	5.1-7.3	Low	Low	Moderate	0.17	3
	7-20	0.6-2.0	0.10-0.15	5.1-7.3	Low	Low	Moderate	0.43	
	20-60	0.06-0.2	0.02-0.04	5.6-7.8	Low	Low	Moderate	0.28	
Lamson:									
Lf	0-9	2.0-6.0	0.12-0.16	6.0-7.3	Low	High	Low	0.32	3
	9-50	2.0-6.0	0.11-0.13	6.5-7.8	Low	High	Low	0.43	
	50-60	2.0-6.0	0.02-0.04	7.4-7.8	Low	High	Low	0.43	

See footnote at end of table.

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete	Erosion factors: K	Erosion factors: T
	In	In/hr	In/in	pH					
Madalin:									
Ma----------------	0-10	0.2-0.6	0.16-0.21	5.6-7.3	Moderate	High------	Low-------	---	---
	10-42	0.06-0.2	0.12-0.13	5.6-7.8	Moderate	High------	Low-------	---	
	42-50	0.06-0.2	0.12-0.13	7.4-8.4	Moderate	High------	Low-------	---	
Massena:									
Me----------------	0-7	0.6-2.0	0.14-0.20	5.6-7.3	Low--------	Moderate	Moderate	0.28	3
	7-27	0.06-0.6	0.08-0.15	5.6-7.3	Low--------	Moderate	Moderate	0.28	
	27-50	0.06-0.6	0.06-0.14	7.3-8.4	Low--------	Moderate	Low-------	0.28	
Middlebury:									
Mf----------------	0-13	0.6-2.0	0.14-0.21	5.1-6.0	Low--------	Moderate	Moderate	---	---
	13-60	0.6-2.0	0.10-0.20	5.1-6.5	Low--------	Moderate	Low-------	---	
Minoa:									
Mn----------------	0-8	0.6-2.0	0.13-0.21	5.1-7.3	Low--------	Moderate	Moderate	0.32	4
	8-31	0.6-2.0	0.13-0.20	5.1-7.3	Low--------	Moderate	Moderate	0.37	
	31-60	0.6-6.0	0.08-0.13	5.6-7.8	Low--------	Moderate	Low-------	0.28	
Minoa variant:									
MoB---------------	0-9	0.6-2.0	0.13-0.16	5.1-7.3	Low--------	Moderate	Moderate	0.32	4
	9-38	0.6-2.0	0.13-0.16	5.1-7.3	Low--------	Moderate	Moderate	0.32	
	38-54	0.6-2.0	0.08-0.10	5.6-7.8	Low--------	Moderate	Moderate	0.28	
Naumburg:									
Na----------------	0-8	2.0-6.0	0.05-0.09	3.6-6.5	Low--------	High------	High------	0.17	5
	8-38	6.0-20	0.06-0.08	3.6-6.5	Low--------	High------	High------	0.17	
	38-50	6.0-20	0.04-0.06	4.5-6.5	Low--------	High------	High------	0.17	
[1]NDB:									
Naumburg part----	0-8	2.0-6.0	0.05-0.09	3.6-6.5	Low--------	High------	High------	0.17	5
	8-38	6.0-20	0.06-0.08	3.6-6.5	Low--------	High------	High------	0.17	
	38-50	6.0-20	0.04-0.06	4.5-6.5	Low--------	High------	High------	0.17	
Duane part-------	0-14	6.0-20	0.02-0.07	3.6-6.0	Low--------	Low--------	High------	0.17	3
	14-38	6.0-20	0.01-0.06	3.6-6.0	Low--------	Low--------	High------	0.17	
	38-52	6.0-20	0.01-0.02	3.6-6.0	Low--------	Low--------	High------	0.17	
[1]NGB:									
Naumburg part----	0-8	2.0-6.0	0.05-0.09	3.6-6.5	Low--------	High------	High------	0.17	5
	8-38	6.0-20	0.06-0.08	3.6-6.5	Low--------	High------	High------	0.17	
	38-50	6.0-20	0.04-0.06	4.5-6.5	Low--------	High------	High------	0.17	
Granby part------	0-11	6.0-20	0.10-0.12	5.6-7.3	Low--------	High------	Low-------	---	---
	11-60	6.0-20	0.05-0.09	5.6-8.4	Low--------	High------	Low-------	---	
Oakville:									
OaB---------------	0-7	5.0-20	0.07-0.09	5.6-7.3	Low--------	Low--------	Moderate	0.15	5
	7-55	>20.0	0.06-0.08	5.6-7.3	Low--------	Low--------	Moderate	0.15	
Palms:									
Pa----------------	0-26	0.2-6.0	0.35-0.45	5.1-7.8	-----------	High------	Moderate	---	---
	26-55	0.2-2.0	0.05-0.19	6.1-8.4	Low--------	High------	Low-------	---	
Raynham:									
RaB---------------	0-9	0.6-2.0	0.20-0.25	5.1-7.3	Low--------	High------	Low-------	0.49	3
	9-36	0.2-2.0	0.18-0.22	5.1-7.3	Low--------	High------	Low-------	0.49	
	36-60	0.06-0.2	0.18-0.22	5.6-7.3	Low--------	High------	Low-------	0.49	
Rhinebeck:									
RhA, RhB----------	0-8	0.2-0.6	0.16-0.21	5.6-7.3	Moderate	High------	Low-------	0.49	3
	8-39	0.06-0.2	0.12-0.14	5.6-7.3	Moderate	High------	Low-------	0.28	
	39-53	0.06-0.2	0.12-0.14	6.5-7.8	Moderate	High------	Low-------	0.28	
Rifle:									
RM----------------	0-15	>20	0.55-0.65	5.6-7.3	-----------	High------	Low-------	---	---
	15-55	6.0-20.0	0.45-0.55	5.6-7.3	-----------	High------	Low-------	---	

See footnote at end of table.

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permea-bility	Available water capacity	Soil reaction	Shrink-swell potential	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete	Erosion factors: K	Erosion factors: T
	In	In/hr	In/in	pH					
Rumney:									
RU	0-8	0.60-6.0	0.10-0.30	6.1-6.5	Low	High	Low	---	---
	8-36	2.0-6.0	0.07-0.18	6.1-7.3	Low	High	Low	---	
	36-50	6.0-20	0.01-0.13	6.1-7.3	Low	High	Low	---	
Scriba:									
ScB, ScC	0-14	0.6-2.0	0.08-0.16	4.5-7.3	Low	Moderate	Moderate	0.20	3
	14-36	0.06-0.2	0.00-0.04	4.5-7.3	Low	Moderate	Moderate	0.28	
	36-50	0.06-0.2	0.00-0.04	5.1-8.4	Low	Moderate	Low	0.28	
[1]SDB	0-14	0.6-2.0	0.14-0.18	4.5-7.3	Low	Moderate	Moderate	0.20	3
	14-36	0.06-0.2	0.00-0.04	4.5-7.3	Low	Moderate	Moderate	0.28	
	36-50	0.06-0.2	0.00-0.04	5.1-8.4	Low	Moderate	Low	0.28	
Sodus:									
SgB, SgC, SgD, [1]SHF	0-7	0.6-2.0	0.10-0.18	5.1-7.3	Low	Low	Moderate	0.17	3
	7-20	0.6-2.0	0.10-0.15	5.1-7.3	Low	Low	Moderate	0.43	
	20-60	0.06-0.2	0.02-0.04	5.6-7.8	Low	Low	Moderate	0.28	
Sun:									
Su	0-9	0.6-2.0	0.12-0.21	5.1-6.5	Low	High	Moderate	0.28	3
	9-36	0.06-0.2	0.08-0.15	5.6-7.3	Low	High	Low	0.28	
	36-40	0.06-0.2	0.06-0.12	6.1-7.8	Low	High	Low	0.28	
Swanton:									
Sw	0-10	2.0-6.0	0.11-0.25	5.1-6.0	Low	High	Moderate	0.32	3
	10-19	2.0-6.0	0.09-0.20	5.1-6.0	Low	High	Moderate	0.32	
	19-60	<0.2	0.09-0.18	5.6-7.8	Moderate	High	Low	0.37	
Urban land:									
UB.									
Wallkill:									
Wa	0-8	0.60-2.0	0.16-0.21	5.1-6.0	Low	Moderate	Moderate	---	---
	8-24	0.60-2.0	0.15-0.20	5.1-6.0	Low	Moderate	Moderate	---	
	24-40	2.0-20.0	0.19-0.22	5.6-7.3	Low	---------	---------	---	
Westbury:									
WbB	0-8	0.6-2.0	0.08-0.16	3.6-6.0	Low	Moderate	High	0.20	3
	8-20	0.6-2.0	0.07-0.15	3.6-6.0	Low	Moderate	High	0.28	
	20-50	0.06-0.2	0.02-0.06	4.5-6.5	Low	Moderate	Moderate	0.28	
[1]WDB:									
Westbury part	0-8	0.6-2.0	0.08-0.16	3.6-6.0	Low	Moderate	High	0.20	3
	8-20	0.6-2.0	0.07-0.15	3.6-6.0	Low	Moderate	High	0.28	
	20-50	0.06-0.2	0.02-0.06	4.5-6.5	Low	Moderate	High	0.28	
Dannemora part	0-9	0.6-6.0	0.08-0.12	4.5-6.0	Low	High	High	0.28	3
	9-17	0.6-6.0	0.08-0.17	4.5-6.0	Low	High	High	0.28	
	17-60	0.06-0.2	0.01-0.04	4.5-7.3	Low	High	High	0.28	
[1]WEB:									
Westbury part	0-8	0.6-2.0	0.08-0.16	3.6-6.0	Low	Moderate	High	0.20	3
	8-20	0.6-2.0	0.07-0.15	3.6-6.0	Low	Moderate	High	0.28	
	20-50	0.06-0.2	0.02-0.06	4.5-6.5	Low	Moderate	High	0.28	
Dannemora part	0-9	0.6-6.0	0.08-0.12	4.5-6.0	Low	High	High	0.28	3
	9-17	0.6-6.0	0.08-0.17	4.5-6.0	Low	High	High	0.28	
	17-60	0.06-0.2	0.01-0.04	4.5-7.3	Low	High	High	0.28	
Williamson:									
WlA, WlB, WlC	0-9	0.6-2.0	0.18-0.20	4.5-6.5	Low	Moderate	Moderate	0.49	3
	9-20	0.6-2.0	0.18-0.20	4.5-6.5	Low	Moderate	Moderate	0.64	
	20-44	0.06-0.2	0.10-0.14	5.1-6.5	Low	Moderate	Moderate	0.64	
	44-50	0.06-0.2	0.10-0.14	5.1-6.5	Low	Moderate	Moderate	0.64	

See footnote at end of table.

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permea-bility	Available water capacity	Soil reaction	Shrink-swell potential	Risk of corrosion		Erosion factors	
						Uncoated steel	Concrete	K	T
	In	In/hr	In/in	pH					
Windsor:									
WnB, WnC	0-9	6.0-20	0.08-0.12	4.5-6.0	Low	Low	High	0.17	5
	9-21	6.0-20	0.02-0.12	4.5-6.0	Low	Low	High	0.17	
	21-63	6.0-20	0.01-0.08	4.5-6.5	Low	Low	High	0.17	
Worth:									
WoB, WoC, WoCK, [1]WRE	0-7	0.6-2.0	0.08-0.14	4.5-5.5	Low	Low	High	0.17	3
	7-27	0.6-2.0	0.08-0.14	4.5-5.5	Low	Low	High	0.28	
	27-48	0.06-0.2	0.02-0.06	5.1-6.0	Low	Low	High	0.28	
	48-62	0.06-0.2	0.03-0.08	5.6-6.0	Low	Low	Moderate	0.28	
[1]WSC:									
Worth part	0-7	0.6-2.0	0.9-0.12	4.5-5.5	Low	Low	High	0.17	3
	7-27	0.6-2.0	0.08-0.14	4.5-5.5	Low	Low	High	0.28	
	27-48	0.06-0.2	0.02-0.06	5.1-6.0	Low	Low	High	0.28	
	48-62	0.06-0.2	0.03-0.08	5.6-6.0	Low	Low	Moderate	0.28	
Empeyville part	0-9	0.6-2.0	0.14-0.19	4.5-6.5	Low	Low	Moderate	0.28	3
	9-17	0.6-2.0	0.08-0.15	4.5-6.5	Low	Low	Moderate	0.28	
	17-60	0.06-0.2	0.03-0.07	4.5-6.5	Low	Low	Moderate	0.28	
[1]WSD:									
Worth part	0-7	0.6-2.0	0.9-0.12	4.5-5.5	Low	Low	High	0.17	3
	7-27	0.6-2.0	0.08-0.14	4.5-5.5	Low	Low	High	0.28	
	27-48	0.06-0.2	0.02-0.06	5.1-6.0	Low	Low	High	0.28	
	48-62	0.06-0.2	0.03-0.08	5.6-6.0	Low	Low	Moderate	0.28	
Empeyville part	0-9	0.6-2.0	0.14-0.19	4.5-6.5	Low	Low	Moderate	0.28	3
	9-17	0.6-2.0	0.08-0.15	4.5-6.5	Low	Low	Moderate	0.28	
	17-60	0.06-0.2	0.03-0.07	4.5-6.5	Low	Low	Moderate	0.28	
[1]WYD:									
Worth part	0-7	0.6-2.0	0.12-0.16	4.5-5.5	Low	Low	High	0.17	3
	7-27	0.6-2.0	0.08-0.14	4.5-5.5	Low	Low	High	0.28	
	27-48	0.06-0.2	0.02-0.06	5.1-6.0	Low	Low	High	0.28	
	48-62	0.06-0.2	0.03-0.08	5.6-6.0	Low	Low	Moderate	0.28	
Empeyville part	0-9	0.6-2.0	0.12-0.14	4.5-6.5	Low	Low	Moderate	0.17	3
	9-17	0.6-2.0	0.08-0.15	4.5-6.5	Low	Low	Moderate	0.28	
	17-60	0.06-0.2	0.03-0.07	4.5-6.5	Low	Low	Moderate	0.28	

[1]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior of the whole map unit.

TABLE 13.--SOIL AND WATER FEATURES

[Absence of an entry indicates that the feature is not a concern. The definitions of "flooding" and "water table" in the Glossary explain terms as "rare," "brief," "apparent," and "perched." The symbol < means less than; > means more than]

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard-ness	
					Ft			In		
Adams:										
[1]AAC:										
Adams part	A	None	---	---	>6.0	---	---	>60	---	Low.
Windsor part	A	None	---	---	>6.0	---	---	>60	---	Low.
[1]AAD:										
Adams part	A	None	---	---	>6.0	---	---	>60	---	Low.
Windsor part	A	None	---	---	>6.0	---	---	>60	---	Low.
Alton:										
AgA, AgB, AgC, AkC, AoB	A	None	---	---	>6.0	---	---	>60	---	Low.
Amboy:										
AvB, AvC3, [1]AyD3, [1]AyE3	C	None	---	---	2.0-2.5	Perched	---	>60	---	Moderate.
[1]AwC3:										
Amboy part	C	None	---	---	2.0-2.5	Perched	---	>60	---	Moderate.
Williamson part	C	None	---	---	1.5-2.0	Perched	Feb-Apr	>60	---	High.
Beaches:										
BC.										
Brockport:										
BrB	D	None	---	---	0.5-1.5	Perched	Dec-May	20-40	Rippable	Moderate.
Canaan:										
[1]CAB:										
Canaan part	C	None	---	---	>6.0	---	---	10-20	Hard	Moderate.
Rock outcrop part.										
Canandaigua:										
Cd	D	None	---	---	0-1.0	Apparent	Nov-May	>60	---	High.
Carlisle:										
Ce	A/D	Frequent	Long	Nov-May	0-1.0	Apparent	Sep-Jun	>60	---	High.
Colton:										
[1]CHC:										
Colton part	A	None	---	---	>6.0	---	---	>60	---	Low.
Hinckley part	A	None	---	---	>6.0	---	---	>60	---	Low.
[1]CHD:										
Colton part	A	None	---	---	>6.0	---	---	>60	---	Low.
Hinckley part	A	None	---	---	>6.0	---	---	>60	---	Low.
[1]CHE:										
Colton part	A	None	---	---	>6.0	---	---	>60	---	Low.
Hinckley part	A	None	---	---	>6.0	---	---	>60	---	Low.
Deerfield:										
DeB	B	None	---	---	1.0-3.0	Apparent	Jan-Apr	>60	---	Moderate.
Elmwood:										
EmB	C	None	---	---	1.0-3.0	Perched	Nov-May	>60	---	High.

See footnote at end of table.

TABLE 13.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard-ness	
					Ft			In		
Empeyville:										
EpB, EpC----------	C	None---------	---	---	1.5-2.0	Perched	Feb-May	>60	---	Moderate.
Fluvaquents and Udifluvents:										
[1]FA----------------	A/B	Frequent----	Very brief	Jan-Dec	0-6.0	Apparent	Apr-May	>60	---	---
Fonda:										
Fn----------------	D	None---------	---	---	0-0.5	Apparent	Oct-Jun	>60	---	Moderate.
Fredon:										
Fr----------------	C	None---------	---	---	0-1.5	Apparent	Jan-Apr	>60		High.
Granby:										
Gr----------------	A/D	None---------	---	---	0-1.0	Apparent	Nov-Jun	>60	---	Moderate.
Halsey:										
Ha----------------	D	None---------	---	---	0-0.5	Apparent	Sep-Jun	>60	---	High.
Herkimer:										
HeB, HeC----------	B	None---------	---	---	2.5-3.0	Apparent	Mar-Apr	>72	---	Moderate.
Hinckley:										
HkB, HkC----------	A	None---------	---	---	>6.0	---	---	>60	---	Low.
Hudson:										
HuB, HuC, HuCK----	C	None---------	---	---	1.5-2.0	Perched	Feb-Apr	>60	---	Moderate.
Humaquepts and Fibrists:										
[1]HW----------------	-	Frequent----	Long-------	Jan-Dec	+1.0-0	Apparent	Jan-Dec	>60	---	---
Ira:										
IrA, IrB, IrC-----	C	None---------	---	---	1.5-2.0	Perched	Feb-Mar	>60	---	Moderate.
[1]IsC:										
Ira part---------	C	None---------	---	---	1.5-2.0	Perched	Feb-Mar	>60	---	Moderate.
Sodus part-------	C	None---------	---	---	2.0-3.0	Perched	Feb-May	>60	---	Moderate.
[1]IUD:										
Ira part---------	C	None---------	---	---	1.5-2.0	Perched	Feb-Mar	>60	---	Moderate.
Sodus part-------	C	None---------	---	---	2.0-3.0	Perched	Feb-May	>60	---	Moderate.
Lamson:										
Lf----------------	D	None---------	---	---	0-0.5	Apparent	Dec-May	>60	---	High.
Madalin:										
Ma----------------	D	None---------	---	---	0-0.5	Apparent	Dec-May	>60	---	Moderate.
Massena:										
Me----------------	C	None---------	---	---	0.5-1.5	Perched	Feb-Apr	>60	---	High.
Middlebury:										
Mf----------------	B	Common-------	Very brief	Feb-Apr	0.5-2.0	Apparent	Feb-Apr	>60	---	Moderate.
Minoa:										
Mn----------------	C	None---------	---	---	0.5-1.5	Apparent	Feb-Apr	>60	---	High.
Minoa variant:										
MoB---------------	B	None---------	---	---	1.5-2.0	Apparent	Feb-Apr	>60	---	Moderate.
Naumburg:										
Na----------------	C	None---------	---	---	0-1.5	Apparent	Dec-Apr	>60	---	Moderate.
[1]NDB:										
Naumburg part----	C	None---------	---	---	0-1.5	Apparent	Dec-Apr	>60	---	Moderate.
Duane part-------	B	None---------	---	---	1.5-2.0	Apparent	Feb-May	>72	---	Low.

See footnote at end of table.

TABLE 13.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	
					Ft			In		
Naumburg:										
[1]NGB:										
Naumburg part	C	None	---	---	0-1.5	Apparent	Dec-Apr	>60	---	Moderate.
Granby part	A/D	None	---	---	0-1.0	Apparent	Nov-Jun	>60	---	Moderate.
Oakville:										
Oab	A	None	---	---	>6.0	---	---	>60	---	Low.
Palms:										
Pa	A/D	Frequent	Long	Nov-May	0-1.0	Apparent	Nov-May	>60	---	High.
Raynham:										
RaB	C	None	---	---	0.5-2.0	Apparent	Mar-Jun	>60	---	High.
Rhinebeck:										
RhA, RhB	D	None	---	---	0.5-1.5	Perched	Jan-May	>60	---	Moderate.
Rifle:										
RM	A/D	Frequent	Long	Nov-May	0-1.0	Apparent	Nov-Jun	>60	---	High.
Rumney:										
RU	C	Common	Brief	Dec-May	0-1.5	Apparent	Nov-Jun	>60	---	High.
Scriba:										
ScB, ScC	C	None	---	---	0.5-1.5	Perched	Feb-Mar	>60	---	High.
[1]SDB	C	None	---	---	0.5-1.5	Perched	Feb-Apr	>60	---	High.
Sodus:										
SgB, SgC, SgD, [1]SHF	C	None	---	---	2.0-3.0	Perched	Feb-May	>60	---	Moderate.
Sun:										
Su	D	None	---	---	0-0.5	Perched	Dec-Apr	>60	---	High.
Swanton:										
Sw	B/D	None	---	---	0-1.5	Apparent	Oct-Jun	>60	---	High.
Urban land:										
UB.										
Wallkill:										
Wa	D	Common	Brief	Dec-May	0-0.5	Apparent	Sep-Jun	>60	---	High.
Westbury:										
WbB	C	None	---	---	0.5-1.5	Perched	Jan-Apr	>60	---	High.
[1]WDB:										
Westbury part	C	None	---	---	0.5-1.5	Perched	Jan-Apr	>60	---	High.
Dannemora part	D	None	---	---	0.0-0.5	Perched	Jan-May	>60	---	High.
[1]WEB:										
Westbury part	C	None	---	---	0.5-1.5	Perched	Jan-Apr	>60	---	High.
Dannemora part	D	None	---	---	0.0-0.5	Perched	Jan-May	>60	---	High.
Williamson:										
WlA, WlB, WlC	C	None	---	---	1.5-2.0	Perched	Feb-Apr	>60	---	High.
Windsor:										
WnB, WnC	A	None	---	---	>6.0	---	---	>60	---	Low.
Worth:										
WoB, WoC, WoCK, [1]WRE	C	None	---	---	2.0-3.0	Perched	Feb-May	>60	---	Moderate.
[1]WSC:										
Worth part	C	None	---	---	2.0-3.0	Perched	Feb-May	>60	---	Moderate.

See footnote at end of table.

TABLE 13.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard-ness	
					Ft			In		
Worth:										
Empeyville part-	C	None---------	---	---	1.5-2.0	Perched	Feb-May	>60	---	Moderate.
[1]WSD:										
Worth part------	C	None---------	---	---	2.0-3.0	Perched	Feb-May	>60	---	Moderate.
Empeyville part-	C	None---------	---	---	1.5-2.0	Perched	Feb-May	>60	---	Moderate.
[1]WYD:										
Worth part------	C	None---------	---	---	2.0-3.0	Perched	Feb-May	>60	---	Moderate.
Empeyville part-	C	None---------	---	---	1.5-2.0	Perched	Feb-May	>60	---	Moderate.

[1]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior of the whole map unit.

TABLE 14.--ENGINEERING TEST DATA

[Dashes indicate data were not available. NP means nonplastic]

Soil name, report number, horizon, and depth in inches	Classification: AASHTO	Classification: Unified	Grain size distribution: Larger than 3 inches	Percentage passing sieve: 2 inch	3/4 inch	3/8 inch	No. 4	No. 10	No. 40	No. 200	Percentage smaller than--: .02 mm	.005 mm	.002 mm	Liquid limit	Plasticity index	Moisture density: Max. dry density	Optimum moisture	Linear shrinkage
			Pct											Pct		Lb/ft3	Pct	Pct
Empeyville gr-fsl:[1] (S68NY-075-005)																		
Ap------ 0 to 8	A-4 (00)	SM	0	98	90	87	78	75	72	40	13	2	2	23	1	101	18	0.0
B2ir---- 8 to 18	A-2-4(00)	SM	0	100	92	85	80	75	70	32	14	3	1	--	NP	109	15	0.0
IIA2---- 18 to 20	A-2-4(00)	SM	0	100	92	89	87	84	79	31	13	7	3	--	NP	--	--	0.0
IIBx---- 20 to 40	A-2-4(00)	SM	5	98	92	88	82	79	75	32	11	6	5	--	NP	127	11	0.0
IIIC1--- 40 to 45	A-2-4(00)	SM	5	87	80	74	69	66	63	22	11	4	3	--	NP	120	10	0.0
IVC2---- 45 to 72	A-2-4(00)	SM	10	97	80	75	71	67	65	24	10	5	4	--	NP	123	9	0.0
Minoa vfsl:[2] (S68NY-075-017)																		
Ap------ 0 to 8	A-2-4(00)	SM	0	100	100	100	100	100	99	29	17	8	1	--	NP	105	16	0.0
B11----- 8 to 14	A-2-4(00)	SM	0	100	100	100	100	100	99	20	9	6	1	--	NP	110	14	0.0
B12----- 14 to 18	A-2-4(00)	SM	0	100	100	100	100	100	99	29	10	4	1	--	NP	113	12	0.0
B21----- 18 to 26	A-2-4(00)	SM	0	100	100	100	100	100	99	35	16	10	8	--	NP	116	12	2.0
B22----- 26 to 31	A-2-4(00)	SM	0	100	100	100	100	100	97	34	12	7	1	--	NP	112	13	0.0
C1------ 31 to 42	A-4 (00)	SM	0	100	100	100	100	99	92	40	12	3	3	--	NP	115	11	0.0
C2------ 42 to 60	A-4 (00)	ML	0	100	100	100	100	100	98	57	22	12	5	--	NP	117	12	3.0
Scriba gr-fsl:[3] (S68NY-075-010)																		
Ap------ 0 to 7	A-4 (00)	SM	1	91	78	74	72	70	65	43	23	7	4	29	3	100	21	3.0
A2g----- 7 to 14	A-4 (00)	SM	2	91	81	76	73	70	64	38	14	6	3	--	NP	118	13	1.0
Bx------ 14 to 34	A-4 (00)	SM	5	95	87	82	78	73	66	42	19	8	3	17	2	125	10	1.0
C------- 34 to 46	A-4 (00)	SM	10	100	91	85	76	73	65	40	17	7	3	15	2	130	9	2.0
Westbury gr-vfsl:[4] (S68NY-075-007)																		
Ap------ 0 to 8	A-4 (00)	SM or OL	0	95	85	82	79	77	71	48	16	2	--	39	1	85	27	1.0
B2------ 8 to 15	A-4 (00)	SM	0	89	79	77	75	72	69	48	10	2	1	--	NP	111	14	1.0
A'2----- 15 to 20	A-2-4(00)	SM	0	100	92	85	80	74	60	32	9	3	2	--	NP	--	--	1.0
B'x----- 20 to 41	A-4 (00)	SM	5	98	90	82	80	75	68	38	14	8	3	--	NP	130	9	1.0
C------- 41 to 48	A-2-4(00)	GM	15	94	76	69	63	57	52	30	12	5	2	14	1	131	9	0.0

See footnotes at end of table.

TABLE 14.--ENGINEERING TEST DATA--Continued

Soil name, report number, horizon, and depth in inches	Classification: AASHTO	Classification: Unified	Grain size distribution: Larger than 3 inches	Percentage passing sieve: 2 inch	3/4 inch	3/8 inch	No. 4	No. 10	No. 40	No. 200	Percentage smaller than--: .02 mm	.005 mm	.002 mm	Liquid limit	Plasticity index	Moisture density: Max. dry density	Optimum moisture	Linear shrinkage
			Pct											Pct		Lb/ft3	Pct	Pct
Windsor lfs:[5] (S68NY-075-001)																		
Ap------ 0 to 9	A-2-4(00)	SM	0	100	100	99	99	98	98	16	5	3	1	--	NP	101	16	0.0
B21----- 9 to 13	A-3 (01)	SW-SM	0	100	100	100	100	100	99	8	--	--	--	--	NP	102	15	0.0
B22----- 13 to 21	A-3 (01)	SP-SM	0	100	100	100	100	100	100	10	--	--	--	--	NP	101	15	0.0
C1------ 21 to 47	A-3 (01)	SW-SM	0	100	100	100	100	100	100	8	--	--	--	--	NP	102	15	0.0
C2------ 47 to 63	A-3 (01)	SW	0	100	100	100	100	100	100	3	--	--	--	--	NP	100	16	0.0

[1]Empeyville gravelly fine sandy loam:
Town of Amboy, 40 feet north of county route 17a, 2,000 feet east of Frank Bryant Road.

[2]Minoa very fine sandy loam:
Town of Hannibal, 160 feet west of county route 56, 2,700 feet south of Dunham Road.

[3]Scriba gravelly fine sandy loam:
Town of New Haven, 660 feet west of Green Road, 75 feet south of Hurlbut Road.

[4]Westbury gravelly very fine sandy loam:
Town of Redfield, 40 feet west of county route 17, 1 mile south of Salmon River Reservoir.

[5]Windsor loamy fine sand:
Town of Constantia, junction of county route 23 and Salt Road.

TABLE 15.--CLASSIFICATION OF THE SOILS

[An asterisk in the first column indicates that the soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series]

Soil name	Family or higher taxonomic class
Adams	Sandy, mixed, frigid Typic Haplorthods
Alton	Loamy-skeletal, mixed, mesic Dystric Eutrochrepts
Amboy	Coarse-silty, mixed, mesic Typic Fragiochrepts
Brockport	Fine, illitic, mesic Aeric Ochraqualfs
Canaan	Loamy-skeletal, mixed, frigid Lithic Haplorthods
Canandaigua	Fine-silty, mixed, nonacid, mesic Mollic Haplaquepts
Carlisle	Euic, mesic Typic Medisaprists
Colton	Sandy-skeletal, mixed, frigid Typic Haplorthods
Dannemora	Coarse-loamy, mixed, frigid Typic Fragiaquepts
Deerfield	Mixed, mesic Aquic Udipsamments
Duane	Sandy-skeletal, mixed, frigid, ortstein Typic Haplorthods
Elmwood	Coarse-loamy over clayey, mixed, mesic Aquic Dystric Eutrochrepts
Empeyville	Coarse-loamy, mixed, frigid Aquic Fragiorthods
Fluvaquents and Udifluvents.	Fluvaquents and Udifluvents
Fonda	Fine, illitic, nonacid, mesic Mollic Haplaquepts
Fredon	Coarse-loamy over sandy or sandy-skeletal, mixed, nonacid, mesic Aeric Haplaquepts
*Granby	Sandy, mixed, mesic Typic Haplaquolls
Halsey	Coarse-loamy over sandy or sandy-skeletal, mixed, nonacid, mesic Mollic Haplaquepts
Herkimer	Coarse-loamy, mixed, mesic Dystric Eutrochrepts
Hinckley	Sandy-skeletal, mixed, mesic Typic Udorthents
Hudson	Fine, illitic, mesic Glossoboric Hapludalfs
Humaquepts and Fibrists	Humaquepts and Fibrists
Ira	Coarse-loamy, mixed, mesic Typic Fragiochrepts
Lamson	Coarse-loamy, mixed, nonacid, mesic Aeric Haplaquepts
Madalin	Fine, illitic, mesic Mollic Ochraqualfs
Massena	Coarse-loamy, mixed, nonacid, mesic Aeric Haplaquepts
Middlebury	Coarse-loamy, mixed, mesic Fluvaquentic Eutrochrepts
Minoa	Coarse-loamy, mixed, mesic Aquic Dystric Eutrochrepts
Minoa variant	Coarse-loamy, mixed, mesic Dystric Eutrochrepts
Naumburg	Sandy, mixed, frigid Aeric Haplaquods
Oakville	Mixed, mesic Typic Udipsamments
Palms	Loamy, mixed, euic, mesic Terric Medisaprists
Raynham	Coarse-silty, mixed, nonacid, mesic Aeric Haplaquepts
Rhinebeck	Fine, illitic, mesic Aeric Ochraqualfs
Rifle	Euic Typic Borohemists
*Rumney	Coarse-loamy, mixed, acid, mesic Typic Fluvaquents
Scriba	Coarse-loamy, mixed, mesic Aeric Fragiaquepts
Sodus	Coarse-loamy, mixed, mesic Typic Fragiochrepts
Sun	Coarse-loamy, mixed, nonacid, mesic Aeric Haplaquepts
Swanton	Coarse-loamy over clayey, mixed, nonacid, mesic Aeric Haplaquepts
Wallkill	Fine-loamy, mixed, nonacid, mesic Thapto-Histic Fluvaquents
Westbury	Coarse-loamy, mixed, frigid Typic Fragiaquods
Williamson	Coarse-silty, mixed, mesic Typic Fragiochrepts
Windsor	Mixed, mesic Typic Udipsamments
Worth	Coarse-loamy, mixed, frigid Typic Fragiorthods

TABLE 16.--TEMPERATURE AND PRECIPITATION DATA

[Data from Oswego, New York]

Month	Temperature				Precipitation				
	Average daily maximum	Average daily minimum	7 years in 10 will have-- Maximum temperature equal to or higher than--	7 years in 10 will have-- Minimum temperature equal to or lower than--	Average monthly total	3 years in 10 will have-- More than--	3 years in 10 will have-- Less than--	Snowfall: Average monthly total	Snowfall: 7 years in 10 will have more than--
	°F	°F	°F	°F	In	In	In	In	In
January---	31	17	44	-2	2.8	3.3	2.0	37	18
February--	32	19	48	1	2.9	3.2	2.4	35	17
March-----	39	26	59	14	2.7	3.0	2.1	17	8
April-----	51	37	72	28	2.9	3.4	2.6	2	4 (1)
May-------	62	46	81	36	3.0	3.6	2.2	0	(2)
June------	73	56	88	45	2.4	3.1	1.5	0	0
July------	78	62	88	55	2.6	3.1	1.9	0	0
August----	77	61	88	51	2.7	3.1	2.1	0	0
September-	70	54	86	42	3.0	4.0	2.2	0	0
October---	60	45	77	32	3.3	3.7	1.8	(2)	(2)
November--	47	35	64	24	3.6	3.8	2.7	7	2
December--	35	23	50	5	3.5	3.8	3.0	29	14
Year---	55	40	92	-3	35.4	37.9	31.7	127	76

[1] 2 years in 10.

[2] Trace.

TABLE 17.--PROBABILITIES OF FREEZE DATES IN SPRING AND FALL

[Data from Oswego, New York]

Probability	Dates for given probability of temperature: 24° F or lower	28° F or lower	32° F or lower
Spring:			
1 year in 10 later than--	Apr. 11	Apr. 23	May 4
2 years in 10 later than--	Apr. 7	Apr. 18	Apr. 30
5 years in 10 later than--	Mar. 27	Apr. 9	Apr. 21
Fall:			
1 year in 10 earlier than--	Nov. 6	Oct. 26	Oct. 12
2 years in 10 earlier than--	Nov. 10	Oct. 31	Oct. 16
5 years in 10 earlier than--	Nov. 21	Nov. 10	Oct. 25

☆U.S. GOVERNMENT PRINTING OFFICE : 1981—246-113/1036

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.