Issued February 1962

SOIL SURVEY
Hartford County, Connecticut

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
in cooperation with
CONNECTICUT AGRICULTURAL EXPERIMENT STATION
and
STORRS AGRICULTURAL EXPERIMENT STATION

HOW TO USE THE SOIL SURVEY REPORT

THIS SOIL SURVEY REPORT of Hartford County provides basic information about the soil. It will help farmers in planning the kind of management that will protect their soils and provide good yields. It will add to the knowledge of soil scientists, engineers, foresters, and others who use and manage soil.

In making this survey, soil scientists walked over the fields and woodlands. They dug holes and examined surface soils and subsoils; measured slopes with a hand level; noticed differences in growth of crops, weeds, and brush; and, in fact, recorded all the things about the soils that they believed might affect their suitability for farming, trees, wildlife, and related uses.

Soils in open places and small woodlots were mapped in detail. Those in large forested areas were surveyed in less detail.

The scientists plotted the boundaries of the soils on aerial photographs. Then, cartographers prepared from the photographs the detailed soil map in the back of this report. Fields, woods, roads, streams, and many other landmarks can be seen on the map.

Locating the soils

Use the index to map sheets to locate areas on the large map. The index is a small map of the county on which numbered rectangles have been drawn to show where each sheet of the large map is located. When the correct sheet of the large map is found, it will be seen that boundaries of the soils are outlined, and that there is a symbol for each kind of soil. All areas marked with the same symbol are the same kind of soil, wherever they appear on the map. The symbol will be inside the area if there is enough space; otherwise, it will be outside the area and a pointer will show where the symbol belongs.

Suppose, for example, an area located on the map has the symbol CaA. The legend for the detailed map shows that this symbol identifies Charlton fine sandy loam, 0 to 3 percent slopes. This soil and all others mapped in the county are described in the section Descriptions of the Soils.

Finding information

Special sections of the report will interest different groups of readers. The introductory part and the sections Soil Associations and Additional Facts about Hartford County will be of interest mainly to those not familiar with the county.

Farmers and those who work with farmers will be interested mainly in the sections Soil Associations, Descriptions of the Soils, and Use and Management of the Soils. A study of these sections will aid them in identifying soils on a farm, in learning ways the soils can be managed, and in judging what yields can be expected.

Engineers can refer to the subsection Engineering Interpretations. The tables in this subsection show characteristics of the soils that affect engineering.

Soil scientists will find information about how the soils were formed and how they were classified in the section Formation and Classification of Soils.

Students, teachers, and other users will find information about soils and their management in various parts of the report, depending on their particular interest.

The soil survey map and report are also useful to foresters, assessors, bankers, appraisers, and others who are concerned with the use and management of land.

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Farmers in Hartford County have organized the Hartford Soil Conservation District. The district, through its board of supervisors, arranges for farmers to receive technical help from the Soil Conservation Service in planning good use and conservation of the soils on their farms. The survey furnishes some of the facts needed for this technical help.

The Guide to Mapping Units and Capability Units at the end of the report will simplify the use of the map and the report. This guide gives the map symbol for each soil, the name of the soil, the page on which the soil is described, the capability unit in which the soil has been placed, and the page where the capability unit is described. Soil survey and engineering terms are defined in the Glossary in the back of the report.

Fieldwork for this survey was completed in 1958. Unless noted otherwise, all statements refer to conditions at the time of the survey.

Cover picture: Foreground: The well-drained Broadbrook and Wethersfield soils and associated wet soils. Background: Holyoke soils.

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Contents

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SOIL SURVEY OF HARTFORD COUNTY, CONNECTICUT

REPORT BY ARTHUR E. SHEARIN, SOIL CONSERVATION SERVICE, AND DAVID E. HILL, CONNECTICUT AGRICULTURAL EXPERIMENT STATION

SOILS SURVEYED BY ARTHUR E. SHEARIN, M. A. PUCHALSKI, F. E. INDORF, Jr., D. E. THOMPSON, A. BENTON, AND N. HOLOWAYCHUK, SOIL CONSERVATION SERVICE,[1] AND G. A. BOURBEAU, A. RITCHIE, Jr., AND J. F. GAMBLE, CONNECTICUT AGRICULTURAL EXPERIMENT STATION

UNITED STATES DEPARTMENT OF AGRICULTURE IN COOPERATION WITH CONNECTICUT AGRICULTURAL EXPERIMENT STATION AND STORRS AGRICULTURAL EXPERIMENT STATION

HARTFORD COUNTY is in northern Connecticut along the Massachusetts border. It has a land area of 473,600 acres, or 740 square miles. According to the 1950 United States census, the population was 539,661, or 729 persons per square mile, of which 81 percent is classified as urban. About 73 percent of the population is concentrated in six towns—Hartford, East Hartford, Manchester, West Hartford, New Britain, and Bristol.

The town of Windsor was first settled by pilgrims from Plymouth, Massachusetts, in 1633 (*17*).[2] The towns of Hartford and Wethersfield were settled shortly thereafter. The county was organized in 1666, and it included all of Tolland County, most of Middlesex and Windham Counties, and parts of Litchfield and New London Counties. Settlement gradually spread east and west from the first settlements along the Connecticut and Farmington Rivers.

According to the 1954 Census of Agriculture, 37.1 percent of Hartford County is in farms, but only 19.6 percent is in cropland. The rest is in cutover forest, brushy pasture, urban development, or idle areas. The predominant crops are hay, tobacco, corn, market vegetables, and potatoes. Hay and corn are grown mainly as feed for dairy cattle. Tobacco is the most valuable crop, amounting to about three-fourths the total value of all crops harvested in 1954.

Soil Associations

Soils occur together in characteristic geographic patterns. A group of soils associated in a defined pattern is called a soil association, or general soil area. A soil association may consist of only a few or of many soils. Although closely associated geographically, the soils in an association may differ in their suitability for agricultural use.

The soils of Hartford County have been grouped into eighteen soil associations, or general soil areas, which are named for important or extensive soils occurring within them. The Charlton-Paxton-Hollis association is an example. The distribution and extent of the soil associations are shown on the colored general soil map in the back of the report. Each soil association on the map is described in the following pages.

A general soil map is useful in showing the pattern, extent, and geographic distribution of relatively broad groups of soils. It is intended only as a general guide to the soils in different parts of the county. The map cannot be used as a basis for farm planning or management because it is too generalized. It is useful in predicting the suitability of broad areas for agriculture, forestry, and other uses.

More detailed information about individual soils in the associations may be obtained from the detailed soil map and by reading the section Descriptions of the Soils.

1. Charlton-Paxton-Hollis Association

This association occurs in the southeastern corner and along the western boundary of the county. The area in the southeastern corner is mostly gently undulating to hilly but has a few narrow, steep slopes. Elevations range from 300 to 825 feet above sea level. The area along the western boundary is gently sloping to hilly and steep. Elevations range from about 350 to 1,100 feet above sea level, except in the town of Hartland, where they are 1,000 to 1,300 feet.

This association consists of stony to very stony soils on uplands interspersed with recent alluvial soils and with outwash terrace soils in narrow valleys. The Charlton, Paxton, and associated Sutton and Woodbridge soils are the important agricultural soils in both areas of this association. Scattered areas of the forested Brookfield and fairly extensive areas of the forested Gloucester soils are in the southeastern corner of the county. Scattered areas of the Gloucester soils are along the western boundary. The forested Hollis soils and Peats and Mucks are fairly common in both parts of this association. Small areas of the Hinckley, Merrimac, Sudbury, Walpole, and Scarboro soils occur throughout the narrow valleys.

If cleared of stone, the upland soils are fairly easy to work, and they respond to fertilization. The terrace soils are easily worked, but they are somewhat droughty.

[1] Some of the fieldwork was done while Soil Survey was part of the Bureau of Plant Industry, Soils, and Agricultural Engineering. Soil Survey was transferred to Soil Conservation Service on November 15, 1952.

[2] Italic numbers in parentheses refer to Literature Cited, p. 121.

Stoniness and the need of drainage and fertilization are important management problems.

About 10 percent of the acreage in this association has been cleared. A large percentage of the cleared land is used for hay, pasture, and silage corn on dairy farms. Small acreages of cleared land are used for sweet corn, potatoes, orchards, nursery stock, and home gardens. The rest is idle. Dairying is the main agricultural enterprise in this general soil area. Broiler and egg production are important sources of income.

2. Hartford-Cheshire-Wethersfield Association

This association is in the southeastern part of the county. The topography ranges from nearly level on some terraces to strongly sloping and hilly. Elevations range from about 120 to 400 feet above sea level.

This association consists of a complex pattern of soils on terraces and uplands. The predominant Hartford, Cheshire, and Wethersfield soils, as well as the Enfield, Merrimac, and Manchester soils, are fairly extensive. Small, scattered areas of the Ludlow, Watchaug, Sudbury, Walpole, Scarboro, Broadbrook, and Narragansett soils are also in the association.

A large percentage of the Cheshire, Wethersfield, and Manchester soils is in forests and residential developments. A large percentage of the Hartford, Enfield, and Merrimac soils is in cultivation. These soils are very easy to work, are responsive to fertilization and management, and are suitable for tobacco and a wide variety of other crops. The Cheshire and Wethersfield soils are somewhat more difficult to work.

About 20 percent of the association is in urban, industrial, and housing developments. About 30 percent of the area has been cleared and is used for cultivated crops, nursery stock, hay, and pasture, or it is idle. Tobacco is the main crop, but market garden vegetables and sweet corn are also important. Small acreages are in potatoes, nursery stock, and orchards. Dairying is fairly important in this association.

3. Narragansett-Cheshire Association

This association is in the east-central and the northeastern parts of the county. The surface is mostly gently sloping to strongly sloping; some parts are nearly level. Elevations range from 120 to 420 feet above sea level.

The predominant Narragansett and Cheshire soils are about equal in total acreage. These soils were originally moderately stony, but most of the stones have been removed from cleared areas. Forested areas are still stony. Small areas of the Wapping, Enfield, Tisbury, Walpole, Hartford, Manchester, and other soils occur throughout the association.

The stone-free Cheshire and Narragansett soils are fairly easy to work, and the Enfield, Tisbury, and Hartford soils are very easy to work. All of these soils respond to the proper use of fertilizer and other good management. The maintenance of tilth, fertility, and organic matter under intensive use and the control of erosion are the main management problems.

About 55 percent of the acreage has been cleared and is used for cultivated crops, orchards, hay, and pasture. Tobacco and potatoes are the main cultivated crops, but silage corn, sweet corn, vegetables, and other crops are grown on small areas. Several small peach and apple orchards are on the Narragansett and Cheshire soils.

4. Agawam-Enfield Association

This association is in the northeastern part of the county. The surface is mostly nearly level to gently rolling or sloping, but some steep terrace breaks and kame-and-kettle topography are also in the association. Elevation above sea level ranges from 150 to 250 feet.

The soils in this association have developed in windblown, water-sorted, and glaciolacustrine deposits of silt and clay. They are the predominant Agawam and Enfield soils; the fairly small, scattered areas of the Merrimac, Windsor, Manchester, Buxton, Elmwood, Swanton, and Ninigret soils; and the alluvial Podunk and Rumney soils along the Scantic River. Soils in this association are free of stone, and, except for the moderately well drained Buxton and the poorly drained and very poorly drained soils, they are very easy to work. The finer textured soils have a high moisture-holding capacity; the coarser textured ones are very droughty but respond to irrigation. All soils respond to fertilization and management. The maintenance of tilth, fertility, and organic matter and the control of erosion on slopes are the main management problems.

About 70 percent of the acreage has been cleared and is used mainly for tobacco, potatoes, hay, and pasture, or it is idle. Some of the acreage is used for silage corn, home gardens, and market vegetables.

5. Agawam-Ninigret-Windsor Association

This association comprises a nearly level, narrow terrace that extends from Glastonbury to the Massachusetts State line. The surface is nearly level to gently undulating or sloping. Elevations range from 50 to 120 feet above sea level.

The soils in this association are well drained to very poorly drained. They range in texture from silt loam to loamy sand or sand. The Agawam and Ninigret soils are the most extensive and most important for agriculture. The extensive Walpole soils are still mainly in forest because only a small percentage of them has been drained. The fairly extensive Windsor soils are not important for agriculture because they are droughty. Although less extensive, the Merrimac and the Elmwood soils are important for agriculture. Also in this association are small tracts of the Sudbury, Scarboro, Melrose, Swanton, Buxton, and Scantic soils.

The well-drained, moderately coarse textured and medium textured soils in this association are very easy to work and respond to fertilization and management. The coarse-textured soils are droughty and can be used only to a limited extent for crops and pasture unless irrigated. The moderately well drained and poorly drained soils, as a rule, are easy to drain.

About 35 percent of the acreage has been cleared and is used mainly for tobacco, hay, and pasture, or it is in urban, industrial, and housing developments. Some of the acreage is used for potatoes, sweet corn, nursery stock, and market vegetables.

6. Buxton-Elmwood Association

This association is in three areas. One is in parts of the towns of Hartford, Windsor, and Bloomfield; the second is in the western parts of Enfield and East Windsor; and the third, a small area, is in South Windsor. Surfaces are nearly level to undulating. Elevations range from about 100 to 140 feet above sea level.

Soils that have developed in glaciolacustrine silt and clay and in coarse-textured terrace deposits make up this association.

The main soils in this association are the predominant Buxton and Elmwood and the associated Scantic, Melrose, and Swanton. Scattered tracts of the Windsor, Agawam, Ninigret, Walpole, and other soils are also in the association. Soils in this association are better suited to dairy farming than to general crops. Drainage and the maintenance of fertility are the main management problems.

About 60 percent of the acreage in this association has been cleared and part of this, in the towns of Hartford, Windsor, and Bloomfield, is in urban development. The cleared acreage is used mainly for hay and pasture in support of dairying. Tobacco is grown on some of the coarse-textured soils in East Windsor and Enfield. Some of the acreage is also used for silage corn, market vegetables, and home gardens.

7. Hadley-Winooski Association

This association consists of alluvial soils along the Connecticut and Farmington Rivers that were extensive enough to be shown on this general soil map. It also consists of alluvial soils that occur in narrow strips along the smaller streams in the county.

The soils in this association are well drained to very poorly drained, and they range in texture from silt loam to loamy sand and sand. The most extensive and the most important agricultural soils are the Hadley and Winooski. Other soils are the Limerick, Saco, Ondawa, Podunk, Rumney, and Suncook.

Most parts of the association are flooded about once a year but seldom during the growing season. The soils are easy to work and responsive to fertilization. The main problems are the hazard of flooding and the poor and very poor drainage on some of the soils.

About 85 percent of the acreage has been cleared and is used mainly for hay and pasture. A large part of the well drained and moderately well drained soils, however, is used for silage corn, sweet corn, and other market vegetables. Some outdoor tobacco and potatoes are also grown.

8. Merrimac-Windsor Association

This association is in three areas. One area is in parts of the towns of Windsor, Windsor Locks, Bloomfield, and East Granby. Another is a narrow strip extending from the State line in Granby to the northern part of the town of Southington. The third area is a small tract in the southwestern part of the county. Surfaces are generally nearly level to gently undulating or sloping, but there are also some kame-and-kettle areas, terrace escarpments, and highly dissected areas in the association. Elevations range from about 160 to 270 feet above sea level.

This association consists of coarse textured and moderately coarse textured soils that have developed on terraces of water-sorted material. The Merrimac and Windsor soils are predominant. Scattered tracts of the Hinckley, Agawam, Enfield, Sudbury, Walpole, and other soils also occur. All are very easy to work and are responsive to fertilization. Droughtiness and the maintenance of fertility are the main management problems.

About 60 percent of the acreage in this association has been cleared. A large part of this is in urban areas and housing developments. Tobacco is the chief crop in areas in the northern half of the county. No tobacco is grown in the areas in the southern half. Some of the acreage in this association is used for sweet corn, garden crops for market and home use, hay, and pasture. A considerable acreage is idle, especially on the Windsor soils.

9. Branford-Hartford Association

This association comprises a small tract in the southwestern corner of the county. The surface is generally nearly level to undulating, but some kame-and-kettle areas and steep terrace breaks also occur. This association differs from the Merrimac-Windsor association mainly in having developed largely from reddish Triassic material.

Coarse- to medium-textured, reddish terrace soils are characteristic of this association. In addition to the agriculturally important Branford and Hartford soils, the association includes the less extensive Manchester and Penwood soils. It also includes small tracts of the Ellington, Walpole, and Scarboro soils and small tracts of Peats and Mucks. These soils are very easy to work, and they respond to fertilization. The main management problems are droughtiness in the coarse-textured soils and maintenance of fertility.

About 45 percent of the acreage has been cleared, and about one-third of this is in urban development. A large acreage of the coarse-textured soils is idle. Most of the cultivated acreage is in sweet corn and other market vegetables; the rest is used for potatoes, nursery stock, silage corn, hay, and pasture.

10. Buxton-Broadbrook-Agawam Association

This association is in the north-central part of the county. It is probably the most highly developed general farming area in the county. The surface is mainly nearly level to sloping or rolling but is strongly sloping in places. Elevations range from 130 to 300 feet above sea level.

The soils have developed on terraces and on low, smoothly rounded upland ridges. On lake-laid terraces, the Buxton, Scantic, and Belgrade soils are associated with areas of the Melrose, Elmwood, and Swanton soils. On the sandy terraces, the dominant Agawam, Merrimac, and Ninigret soils are associated with areas of the Enfield, Hartford, Windsor, Sudbury, Walpole, and Scarboro soils. On uplands, the main soils are the Broadbrook, Wethersfield, Poquonock, and Narragansett, which occupy low ridges.

These soils differ widely in drainage. Consequently, they differ in use suitability and management. Coarse-

textured soils are suitable for early vegetables and, if irrigated, for tobacco and other crops. The fine-textured soils are more suitable for hay and pasture than for cultivated crops. The management problems are maintenance of tilth and fertility, the control of erosion, and local improvement of drainage.

About 75 percent of the acreage in this association has been cleared. Of this, 10 percent is in urban areas, and the rest is used for hay, pasture, and cultivated crops, or it is idle. Very poorly drained, very coarse textured, and stony soils are largely in cutover forests. Dairying is the chief agricultural enterprise, but some beef cattle are raised. Most of the medium-textured, lake-laid terrace soils are used for hay and pasture in support of dairying. Tobacco, potatoes, silage corn, market vegetables, and sweet corn are the chief cultivated crops. Some nursery stock is also grown. Most of the tobacco is grown on the moderately coarse textured terrace soils, such as Agawam fine sandy loam and Merrimac sandy loam.

11. Wethersfield-Branford-Berlin Association

This association is in the south-central part of the county. Most areas range from nearly level and gently undulating to hilly, but some are steeper. Elevations range from about 140 to 450 feet above sea level.

Reddish soils on terraces and uplands are characteristic of this association. More than half the acreage consists of the Wethersfield and associated Ludlow and Wilbraham soils and scattered tracts of the Holyoke and Sunderland soils. The main soils on terraces are the Branford, Hartford, and Manchester. The Berlin, Scantic reddish variant, and Biddeford reddish variant soils of lake-laid terraces occur throughout the association. The Wethersfield, Berlin, and associated soils are somewhat difficult to work for cultivated crops, but they are suitable for hay, pasture, and orchards. Branford and Hartford soils are easy to work, and they are suitable for many kinds of crops. The removal of stones and the need for lime and fertilizer, drainage, and erosion control are the main management problems.

About 25 percent of the acreage is in urban development, and about 38 percent has been cleared. The rest is in cutover forest. Dairying is the main agricultural enterprise, and a large part of the cleared land is in hay, pasture, and silage corn in support of dairying. Considerable acreage is used for market vegetables and nursery stock. There are a few orchards in this association. Forests are mainly on the stony Wethersfield, Ludlow, and Wilbraham soils and the rocky Holyoke soils.

12. Broadbrook-Wethersfield-Buxton Association

This association is in central Hartford County. Most areas are nearly level to rolling, but some are steep. Elevations range from 150 to 300 feet.

Upland and lake-laid soils make up this association. The predominant Broadbrook, Wethersfield, Buxton, and associated soils cover a large percentage of the association. The Enfield, Narragansett, Elmwood, Swanton, Walpole, and Scarboro soils occur in small, scattered tracts. The soils in this association respond to fertilization. Most cleared areas are moderately easy to work. Stoniness and the need of fertilization, drainage, and erosion control are management problems.

About 60 percent of the acreage has been cleared. About half of this is in urban development and golf courses; the rest is used for hay, pasture, cultivated crops, and orchards, or it is idle. Dairying is the main agricultural enterprise. A small acreage is used for silage corn, market vegetables, nursery stock, and orchards.

13. Holyoke-Wethersfield Association

This association comprises a narrow strip extending from Berlin and Southington in the southwestern part of the county to the northeast corner of Simsburg where the Farmington River turns east. It consists of a series of ridges running north and south, including several local mountains. The surface is gently sloping to steep and precipitous. Elevations range from about 250 to 900 feet above sea level.

Shallow Holyoke soils and Rocky land cover about 80 percent of this association. In addition, the Wethersfield, Ludlow, Wilbraham, and other soils occur in small areas. In some places bare rock ledges and talus slopes make up more than 50 percent of the surface. Steep slopes, stoniness, and shallowness make these soils suitable mainly for pasture, forestry, and wildlife.

About 2 percent of the acreage has been cleared; the rest is in cutover forest. The cleared acreage is in orchards, in pasture, and in commercial development, or it is idle.

14. Berlin-Scantic Reddish Variant Association

This association comprises a small area in the south-central part of the county, mainly in the town of Berlin. The surface is nearly level to undulating. Elevations range from about 35 to 70 feet above sea level.

The association is characterized by reddish soils that have developed in glaciolacustrine deposits of silt and clay. The Berlin and Scantic reddish variant and the associated Biddeford reddish variant soils are predominant. In addition, there are small areas of the Wethersfield, Ludlow, and other soils. Much of the acreage is in urban development and clay pits, and some is idle. Very little acreage is in cultivation, except for home gardens. Hay and pasture occupy some of the cleared area.

15. Wethersfield-Wilbraham Association

This association occurs in two areas. One area is in the eastern part of Southington; the other is in the eastern parts of Avon, Simsbury, and Farmington. Surfaces are gently sloping to hilly. Elevations range from about 250 to 550 feet above sea level.

The association consists mainly of reddish, well-drained soils on uplands. The Wethersfield and the associated Ludlow, Wilbraham, and Menlo soils are dominant. Small areas of the Broadbrook, Holyoke, Hartford, Manchester, and other soils also occur. If cleared of stones, the well-drained Wethersfield, Broadbrook, and other soils of uplands are moderately easy to work, and they are suitable for hay, pasture, and orchards.

About 20 percent of the acreage has been cleared and is used mainly for hay, pasture, silage corn, and orchards. The stony and very stony soils are generally in forest.

16. Cheshire-Wilbraham Association

This association is in two areas in the southwestern part of the county. The surface ranges from very gently sloping or undulating to strongly sloping or rolling. Elevations range from about 150 to 420 feet above sea level.

The association consists largely of reddish soils on uplands, but there are some small areas on terraces. The Cheshire are the dominant soils. The Watchaug, Wilbraham, Menlo, Wethersfield, Ludlow, Hartford, and Manchester soils occur less extensively. The Cheshire and associated soils on uplands were originally stony to very stony. Forested areas of most of these soils are still stony. The Cheshire soils are fairly easy to work if stones have been removed, and they respond to fertilization and management. Stoniness and the need of fertilization, drainage, and erosion control are the main management problems.

About 15 percent of the acreage in this association is in urban development, 20 percent has been cleared, and the rest is in cutover forest. The cleared acreage is used mainly for hay, pasture, and silage corn in support of dairying. A small acreage is used for sweet corn, market vegetables, and nursery stock. Some of the cleared acreage is idle.

17. Poquonock-Merrimac-Elmwood Association

This association is in the north-central part of the county near Windsor. It is nearly level to strongly sloping. Elevations range from about 75 to 180 feet above sea level.

The association consists of a large number of soils that occur in a complex pattern and vary in texture and drainage. They consist of the predominant Poquonock, Merrimac, and Elmwood soils and the less extensive Swanton, Buxton, Scantic, Sudbury, Walpole, Wethersfield, Ludlow, Agawam, Ninigret, and Windsor soils. Most of the well-drained soils are very easy to work. The coarse-textured soils are droughty. All respond to fertilization and management. Droughtiness and the need of fertilization, local drainage, and erosion control are the principal management problems.

About 50 percent of the acreage has been cleared. Of this, part is in housing development, part is idle, and the rest is used for nursery stock, forage crops, and cultivated crops. Tobacco is the main cultivated crop, but small acreages are used for sweet corn, vegetables, and small fruit.

18. Wethersfield-Broadbrook-Holyoke Association

This association is in the north-central and the northwestern parts of the county. Relief ranges from nearly level to hilly and steep. Elevations range from about 200 to 700 feet above sea level. The highest elevations are on the relatively narrow traprock ridges that run from north to south.

The association consists of a large number of soils that occur in complex pattern and range widely in texture and drainage. The Wethersfield, Broadbrook, Holyoke, Narragansett, and associated soils of the uplands are dominant. The terrace soils are the Enfield, Merrimac, Windsor, Hinckley, Sudbury, Walpole, and Scarboro. The soils on uplands, except Holyoke, when cleared of stones, are fairly easy to work, and they are well suited to hay, pasture, and cultivated crops. The soils on terraces are very easy to work, but the coarse-textured ones are droughty. All respond to fertilization and management. Management problems include stoniness and the need of fertilization, local drainage, and erosion control.

About 20 percent of the acreage in this association has been cleared and is used for hay, pasture, and cultivated crops, or it is idle. A small acreage is used for tobacco, silage corn, market vegetables, nursery stock, and orchards.

Use and Management of the Soils

This section has several parts. The first part describes the general management practices for a few of the important crops grown in Hartford County. The second part describes the capability grouping of soils and lists the soils in capability units. Each capability unit is described and suitable management and conservation practices are suggested. The third part gives estimated yields of the main crops that can be expected under a specified level of management. The last four parts deal with forestry, soil-moisture storage capacity, engineering interpretations, and urban development.

General Management of a Few Important Crops

Tobacco[3]

Three types of cigar tobacco are grown. Two of these, Broadleaf and Havana Seed, are commonly called outdoor tobacco. The third type is known as shade tobacco because it is grown in fields covered by tents of cotton cloth. Shade-grown tobacco is used mainly for cigar wrappers—the outer layer; outdoor tobacco is used mainly for cigar binders—the layer under the wrapper (*2*).

Tobacco is grown largely in coarse-textured to medium-textured, well-aerated, and well-drained soil. Some is grown in moderately well drained and poorly drained soils that have been artificially drained or only partly drained. Moderately coarse to medium textured, very friable, well-drained soils are the best for tobacco. Soils with impeded drainage and alluvial soils along streams generally produce a rank growth but a poor quality of tobacco. However, excessively drained, coarse-textured, shallow, gravelly soils are droughty in most years. Fertilizers leach rapidly from them.

Continuous culture of tobacco is fairly common. Some fields are said to have produced tobacco continuously for more than 50 years without a decline in yield or quality. Very short rotations for shade-grown tobacco are consid-

[3] This part was written by HENRY C. DEROO, soil scientist, Connecticut Agricultural Experiment Station, New Haven, Conn.

ered impractical. In practice, fields are rested after 4 or 5 years, if yields and quality begin to decline. Some fields produce high yields for only 2 or 3 years. Tobacco fields are left fallow, or corn or potatoes may be grown on them.

Highly destructive, soil-borne diseases have not yet developed in Hartford County soils. However, the fumigation of soil to control nematodes or brown root rot is becoming more essential to obtain satisfactory tobacco yields. Nematode infestation is always worse after corn, timothy, or forage crops have been grown. A cover crop of oats followed by weeds or by clean cultivation generally provides some degree of control of nematodes.

The quality and growth of tobacco is best when the pH is between 5.0 and 5.6. A soil with lower acidity favors the development of black root rot, which is caused by a soil-inhabiting fungus. A high degree of acidity may produce tobacco of inferior quality. If the pH is below 4.5, the tobacco is damaged by manganese poisoning caused by the formation of soluble manganese compounds in the soil. Affected plants are stunted, the leaves grow pale, and a yellow color develops between the veins. Excessive amounts of manganese compounds in cured tobacco make the leaves yellow and inelastic and give the ash an objectionable reddish-brown, muddy, or bricklike color. The more acid the soil, the greater is the absorption of manganese by the tobacco plant.

Hydrated lime, or sometimes ground limestone, is used to maintain soil reaction within the favorable pH range. Gypsum may be used as a source of calcium that does not change the pH of the soil. The amount of gypsum applied depends on the acidity, kind of soil, and the composition of the tobacco fertilizer.

The production of tobacco in Connecticut requires liberal fertilization. During the 6 to 8 weeks in which the crop makes most of its growth, an abundant supply of plant food must be readily available in the soil. Research and experience have led to the general use of about 200 pounds of nitrogen, 100 to 120 pounds of P_2O_5, and 200 pounds of K_2O per acre. Standard commercial fertilizer for tobacco generally has a 6–3–6 formula. Some farmers use a 6–4–7 fertilizer, especially following seasons of severe leaching. Two-thirds to four-fifths of the nitrogen in tobacco fertilizer is obtained from cottonseed meal, castor pomace, linseed meal, dry ground fish, or other organic sources. The rest is from nitrate of soda, ammonium nitrate, nitrate of potash, or urea.

The supply of nitrogen has to be controlled in order to meet the demands of the tobacco crop. Nitrogen, however, is the nutrient most difficult to manage efficiently in the coarse-textured to medium-textured soils. In sandy soils, which are subject to rapid leaching, side dressing with nitrogen is sometimes necessary in seasons of heavy rainfall. If the nitrogen supply is low, the yield is reduced, and the tobacco leaves become yellow in the field. When cured, the leaves are dead, yellow, and inelastic. Such leaves are of inferior quality. A low level of available soil nitrogen is favored at harvesttime. If there is too much nitrogen, the cured leaves are dark and heavy, and the taste and aroma of the tobacco are not pleasant. The quality of Connecticut tobacco, however, is less adversely affected by an overabundance of nitrogen than that of many other kinds of tobacco.

A large number of nitrogenous materials may be used as fertilizer. At first, manures were used to fertilize tobacco. A long-established practice is to use mixed fertilizers that contain a large percentage of vegetable meal and some fish and bone meal. Each year, however, more of the less expensive chemicals containing more concentrated plant nutrients are used in place of manure and natural organic material. Stable manure is still being used as a supplement to commercial fertilizer (*8*).

Much of the nitrogen in manure and vegetable meal is insoluble in water and is transformed slowly in the soil. These materials furnish nitrates as plant growth progresses, and their use prevents excessive leaching by rains during the critical first 4 to 6 weeks when the crop absorbs only a small amount of nitrogen. Research has shown that synthetic organic and inorganic nitrogen materials are suitable as tobacco fertilizer when used in accordance with their properties. Part of the nitrogen should be applied at planting time and the rest as a side dressing with nitrates just before tobacco absorbs the maximum amount of nitrogen.

The choice of phosphate and potash fertilizers offers no particular problems, except that extremely large quantities of sulfur should not be applied with these nutrients. The capacity of tobacco to absorb sulfur is limited, but an excess of it in the fertilizer might reduce the fire-holding quality of the tobacco. The ash of burned cotton hulls is probably the most commonly used carrier of potash. Muriate of potash is never used in Connecticut because the chlorine is greedily absorbed by the tobacco and impairs the burn. Tobacco needs about 20 pounds per acre of P_2O_5. The liberal use of phosphatic fertilizer has resulted in heavy accumulations of residual phosphorus in the plow layer of the older tobacco soils. The purpose of the apparently superfluous quantity of 100 to 120 pounds annually is to furnish for the nutrition of the tobacco a supply of phosphorus well above that which is "fixed" by the soil and made unavailable to the plants.

Magnesium is the fourth important element. If the ash of the tobacco is satisfactory, it is not necessary to increase the supply of this element. About 75 pounds per acre applied annually should produce good burning characteristics in tobacco. Hydrated magnesium lime or ground dolomitic limestone are probably the most economical and convenient materials for supplying magnesium.

A cover crop of oats, rye, or barley is generally used on tobacco soil. One of the major values of a cover crop is that it prevents the loss of nutrients between tobacco seasons. In a lysimeter experiment at the Tobacco Laboratory in Windsor, Conn., a cover crop of oats, feeding on the unused tobacco nutrients, prevented the leaching of 56 pounds of nitrogen, 44 pounds of calcium, 24 pounds of potassium, and 8 pounds of magnesium per acre during the winter. Inexpensive inorganic nitrogen can be converted to organic nitrogen through the fertilization of cover crops. Plowing under considerable quantities of organic matter maintains the organic content and makes the soils less susceptible to compaction and crusting.

The sandy-textured soils have a naturally weak structure, and they are easily compacted by conventional plowing and cultivation. These compacted layers restrict the penetration of roots and the feeding zone of most plants. A soil density above about 1.53 prevents the

penetration and spread of tobacco roots in sandy loam soils. Deep tillage, the elimination of unnecessary traffic and secondary tillage, and the shallow burial of green manure or winter cover crops tend to preserve tilth. Soils in good tilth allow plant roots to draw nutrients and water from the deeper horizons. Optimum root development and the efficient use of fertilizer and moisture by the crop are the results of proper soil management (*7*).

Potatoes[4]

Well-drained silt loam, very fine sandy loam, and fine sandy loam on nearly level to gently undulating relief are well suited to potatoes. Moderately well drained soils with sandy or sandy and gravelly substrata are also suitable for potatoes, especially if partly drained. Soils of high moisture-holding capacity will produce better yields and tubers with a better shape and a higher dry-matter content than excessively drained coarse-textured soils, especially in droughty seasons. They also need less frequent irrigation.

The soil should be kept acid (a pH of about 5.3) to control scab. As a rule, scab is more of a problem in soils that were used for potatoes several years in succession than in those where they were grown in rotation with other crops. A rotation of potatoes with tobacco is very satisfactory because the soil is maintained acid to control diseases of both crops. In addition, rye, for a winter cover, can be planted early following tobacco harvest to help maintain organic matter.

Experiments in the Connecticut River Valley by the Storrs Agricultural Experiment Station (*14*, *15*, *16*) have shown the importance of organic matter and the need of lime for excessively acid soils to prevent toxicity to potatoes, especially to the Katahdin variety. A good cover of rye will help maintain organic matter, prevent leaching of some of the nutrients, and help control erosion. Recent experiments with soils planted each year to potatoes show that plots with rye cover have consistently outyielded plots without rye cover.

Rye planted after the harvest of late-grown potatoes is limited in growth by the climate of the Connecticut River Valley. Any practice that increases the growth of rye in the fall helps the control of erosion and increases the supply of organic matter for plowing under in the spring. Sloping fields should be harvested for potatoes and seeded to rye before the less-sloping fields. If rye is drilled rather than broadcast, it produces heavier stands with less seed and allows for more growth in the fall.

Unless the weather is very unfavorable, rye planted before the 15th of October in soil low in nitrogen responds to nitrogen fertilization. An application of 20 to 30 pounds of nitrogen per acre in the form of ammonium nitrate is recommended; a second application of the same amount should be broadcast early in the spring. Good soil-improving crops for land kept out of potatoes for a year are redtop seeded in rye cover early in spring, or annual field bromegrass seeded early in August and well fertilized with nitrogen. A rye-millet-rye combination produces a large amount of organic matter for improvement of potato soils in 1 year. Redtop or redtop and alsike clover are especially good for soils that are to be kept out of potatoes for as much as 2 years.

Magnesium lime will reduce excess acidity and improve the supply of magnesium in soils naturally low in available magnesium.

Most of the fertilizer applied to potatoes is sidebanded at planting time. Ammonia is the primary source of nitrogen in complete fertilizers. Not much nitrate nitrogen is used in fertilizer mixtures, because it is more costly, subject to leaching, and less compatible in the mixture. Experiments on commercial potato farms in Hartford County show that yields of potatoes from soils low in available nitrogen can be progressively increased by application of as much as 150 to 180 pounds of nitrogen per acre. If these soils had a good moisture-holding capacity, or if they were irrigated, better yields were obtained with the higher application of nitrogen, provided insects and diseases were controlled. Less nitrogen is recommended where potatoes follow tobacco or legume crops.

The application of part of the nitrogen as a side dressing of ammonium nitrate or urea produced as good yields as the application of all the nitrogen in a complete fertilizer in sidebands at planting time.

Most soils used frequently for potatoes or for other heavily fertilized crops are shown by tests to have a medium, or higher, supply of available phosphorus and potassium. Experiments in the Connecticut River Valley show that such soils produce as good yields with applications of 150 pounds per acre or less of P_2O_5 as with applications of higher amounts. In addition, yields are as good or slightly better with applications of 150 pounds per acre of K_2O than with applications of 200 pounds.

Soils containing a medium, or higher, supply of available phosphorus and potassium can be fertilized effectively for potatoes by (a) using less 1–2–2 or 3–4–4 ratio fertilizer in the row and broadcasting additional nitrogen or applying it as a side dressing, or (b) using fertilizer having a 1–1–1 ratio. However, fertilizers in this ratio are normally highly acid and are not recommended for excessively acid soils that are low in organic matter.

Soils that are low in available phosphorus and potassium should be fertilized with 200 pounds each per acre of P_2O_5 and K_2O. Fertilizers having a ratio of 3–4–4, applied at rates that will provide 200 pounds each per acre of P_2O_5 and K_2O, will also furnish most or all of the nitrogen that is needed. An additional 30 pounds per acre of nitrogen may increase the yield of potatoes in irrigated soils, or in soils that are low in available nitrogen but high in moisture-holding capacity.

Potatoes on soils that have less than a medium supply of available magnesium should be fertilized for potatoes at planting time with 30 pounds per acre of water-soluble magnesium oxide.

Forage crops

Forage crops are grown on soils ranging in texture from coarse to medium and in drainage from excessive to poor. Generally, the medium to moderately coarse textured, well drained to moderately well drained soils are best suited to forage crops. Because of its deep root system, alfalfa grows fairly well on droughty soils, which are poorly suited to clover and grass. On the other hand, some clover and grass grow well on wet soils that are poorly suited to alfalfa. Corn grows best on soils that have a high moisture-holding capacity.

[4] This part was prepared by ARTHUR HAWKINS, agronomist, Storrs Agricultural Experiment Station, Storrs, Conn.

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The soils in Hartford County are generally strongly to very strongly acid, and they need liberal quantities of lime for good yields of alfalfa, ladino clover, birdsfoot trefoil, and other legumes. In order to prolong the stand of legumes as long as possible, enough lime should be applied at seeding time to maintain the pH between 6.6 and 7.0. Small grains and corn will tolerate acid soils, but the pH for best growth is probably 5.8 or above.

All forage crops need liberal fertilization as well as lime for legumes. Potash is the critical nutrient in the fertilization of alfalfa. Nitrogen is generally the critical nutrient in the fertilization of corn, grasses, and small grains. The quantity of plant nutrients and lime for best yields of crops depends on the soil type, supplies of organic matter, and previous management. Consequently, lime and fertilizers should be applied in amounts determined by soil tests. Current recommendations for liming and fertilizing can be obtained from the Storrs Agricultural Experiment Station and the Extension Service, University of Connecticut.

Nursery stock

Nursery stock is one of the largest cash crops in the State. A wide variety of evergreens and flowering shrubs are grown. They grow best in well-drained soils of sandy loam and fine sandy loam texture. Such soils promote rapid root development. Soils with impeded drainage, fine-textured soils, and soils with hardpans generally restrict the growth of root systems.

Nursery stock is grown at the higher management levels because it is profitable to grow a mature tree or shrub of marketable size in the shortest possible time. The management generally includes irrigation and tile drainage as needed, liberal applications of fertilizers, control of pH values to suit individual species, and weed and insect control.

Yields usually depend upon the variety grown. During the last few years of growth, all varieties are generally placed in check rows 3 by 3 feet apart. They are considered marketable when they reach a specified size. Thus some plants may be harvested a year or more before slower growing plants on the same field. Quick growing species, such as arborvitae, may be marketed in 5 to 7 years, whereas slower growing varieties, such as hemlock or Japanese yew, may take as long as 7 to 10 years to develop on suitable soils.

Capability Groups of Soils

Capability grouping is a system of classification used to show the relative suitability of soils for crops, grazing, forestry, and wildlife. It is a practical grouping based on the needs, limitations, and risks of damage to the soils, and also on their response to management. There are three levels above the mapping unit in the grouping. They are the unit, subclass, and class.

The capability unit, sometimes called a management group, is the lowest level of grouping. A capability unit is made up of soils similar in kind of management they need, in risk of damage, and in general suitability for use.

The next broader grouping, the subclass, is used to indicate the dominant kind of limitation. The letter symbol "e" indicates that the main limiting factor is risk of erosion if the plant cover is not maintained; "w" means excess water that retards plant growth or interferes with cultivation; and "s" shows that the soils are shallow, droughty, stony, or unusually low in fertility; "we" indicates that wetness is the main limitation but erosion is also a limitation; "se" indicates that mainly droughtiness but also erosion are the limitations; "ws" indicates that mainly wetness but also stoniness are the limitations; "es" indicates that mainly erosion but also stoniness are the limitations.

The broadest grouping, the land capability class, is identified by Roman numerals. All the soils in one class have limitations and hazards of about the same degree, but they are of different kinds as shown by the subclass. All the land classes except class I may have one or more subclasses.

In classes I, II, and III are soils that are suitable for annual or periodic cultivation of annual or short-lived crops.

Class I soils are those that have the widest range of use and the least risk of damage. They are level, or nearly level, well drained, and easy to work. They can be cultivated with almost no risk of erosion and will remain productive if managed with normal care.

Class II soils can be cultivated regularly, but they do not have quite so wide a range of suitability as class I soils. Some class II soils are gently sloping; consequently, they need moderate care to prevent erosion. Others soils in class II may be slightly droughty or slightly wet, or somewhat limited in depth.

Class III soils can be cropped regularly, but they have a narrower range of use. These need even more careful management.

In class IV are soils that should be cultivated only occasionally, or they can be cultivated for some crops under very careful management.

In classes V, VI, and VII are soils that normally should not be cultivated for annual or short-lived crops, but they can be used for pasture or range, for wildlife, or as woodland.

Class V soils are nearly level and gently sloping but are wet, or otherwise unsuitable for cultivation.

Class VI soils have severe limitations that make them generally unsuited to cultivation and limit their use largely to grazing, woodland, or wildlife.

Class VII soils have very severe limitations that make them unsuited to cultivation and restrict their use largely to grazing, woodland, or wildlife.

In class VIII are soils that have practically no agricultural use. Some of them have value as watersheds, as wildlife habitats, or as recreation areas.

The soils of Hartford County are in the following classes, subclasses, and units:

Class I.—Soils having few limitations that restrict their use.

- Unit I–1: Nearly level, well-drained soils on uplands and terraces over firm to very friable glacial till and stratified sand and gravel.
- Unit I–2: Nearly level, well-drained soils on uplands that have a compact, slowly to very slowly permeable pan layer at a depth of about 2 feet.

Class II.—Soils having some limitations that reduce the choice of plants or require moderate conservation practices.
- Subclass IIe: Soils subject to moderate risk of erosion if they are not protected.
  - Unit IIe–1: Undulating or gently sloping, well-drained soils on uplands and terraces.
  - Unit IIe–2: Undulating or gently sloping, well-drained soils on uplands that have a compact, slowly to very slowly permeable pan layer at a depth of about 2 feet.
- Subclass IIw: Soils moderately limited by wetness.
  - Unit IIw–1: Nearly level, moderately well drained soils on uplands and terraces.
  - Unit IIw–2: Nearly level, moderately well drained soils on uplands that have a compact, slowly to very slowly permeable pan horizon.
  - Unit IIw–3: Nearly level, moderately well drained glaciolacustrine soils.
  - Unit IIw–4: Well-drained soils on flood plains subject to frequent flooding.
  - Unit IIw–5: Nearly level, moderately well drained soils on flood plains.
- Subclass IIwe: Soils moderately limited by wetness and risk of erosion.
  - Unit IIwe–1: Undulating or gently sloping, moderately well drained soils on uplands and terraces.
  - Unit IIwe–2: Undulating or gently sloping, moderately well drained soils on uplands that have a compact, slowly to very slowly permeable pan horizon.
  - Unit IIwe–3: Undulating or gently sloping, moderately well drained glaciolacustrine soils.
- Subclass IIs: Soils moderately limited by depth or by capacity to hold moisture.
  - Unit IIs–1: Nearly level, well-drained to somewhat excessively drained soils on uplands and terraces.
  - Unit IIs–2: Undulating or gently sloping, well-drained to somewhat excessively drained soils on uplands and terraces.

Class III.—Soils having severe limitations that reduce the choice of plants or require special conservation practices, or both.
- Subclass IIIe: Soils that have severe risk of erosion if they are not protected.
  - Unit IIIe–1: Sloping or rolling, well-drained soils on uplands and terraces.
  - Unit IIIe–2: Sloping or rolling, well-drained soils that have a compact, slowly to very slowly permeable pan horizon.
  - Unit IIIe–3: Sloping or rolling, somewhat excessively drained soils on uplands and terraces.
  - Unit IIIe–4: Sloping or rolling, moderately well drained silty soils on glaciolacustrine terraces.
- Subclass IIIw: Soils severely limited by wetness.
  - Unit IIIw–1: Nearly level, poorly drained soils on uplands and terraces.
  - Unit IIIw–2: Nearly level, poorly drained soils on flood plains.
- Subclass IIIs: Soils severely limited by depth or by capacity to hold moisture.
  - Unit IIIs–1: Nearly level to gently sloping, very droughty soils.
  - Unit IIIs–2: Nearly level, droughty soils.
- Subclass IIIse: Soils severely limited by moisture capacity and risk of erosion.
  - Unit IIIse–1: Gently sloping or rolling, droughty soils.

Class IV.—Soils having very severe limitations that restrict the choice of plants, require very careful management, or both.
- Subclass IVe: Soils very severely limited by risk of erosion if they are not protected.
  - Unit IVe–1: Strongly sloping or hilly soils on uplands.
  - Unit IVe–2: Strongly sloping or hilly soils on uplands that have a compact, slowly to very slowly permeable pan horizon.
- Subclass IVes: Soils very severely limited by risk of erosion and by stoniness.
  - Unit IVes–1: Gently sloping to rolling, well-drained, stony soils.
  - Unit IVes–2: Gently sloping to rolling, well-drained, stony soils having a compact, slowly to very slowly permeable pan horizon.
- Subclass IVw: Soils very severely limited by wetness.
  - Unit IVw–1: Nearly level, poorly drained soils on glaciolacustrine terraces.
- Subclass IVs: Soils very severely limited by moisture capacity.
  - Unit IVs–1: Gently sloping to rolling, excessively drained, extremely droughty soils.
- Subclass IVws: Soils very severely limited by wetness and risk of erosion.
  - Unit IVws–1: Nearly level to gently sloping, moderately well drained, stony soils.
  - Unit IVws–2: Nearly level to gently sloping, moderately well drained, stony soils having a compact, slowly to very slowly permeable pan horizon.

Class V.—Soils having little or no erosion hazard, but having other limitations that are impractical to remove that limit their use mainly to pasture, range, woodland, or wildlife food and cover.
- Subclass Vw: Soils too wet for cultivation with the usual crops but not greatly limited for pasture or woodland use.
  - Unit Vw–1: Nearly level, very poorly drained soils on uplands and terraces.
  - Unit Vw–2: Nearly level, very poorly drained glaciolacustrine soils.

Class VI.—Soils having severe limitations that make them generally unsuited to cultivation and limit their use mainly to pasture or range, woodland, or wildlife food and cover.
- Subclass VIe: Soils too steep for cultivation and subject to very severe erosion if not protected.
  - Unit VIe–1: Strongly sloping to steep soils on the breaks of terraces.
- Subclass VIes: Soils limited by erosion and stones or by depth to pasture and woodland use.
  - Unit VIes–1: Strongly sloping and hilly, well-drained, stony soils.

Unit VIes–2: Strongly sloping and hilly, well-drained, stony soils having a compact, slowly to very slowly permeable pan horizon.

Subclass VIw: Soils not suitable for cultivation and limited by wetness to pasture or woodland use.

Unit VIw–1: Very poorly drained, very frequently flooded soils of the flood plains.

Subclass VIws: Soils not suitable for cultivation and severely limited by wetness and stones for pasture or woodland use.

Unit VIws–1: Nearly level, poorly drained, stony soils on uplands.

Unit VIws–2: Very poorly drained, stony soils on uplands.

Subclass VIs: Soils not suitable for cultivation and limited by stones or depth to pasture and woodland use.

Unit VIs–1: Gently sloping to rolling, well drained and moderately well drained, very stony soils.

Unit VIs–2: Gently sloping to rolling, well drained to moderately well drained, very stony soils having a compact, slowly to very slowly permeable pan horizon.

Unit VIs–3: Gently sloping to rolling, rocky, shallow soils.

Class VII.—Soils having very severe limitations that make them unsuited to cultivation and that restrict their use largely to grazing, woodland, or wildlife.

Subclass VIIs: Soils not suitable for cultivation and severely limited by stones or depth for pasture or woodland use.

Unit VIIs–1: Strongly sloping and hilly, well-drained, very stony soils.

Unit VIIs–2: Strongly sloping and hilly, well-drained soils having a compact, slowly to very slowly permeable pan horizon.

Unit VIIs–3: Gently sloping to steep, well-drained, rocky and very rocky soils.

Unit VIIs–4: Nearly level to very gently sloping, poorly and very poorly drained, very stony soils.

Class VIII.—Soils having limitations that preclude their use for commercial plant production and restrict their use to recreation, wildlife, water supply, or esthetic purposes.

Subclass VIIIw: Soils severely limited by wetness.

Unit VIIIw–1: Very poorly drained peats and mucks.

Subclass VIIIs: Soils very severely limited by rocks and stones.

Unit VIIIs–1: Rocky land and riverwash.

Descriptions of capability units

In this section each capability unit is described and the soils in it are listed. In addition, suggestions are given for the use and management of the soils in each unit.

The soils in each unit have many similarities. Distinctive characteristics that affect the use and management of particular soils are given with the descriptions of some units. All soils in the county are low to very low in natural fertility, and they are naturally acid. The need of the soils for lime and plant nutrients depends on past management and cropping practices. Consequently, lime and fertilizer should be applied in amounts determined by soil tests.

Recommendations on crop varieties and pasture-seeding mixtures can be obtained from publications of the Connecticut Agricultural Experiment Station at New Haven, the Tobacco Laboratory at Windsor, and the Storrs Agricultural Experiment Station at Storrs. The Agricultural Extension Service and the Soil Conservation Service can help you interpret the recommendations for soils on your farm. They can also give you technical assistance on land preparation, cropping systems, terracing, drainage, forestry, pasture management, and other farm problems.

CAPABILITY UNIT I–1

This unit consists of nearly level, well-drained, medium to moderately coarse textured soils. These soils are very friable and moderately permeable, and they have a high moisture-holding capacity. They are very responsive to fertilization and management.

Some of the soils have developed on firm to very friable glacial till and others on stratified sand and gravel. Although essentially free of surface stone, small angular fragments of rock, cobbles, and subsurface stone cause some difficulty in cultivating the Charlton, Cheshire, and Narragansett soils. The other soils are easy to work. The soils in this unit are:

Agawam very fine sandy loam, 0 to 3 percent slopes.
Agawam very fine sandy loam, overflow, 0 to 3 percent slopes.
Branford silt loam, 0 to 3 percent slopes.
Charlton fine sandy loam, 0 to 3 percent slopes.
Cheshire fine sandy loam, 0 to 3 percent slopes.
Enfield silt loam, 0 to 3 percent slopes.
Enfield silt loam, overflow, 0 to 3 percent slopes.
Hartford fine sandy loam, 0 to 3 percent slopes.
Melrose very fine sandy loam, 0 to 3 percent slopes.
Merrimac fine sandy loam, 0 to 3 percent slopes.
Merrimac fine sandy loam, overflow, 0 to 3 percent slopes.
Narragansett silt loam, 0 to 3 percent slopes.

These soils are suitable for all crops grown in the county, and some of them are the most desirable soils for potatoes and tobacco. A large percentage of the total acreage has been cleared and is used for cultivated crops, orchards, hay, and pasture. Some of the acreage is in urban developments, and a small acreage is idle. Tobacco, potatoes, silage corn, sweet corn, nursery stock, and forage are the principal crops. Tobacco is grown on all soils except the Charlton, which occurs in the Eastern and Western Highlands where tobacco is not grown.

These soils can be used intensively with a minimum risk of erosion, but careful management is needed to maintain organic matter and good tilth. A plowsole very commonly develops in soils that are intensively used for tobacco, potatoes, and other market crops. This compacted layer can be broken by subsoiling, deep plowing, and growing winter cover crops (7).

A suitable cropping system should include a small grain or grass or a grass-legume mixture for at least 1 year in 3 or 4 years. A winter cover crop should follow row crops each year. Some shade-tobacco farmers grow corn for 1 year in 4 or 5 years. Fumigation for nematodes is necessary after the corn crop.

Fertilization is needed to produce good yields. Lime and fertilizer should be applied in amounts determined by soil tests.

CAPABILITY UNIT I–2

This unit consists of nearly level, well-drained soils that have a slowly to very slowly permeable, compact pan layer at a depth of about 2 feet. The surface soils and subsoils are medium to moderately coarse textured. They are moderately permeable above the pan and have a high moisture-holding capacity. The pan interferes with internal drainage and causes these soils to warm slowly in spring. Crops are seldom damaged by lack of moisture during the growing season. These soils are moderately easy to work and are responsive to fertilization and good management. They are essentially free of surface stone, but small, angular rock fragments, cobbles, and stones are common in the surface soil and subsoil of the Wethersfield and Broadbrook soils. The soils in this unit are:

Broadbrook silt loam, 0 to 3 percent slopes.
Poquonock sandy loam, 0 to 3 percent slopes.
Wethersfield loam, 0 to 3 percent slopes.

These soils are used mainly for silage corn, hay, pasture, and orchards, and they are best suited to these crops. Small acreages are used for potatoes and other crops and for the varieties of tobacco grown without shade. Because they warm rather slowly in spring, these soils are not well suited to tobacco. Alfalfa grows well, but it is subject to some heaving in winter and early spring.

The risk of erosion is not great in cultivated areas, but organic matter and good tilth should be maintained. A desirable cropping system should include a grass or a grass-legume mixture at least 1 year in 3 or 4 years. Winter cover crops should follow row crops.

Fertilization is necessary for good yields of cultivated crops, hay, and pasture. Lime and fertilizer should be applied according to the results of soil tests.

CAPABILITY UNIT IIe–1

This unit consists of gently sloping or undulating, well-drained, moderately coarse to medium textured soils. All soils are very friable and moderately to rapidly permeable. Their moisture-holding capacity is high. The Melrose soils have developed over glaciolacustrine silt and clay. The other soils in the unit have developed over firm to very friable glacial till and stratified sand and gravel. The eroded phases of these soils are shallower than the normal soils.

The Charlton, Cheshire, and Narragansett soils are slightly more difficult to work than the other soils because of small rock fragments, cobbles, and a few stones in the surface soil. Soils in the unit are:

Agawam very fine sandy loam, 3 to 8 percent slopes.
Branford silt loam, 3 to 8 percent slopes.
Charlton fine sandy loam, 3 to 8 percent slopes.
Cheshire fine sandy loam, 3 to 8 percent slopes.
Cheshire fine sandy loam, 3 to 8 percent slopes, eroded.
Enfield silt loam, 3 to 8 percent slopes.
Hartford fine sandy loam, 3 to 8 percent slopes.
Melrose very fine sandy loam, 3 to 8 percent slopes.
Merrimac fine sandy loam, 3 to 8 percent slopes.
Narragansett silt loam, 3 to 8 percent slopes.
Narragansett silt loam, 3 to 8 percent slopes, eroded.

These soils are suitable for all crops that are generally grown in the county. Tobacco, potatoes, silage corn, and sweet corn are the principal cultivated crops.

These soils are suitable for intensive cultivation, where fairly short crop rotations are used, if management is good. Management is needed to control erosion and to maintain organic matter and good tilth. Erosion control practices should include contour cultivation and the use of cropland terraces and waterways on long slopes. A suitable cropping system should include a small grain or grass or a grass-legume mixture 1 year in 3. Winter cover crops should follow row crops.

Fertilization is necessary for good yields. Lime and fertilizer should be applied according to needs determined by soil tests.

CAPABILITY UNIT IIe–2

This unit consists of gently sloping or undulating, well-drained, medium to moderately coarse textured soils. They have developed on glacial till and have a compact pan at a depth of about 2 feet. The surface soil and subsoil above the pan are friable to very friable and moderately permeable and have a high moisture-holding capacity. The pan is slowly permeable and interferes with internal drainage. Consequently, the soils warm more slowly in spring than those in capability unit IIe–1. Eroded phases of these soils are shallower than the normal soils. Soils in the unit are:

Broadbrook silt loam, 3 to 8 percent slopes.
Broadbrook silt loam, 3 to 8 percent slopes, eroded.
Paxton fine sandy loam, reddish substratum, 3 to 8 percent slopes.
Paxton loam, 3 to 8 percent slopes.
Poquonock sandy loam, 3 to 8 percent slopes.
Wethersfield loam, 3 to 8 percent slopes.
Wethersfield loam, 3 to 8 percent slopes, eroded.

These soils are well suited to silage corn, hay, pasture, and tree fruits. Alfalfa grows well, but it is subject to heaving in winter and early in spring. Tobacco, mainly the varieties grown without shade, is grown on the Broadbrook, Wethersfield, and Poquonock soils, but these soils are not considered to be ideal tobacco soils. However, crops, grasses, and legumes grown on these soils are seldom seriously damaged by lack of moisture during the growing season.

The risk of erosion is greater for these soils than for those in capability unit IIe–1. Where cultivated intensively, the soils should be protected through contour cultivation, and by cropland terraces in places and by waterways on long slopes. Drainage of small seepy spots results of soil tests.

A suitable cropping system should include a close-growing crop for 1 year in 3 years. Winter cover crops should follow row crops. These practices help to control runoff and to maintain organic matter and good tilth. Lime and fertilizer should be applied according to the results of soil tests.

CAPABILITY UNIT IIw–1

This unit consists of nearly level, moderately well drained, medium to moderately coarse textured soils. These soils are moderately to rapidly permeable, and they have a high to moderate moisture-holding capacity. They are similar to those in capability unit IIwe–1 except that they are nearly level. They have developed on firm to very friable glacial till, glaciolacustrine silt and clay, and stratified sand and gravel. Mottles at depths of 10 to 20 inches indicate that the lower subsoil is satu-

rated in very wet seasons. Seepage and a high water table interfere with drainage. The soils in this unit are:

Acton fine sandy loam, 0 to 3 percent slopes.
Ellington fine sandy loam, 0 to 3 percent slopes.
Elmwood sandy loam, 0 to 3 percent slopes.
Elmwood very fine sandy loam, 0 to 3 percent slopes.
Ninigret fine sandy loam, 0 to 3 percent slopes.
Ninigret very fine sandy loam, 0 to 3 percent slopes.
Sudbury fine sandy loam, 0 to 3 percent slopes.
Sutton loam, 0 to 3 percent slopes.
Tisbury silt loam, 0 to 3 percent slopes.
Wapping silt loam, 0 to 3 percent slopes.
Watchaug loam, 0 to 3 percent slopes.

These soils are generally suitable without drainage for silage corn and for grasses and legumes grown for hay and pasture. If partly drained, they are suitable for the general crops grown in the area, including tobacco and potatoes. The Action, Sutton, and Watchaug soils are used mainly for hay and pasture and to some extent for silage corn. A considerable acreage of the Ninigret, Tisbury, Sudbury, and Elmwood soils is used for potatoes and outdoor tobacco. Shade-grown tobacco is grown to some extent on these soils.

The lack of adequate drainage in the soils of this capability unit delays land preparation and planting in spring. Plowing these soils when too wet hastens the development of a plowsole. Careful management is needed in cultivated areas to maintain organic matter and good tilth. A desirable cropping system includes a small grain or a grass and legume mixture for 1 year in 3 years. Row crops should be followed by winter cover crops.

Fertilization is necessary for good yields. Lime and fertilizer should be applied according to the results of soil tests.

CAPABILITY UNIT IIw–2

This unit consists of nearly level, moderately well drained, medium-textured soils that have a slowly permeable, compact pan horizon at depths of 20 to 26 inches. The surface soils and subsoils above the pan are friable to very friable and are moderately permeable. They have a high moisture-holding capacity. In winter and early spring, a perched water table commonly occurs above the pan. Mottles occur at depths ranging from 10 to 18 inches. These soils are similar to those in capability unit IIwe–2 except that they are nearly level and have slower surface drainage. The soils in this unit are:

Birchwood fine sandy loam, 0 to 3 percent slopes.
Ludlow loam, 0 to 3 percent slopes.
Rainbow silt loam, 0 to 3 percent slopes.
Woodbridge loam, 0 to 3 percent slopes.
Woodbridge loam, reddish substratum, 0 to 3 percent slopes.

The undrained soils in this unit are suitable for hay and pasture, and they are used mainly for these crops. Drained areas are suitable for silage corn, potatoes, vegetables, alfalfa, and other crops. The Ludlow, Rainbow, and Birchwood soils are used for tobacco and potatoes where they occur as small areas in fields of well-drained soils.

The risk of erosion in cultivated areas is not great because the surface is nearly level. Soils in this unit that are used for cultivated crops, orchards, and, in places, for hay and pasture, should be drained and protected by diversion terraces to intercept surface and seepage water from higher areas. Management is needed to maintain organic matter and good tilth. A suitable rotation should include a close-growing crop for at least 1 year in 3 years. Winter cover crops should follow row crops each year. Grazing of pastures should be controlled.

CAPABILITY UNIT IIw–3

This unit consists of nearly level to moderately well drained silty soils that have developed from glacial lake deposits of silt and clay. These soils have a high moisture-holding capacity and are somewhat difficult to work. Drainage is a problem, especially in the Buxton and Berlin soils. Belgrade silt loam and its reddish variant are medium textured and moderately permeable throughout. The soils in this unit have less slope than those in a capability unit IIwe–3. They are:

Belgrade silt loam, 0 to 3 percent slopes.
Belgrade silt loam, reddish variant, 0 to 3 percent slopes.
Berlin silt loam, 0 to 3 percent slopes.
Buxton silt loam, 0 to 3 percent slopes.

Most of the acreage of these soils is used for hay and pasture, but a small acreage is used for silage corn, vegetables, and other crops. Suitable grasses and legumes for hay and pasture grow well if lime and fertilizer are applied according to needs determined by soil tests. Unprotected fields on very gentle slopes are subject to erosion. Consequently, cropping systems should include a close-growing crop for at least 1 year in 3. Pastures should not be grazed when wet because trampling puddles the soil, packs it, and cuts up the sod.

Tile and open-ditch drainage are not satisfactory in the Buxton and Berlin soils because of their fine texture and slowly permeable lower horizons. Diversion terraces, bedding, and waterways should be constructed in places.

CAPABILITY UNIT IIw–4

This unit consists of very friable, well-drained, medium to moderately coarse textured soils on flood plains. These soils are moderately to rapidly permeable and have a moderate to high moisture-holding capacity. They are easy to work. Flooding is the greatest hazard on these soils, but it seldom occurs during the growing season. The soils in this unit are:

Bermudian sandy loam, 0 to 3 percent slopes.
Bermudian silt loam, 0 to 3 percent slopes.
Hadley silt loam, 0 to 3 percent slopes.
Ondawa sandy loam, 0 to 3 percent slopes.

The soils in this unit are suitable for hay and pasture and for general crops grown in the county. Because of the hazard of flooding late in spring and early in fall, they are used mainly for hay, pasture, silage corn, and sweet corn. Some acreage is used for tobacco, potatoes, carrots, spinach, lettuce, celery, cabbage, and other market vegetables. Preparation of land and planting of crops in spring are somewhat delayed because of the slow runoff and moderate permeability of some soils. Supplies of moisture for plants are generally adequate during the growing season.

Proper management practices consist of applying lime and fertilizer according to needs determined by soil tests and using crop rotations that improve and maintain the supply of organic matter. A suitable rotation for intensively cultivated areas should include a close-growing crop 1 year in 3. Winter cover crops should follow row crops. Streambank protection should be provided in places.

CAPABILITY UNIT IIw-5

This capability unit consists of nearly level, moderately well drained soils on the flood plains. Textures range from moderately coarse to medium. The soils are subject to occasional or frequent flooding. They are moderately permeable to rapidly permeable, but a seasonal high water table restricts drainage. They have a moderate to high moisture-holding capacity. The soils in this unit are:

Podunk sandy loam, 0 to 3 percent slopes.
Rowland silt loam, 0 to 3 percent slopes.
Winooski silt loam, 0 to 3 percent slopes.

The soils in this unit are used mainly for hay and pasture, but they produce some silage corn, outdoor tobacco, potatoes, sweet corn, and vegetables. If limed and fertilized properly, they are well suited to water-tolerant grasses and legumes for hay and pasture.

Winter cover crops should follow intensively cultivated row crops. To maintain tilth and the supply of organic matter, a close-growing crop should be grown 1 year in 3. Soils should not be worked nor pastures grazed when too wet.

CAPABILITY UNIT IIwe-1

This unit consists of gently sloping, moderately well drained, moderately coarse to medium textured soils. They have developed on firm to very friable glacial till, stratified sand and gravel, and glacial-lake deposits of silt and clay. Runoff and permeability are moderate, but internal drainage is restricted by a seasonal high water table. The moisture-holding capacity is high. Mottling at depths of 10 to 20 inches indicates that the lower subsoils are saturated in very wet seasons. The soils in this unit are:

Acton fine sandy loam, 3 to 8 percent slopes.
Elmwood sandy loam, 3 to 8 percent slopes.
Elmwood very fine sandy loam, 3 to 8 percent slopes.
Ninigret fine sandy loam, 3 to 8 percent slopes.
Ninigret very fine sandy loam, 3 to 8 percent slopes.
Sutton loam, 3 to 8 percent slopes.
Tisbury silt loam, 3 to 8 percent slopes.
Wapping silt loam, 3 to 8 percent slopes.
Watchaug loam, 3 to 8 percent slopes.

Cleared areas of the Acton, Sutton, and Watchaug soils are used mainly for hay and pasture. Some of the acreage is used for corn and vegetables. The other soils in the unit are used for outdoor tobacco, potatoes, silage corn, hay, and pasture. Drainage is generally needed to obtain the best yields of potatoes and tobacco. Normally it is not needed for silage corn, hay, and pasture except in seep spots and low areas where surface water accumulates. Wherever practical, cultivation should be on the contour to control runoff. Field terraces and waterways are needed in places.

Lime and fertilizer should be applied according to the results of soil tests. Management is necessary to maintain supplies of organic matter and good tilth. A plowsole tends to develop if these soils are plowed when too wet. The most intensive rotation should include a close-growing crop 1 year in 3. Winter cover crops should follow row crops in the rotation.

CAPABILITY UNIT IIwe-2

This unit consists of gently sloping, moderately well drained, moderately coarse and medium textured soils. These soils have a slowly to very slowly permeable, compact pan layer at depths of 20 to 26 inches. Mottles at depths of 10 to 18 inches indicate that drainage is impeded in the lower subsoil. However, surface drainage is moderate. The surface soils and subsoils above the pan are friable to very friable, and they are moderately permeable. The moisture-holding capacity is high. The soils in this unit are:

Birchwood fine sandy loam, 3 to 8 percent slopes.
Ludlow loam, 3 to 8 percent slopes.
Rainbow silt loam, 3 to 8 percent slopes.
Woodbridge loam, 3 to 8 percent slopes.
Woodbridge loam, reddish substratum, 3 to 8 percent slopes.

These soils are used mainly for hay and pasture, and, unless drained, they are best suited to these uses. They are fairly well suited to silage corn, late vegetables, potatoes, and small fruits. If adequately drained, the soils are suitable for alfalfa, tree fruits, and general crops. Alfalfa can be grown alone in short rotations, but it produces better when seeded in mixtures with other forage plants. Small areas of Birchwood, Ludlow, and Rainbow soils are used for outdoor tobacco and potatoes. These areas generally are odd corners or small spots in fields of well-drained soils.

There is moderate risk of erosion on unprotected slopes. Practices to control erosion on intensively cultivated fields should include drainage in places, and the use of diversion terraces, graded stripcropping or contour cultivation, and waterways. The most intensive rotations used should consist of 2 years of row crops, followed each winter by cover crops, and 2 years of a legume or a legume-grass mixture. Cultivated crops need fertilizers for highest yields; grasses and legumes need lime and fertilizers.

CAPABILITY UNIT IIwe-3

This unit consists of gently sloping or undulating, moderately well drained soils that have developed from glaciolacustrine deposits of silt and clay. All soils in this unit have a high moisture-holding capacity. They are somewhat difficult to work, and the risk of erosion is high in clean-cultivated fields. Surface drainage is moderate to rapid, depending on slopes.

The Belgrade soils are medium textured and are moderately to slowly permeable. They have moderate to slow internal drainage. The Buxton and Berlin soils are medium textured and moderately permeable in the surface layers and fine textured and slowly to very slowly permeable in the lower horizons. They have slow to very slow internal drainage. The soils in this unit are:

Belgrade silt loam, 3 to 8 percent slopes.
Belgrade silt loam, reddish variant, 3 to 8 percent slopes.
Berlin silt loam, 3 to 8 percent slopes.
Buxton silt loam, 3 to 8 percent slopes.

These soils are used mainly for hay and pasture, and they are well suited to these purposes. Small acreages are used for silage corn and vegetables. A very small acreage of Belgrade silt loam has been used in the past for outdoor tobacco. Cultivated crops and grasses and legumes for hay and pasture should be limed and fertilized in amounts determined by soil tests. Cropping systems should include close-growing crops at least 3 years in 5.

To avoid puddling and compaction, the soils should be worked within a fairly narrow range of moisture conditions. The risk of erosion is high on unprotected slopes. Some areas in this unit are suitable for graded stripcropping and cultivation across the slope; others are too irregular for these practices. Waterways and diversion terraces are practical and desirable in places.

CAPABILITY UNIT IIs–1

This unit consists of nearly level, well-drained to somewhat excessively drained soils on uplands and terraces. These soils are rapidly to very rapidly permeable and have a moderate to low water-holding capacity. They are somewhat droughty. However, they warm early in spring, are easy to work, and are very responsive to fertilization.

Melrose sandy loam has developed on deposits of silt and clay that occur at depths of 2½ to 4 feet. The other soils have developed on coarse-textured glacial till or on stratified sand and gravel. The soils in this unit are:

Agawam fine sandy loam, 0 to 3 percent slopes.
Enfield silt loam, 0 to 3 percent slopes, eroded.
Gloucester fine sandy loam, 0 to 3 percent slopes.
Hartford sandy loam, 0 to 3 percent slopes.
Melrose sandy loam, 0 to 3 percent slopes.
Merrimac sandy loam, 0 to 3 percent slopes.

The soils in this unit are suitable for a wide variety of crops. Tobacco, sweet corn, and early vegetables are the principal crops, but some acreage is used for silage corn, alfalfa, potatoes, tree fruits, nursery stock, hay, and pasture. Shade-grown and outdoor tobacco are produced extensively on the Merrimac, Hartford, and Agawam soils in the northern part of the county. Although the soils are fertilized properly, crop yields in most years are limited by lack of moisture unless supplemental irrigation is used.

These soils can be used intensively with minimum risk of erosion. Unprotected soil, however, is subject to wind erosion late in winter and in spring. Lime and fertilizers should be applied according to soil tests. These elements leach away fairly rapidly. Careful management is necessary to maintain organic matter and good tilth. A plowsole commonly develops in soils that are cultivated intensively for tobacco, potatoes, and other market vegetables.

A suitable cropping system should include small grain, grass, or a grass-legume mixture 1 year in 3 or 4 years. Some farmers specializing in shade tobacco grow corn 1 year in 4 or 5 years. Winter cover crops should follow row crops each year.

CAPABILITY UNIT IIs–2

This capability unit consists of gently sloping or undulating, well-drained or somewhat excessively drained soils on uplands and terraces. The soils are rapidly to very rapidly permeable and have a moderate moisture-holding capacity. They have more runoff and are somewhat more droughty than those in capability unit IIs–1.

Melrose sandy loam has developed over deposits of silt and clay and Poquonock loamy sand over a compact pan. The other soils have developed over sand and gravel. The soils in this unit are:

Agawam fine sandy loam, 3 to 8 percent slopes.
Brookfield fine sandy loam, 3 to 8 percent slopes.
Enfield silt loam, 3 to 8 percent slopes, eroded.
Gloucester fine sandy loam, 3 to 8 percent slopes.
Hartford sandy loam, 3 to 8 percent slopes.
Melrose sandy loam, 3 to 8 percent slopes.
Merrimac sandy loam, 3 to 8 percent slopes.
Poquonock loamy sand, 3 to 8 percent slopes.

These soils are used for the same crops as those in capability unit IIs–1. Management is essentially the same except for the control of runoff. Contour cultivation and the construction of field terraces and waterways are needed on these soils in places.

CAPABILITY UNIT IIIe–1

This unit consists of sloping or rolling, moderately coarse to medium textured soils on uplands and terraces. The soils have developed on firm to very friable glacial till and stratified sand and gravel. They are very friable and moderately to rapidly permeable. The moisture-holding capacity is high to moderate. Eroded phases have shallower sola than the normal soils. Soils in this unit are:

Agawam very fine sandy loam, 8 to 15 percent slopes.
Charlton fine sandy loam, 8 to 15 percent slopes.
Cheshire fine sandy loam, 8 to 15 percent slopes.
Cheshire fine sandy loam, 8 to 15 percent slopes, eroded.
Enfield silt loam, 8 to 15 percent slopes.
Merrimac fine sandy loam, 8 to 15 percent slopes.
Narragansett silt loam, 8 to 15 percent slopes.
Narragansett silt loam, 8 to 15 percent slopes, eroded.

A large percentage of the acreage is used for hay and pasture. A small acreage of the Cheshire, Narragansett, Enfield, Agawam, and Merrimac soils is used for silage corn, tree fruits, sweet corn, tobacco, and potatoes. The soils are suitable for the general crops grown in the county. Eroded areas are more droughty than the normal soils, and special management is needed to improve fertility and prevent further erosion. Intensively cultivated fields require practices to conserve moisture and control erosion. These include contour stripcropping and waterways, and diversion terraces spaced at intervals of about 300 feet or less.

A cropping system that will maintain good tilth and organic matter and control erosion is needed. A good cropping system consists of 2 years of row crops followed by winter cover crops each year, and 2 years of hay. Lime and fertilizer should be applied according to the results of soil tests.

CAPABILITY UNIT IIIe–2

This capability unit consists of sloping or rolling, well-drained soils developed on glacial till. These soils have a compact pan at a depth of about 24 inches. They are friable to very friable and moderately permeable, and they have a high moisture-holding capacity above the pan. The pan is slowly permeable, and it restricts internal drainage to some extent. Eroded phases are shallower to the pan horizon than the normal soils. The soils in this unit are:

Broadbrook silt loam, 8 to 15 percent slopes.
Broadbrook silt loam, 8 to 15 percent slopes, eroded.

Paxton fine sandy loam, reddish substratum, 8 to 15 percent slopes.
Paxton loam, 8 to 15 percent slopes.
Poquonock sandy loam, 8 to 15 percent slopes.
Wethersfield loam, 8 to 15 percent slopes.
Wethersfield loam, 8 to 15 percent slopes, eroded.

These soils are used mainly for hay, pasture, and fruit trees, and they are suitable for these crops. Very small acreages are used for silage corn, potatoes, vegetables, and other crops. Good yields of grasses, alfalfa, and other legumes for hay and pasture can be obtained if the soils are properly limed and fertilized. The risk of erosion limits the use of these soils for cultivated crops.

A 5-year rotation consisting of 2 years of row crops, followed each year by winter cover, and 3 years of hay will help control erosion and maintain good tilth. Supporting conservation practices should include contour stripcropping, spot drainage of seeps, the use of diversion terraces spaced at intervals of about 300 feet, and waterways. Eroded soils require special management to improve fertility and prevent further erosion.

CAPABILITY UNIT IIIe-3

This unit consists of sloping or rolling, somewhat excessively drained soils on uplands and terraces. All soils are rapidly to very rapidly permeable and have a moderate moisture-holding capacity. The compact pan layer in the Poquonock loamy sand restricts internal drainage to some extent. The soils in this unit are:

Agawam fine sandy loam, 8 to 15 percent slopes.
Brookfield fine sandy loam, 8 to 15 percent slopes.
Enfield silt loam, 8 to 15 percent slopes, eroded.
Gloucester fine sandy loam, 8 to 15 percent slopes.
Hartford sandy loam, 8 to 15 percent slopes.
Merrimac sandy loam, 8 to 15 percent slopes.
Poquonock loamy sand, 8 to 15 percent slopes.

More than half the acreage of these soils is in forests; some is idle. The Agawam, Hartford, Merrimac, and Enfield soils are used mainly for tobacco, potatoes, and sweet corn, but some of the acreage is used for hay and pasture. The Gloucester and Brookfield soils are used principally for hay and pasture. Even if the soils in this unit are fertilized heavily, crop yields in most years are limited by lack of moisture unless supplemental irrigation is used. If heavily limed and fertilized, these soils are suitable for alfalfa, but they are poorly suited to shallow-rooted grasses and legumes for hay and pasture.

Erosion control practices in cultivated fields should include contour stripcropping, where practical, and the use of waterways and diversion terraces. A suitable cropping system should include a close-growing crop for 2 years in 4.

CAPABILITY UNIT IIIe-4

This unit consists of sloping or rolling, moderately well drained silty soils on glaciolacustrine terraces. Surface layers are medium textured and moderately to slowly permeable; lower layers are fine textured and slowly to very slowly permeable. The moisture-holding capacity is high. These soils are somewhat difficult to manage because of fine texture and the risk of erosion on unprotected slopes. The soils in this unit are:

Berlin silt loam, 8 to 15 percent slopes.
Buxton silt loam, 8 to 15 percent slopes.

These soils are used mainly for hay and pasture, and they are suitable for these crops. Very small acreages are used for silage corn and vegetables. The soils are only fairly well suited to cultivated crops because they are rather difficult to work. In addition, the risk of erosion is high on unprotected slopes. The reseeding of hayfields and pastures should be done in strips and lime and fertilizer applied in amounts determined by soil tests. Pastures should not be grazed when too wet. Rotations should be fairly long on cultivated soils; a row crop should be grown only 1 year in 4. Graded stripcropping is practical only on some areas. Spot drainage and the use of waterways are suitable practices in some places.

CAPABILITY UNIT IIIw-1

This unit consists of nearly level, poorly drained soils on uplands and terraces that have developed on glacial till, stratified sand and gravel, and deposits of silt and clay. Runoff is slow to very slow. Permeability is moderate to rapid, but a high water table interferes with internal drainage. Some areas are ponded in very wet seasons. The soils in this unit are:

Leicester loam, 0 to 3 percent slopes.
Ridgebury loam, 0 to 3 percent slopes.
Swanton sandy loam, 0 to 3 percent slopes.
Swanton very fine sandy loam, 0 to 3 percent slopes.
Wallington silt loam, 0 to 3 percent slopes.
Wallington silt loam, reddish variant, 0 to 3 percent slopes.
Walpole loam, 0 to 3 percent slopes.
Walpole sandy loam, 0 to 3 percent slopes.
Wilbraham silt loam, 0 to 3 percent slopes.

More than half the acreage of this unit is in forest. The use of these soils for cultivated crops is limited by poor drainage. Cleared, undrained areas are mainly in unimproved pasture, or they are idle. Drained and partly drained areas are used mainly for hay and pasture. Small areas of the Walpole and Swanton soils are used for tobacco, potatoes, sweet corn, and nursery stock. Drainage and fertilization are the main needs of these soils. Land smoothing in places will eliminate low, wet spots and improve surface drainage.

A good cropping system includes a close-growing crop 1 year in 3 or 4 years. Cultivated crops should be limed and fertilized in amounts determined by soil tests. Areas to be used for pasture or hay should be seeded to water-tolerant grasses and legumes and then limed and fertilized. Pastures should not be grazed when they are too wet.

If suitable outlets can be located, most of these soils can be readily drained through the use of tile or open ditches. However, the Ridgebury and Wilbraham soils have a compact pan, the Swanton are underlain by silt and clay, and the Wallington are silty textured. Consequently, these soils are somewhat more difficult to drain than the Walpole soils.

CAPABILITY UNIT IIIw-2

This unit consists of nearly level soils from recent alluvium. These soils are poorly drained except Allu-

vial land (0 to 3 percent slopes), which varies in drainage. They are subject to fairly frequent flooding. They are moderately to rapidly permeable, but internal drainage is restricted by a high water table. The moisture-holding capacity is high to moderate. The soils in this unit are:

Alluvial land (0 to 3 percent slopes).
Bowmansville silt loam, 0 to 3 percent slopes.
Limerick silt loam, 0 to 3 percent slopes.
Rumney sandy loam, 0 to 3 percent slopes.

These soils occupy some of the lowest parts of flood plains. In their natural undrained condition, they are more suitable for hay and pasture than for cultivated crops. Small, scattered areas of these soils in fields that consist mainly of well drained and moderately well drained alluvial soils are used for potatoes, silage corn, and vegetables.

Adequately drained soils can be used for cultivated crops. Frequent flooding and the lack of suitable outlets, however, may prevent proper drainage. Partly drained areas are suitable for water-tolerant legumes and grasses for hay and pasture. These plants need lime and fertilizer. Unimproved native pastures produce forage of poor quality but can be grazed during dry periods in summer and fall.

CAPABLITY UNIT IIIs-1

This unit consists of nearly level to gently sloping, excessively drained soils of very low natural fertility. These soils are very rapidly permeable, have a low water-holding capacity, and are droughty. They warm up very early in spring and are responsive to fertilization when the moisture supply is adequate. Soils in this unit are:

Elmwood loamy sand, 0 to 3 percent slopes.
Penwood loamy sand, 0 to 3 percent slopes.
Penwood loamy sand, 3 to 8 percent slopes.
Suncook loamy sand, 0 to 3 percent slopes.
Windsor loamy coarse sand, 0 to 3 percent slopes.
Windsor loamy coarse sand, 3 to 8 percent slopes.
Windsor loamy fine sand, 0 to 3 percent slopes.
Windsor loamy fine sand, 3 to 8 percent slopes.

More than 75 percent of the acreage in this capability unit is in scrubby forest, urban development, and idle land. Because of droughtiness and very low natural fertility, these soils have limited suitability for crops, hay, and pasture. Tobacco and sweet corn are the principal crops, and they are heavily fertilized and generally irrigated. Small acreages are used for vegetables, pasture, alfalfa, orchards, and nursery stock. Alfalfa grows fairly well if properly limed and fertilized.

Intensively cultivated areas need careful management to improve and maintain fertility and the supply of organic matter. Crops should be irrigated. A good cropping system includes a close-growing crop 1 year in 3. Winter cover crops should follow row crops each year. Fertilizers and lime leach out rapidly; they should be applied in amounts indicated by soil tests. Unprotected areas are subject to wind erosion late in winter and in spring.

CAPABILITY UNIT IIIs-2

This unit consists of nearly level, excessively drained, shallow, droughty soils. These soils are rapidly to very rapidly permeable, and they have a moderate to low moisture-holding capacity. They are underlain by coarse sand and gravel but are not so droughty as those in capability unit IIIs-1. The soils in this capability unit are:

Hinckley gravelly sandy loam, 0 to 3 percent slopes.
Manchester gravelly loam, 0 to 3 percent slopes.
Manchester gravelly sandy loam, 0 to 3 percent slopes.

Cleared areas of these soils are used mainly for hay and pasture, or they are idle. A very small acreage is used for tobacco, sweet corn, alfalfa, orchards, and vegetables. Alfalfa grows fairly well if it is properly limed and fertilized. Management requirements are similar to those for the soils in capability unit IIIs-1.

CAPABILITY UNIT IIIse-1

This unit consists of gently sloping or rolling, excessively drained, shallow, and droughty soils. These soils are underlain by coarse sand and gravel. They are moderately to rapidly permeable and have a moderate to low moisture-holding capacity. Unprotected slopes are subject to erosion. The soils in this unit are similar to those in capability unit IIIs-2 except for slopes. They are:

Hinckley gravelly sandy loam, 3 to 15 percent slopes.
Manchester gravelly loam, 3 to 15 percent slopes.
Manchester gravelly sandy loam, 3 to 15 percent slopes.

These soils are mainly in cutover forest, or they are idle. Small areas in the northern part of the county are used for tobacco, sweet corn, vegetables, orchards, alfalfa, hay, and pasture. A higher percentage of Manchester gravelly loam is used for crops, hay, and pasture than of the Hinckley and Manchester gravelly sandy loams.

The soils in this unit are best suited to alfalfa, early vegetables, and grass-legume mixtures for hay and pasture. Their use for grasses, legumes, and general crops is limited by droughtiness. Alfalfa grows fairly well if it is properly limed and fertilized.

The risk of erosion on cultivated slopes is moderate to high. Erosion is difficult to control, because, in many places, the terrain is too irregular for contour cultivation, stripcropping, and the use of field terraces.

CAPABILITY UNIT IVe-1

This capability unit consists of strongly sloping or hilly, well-drained soils on uplands. They have developed over firm to very friable glacial till. These soils are moderately to rapidly permeable and have a moderate to high moisture-holding capacity. The eroded phases have thinner sola than the normal soils, and their surface soils generally contain a higher percentage of angular rock fragments. The soils in this unit are:

Charlton fine sandy loam, 15 to 25 percent slopes.
Cheshire fine sandy loam, 15 to 25 percent slopes, eroded.
Gloucester fine sandy loam, 15 to 25 percent slopes.
Narragansett silt loam, 15 to 25 percent slopes.

Cleared areas are used mainly for hay, pasture, and tree fruits, and the soils are suited best to these crops. Small areas are used for corn and other crops. Some areas are idle. The risk of erosion is high if these soils are used for cultivated crops. However, cultivated crops

can be grown if suitable cropping systems and conservation practices are used. A row crop should be grown only 1 year in 6 years. In addition, contour stripcropping, waterways, and diversion terraces spaced at intervals of about 300 feet should be used.

Areas used for hay and pasture should be reseeded in strips about 100 feet wide. Lime and fertilizer applied in amounts determined by soil tests will assure a good stand.

CAPABILITY UNIT IVe–2

This unit consists of well-drained, strongly sloping or hilly soils that have a very compact pan horizon at depths ranging from 20 to 30 inches. These soils are generally moderately permeable, and they have a moderate to high moisture-holding capacity above the pan. Eroded areas have shallower sola than the normal soils on similar slopes. The soils in this unit are:

Broadbrook silt loam, 15 to 25 percent slopes.
Paxton fine sandy loam, reddish substratum, 15 to 25 percent slopes.
Paxton loam, 15 to 25 percent slopes, eroded.
Wethersfield loam, 15 to 25 percent slopes.
Wethersfield loam, 15 to 25 percent slopes, severely eroded.

Cleared areas are used largely for hay, pasture, and tree fruits, or they are idle. If properly fertilized, the soils are well suited to tree fruits, and to grasses and legumes for hay and pasture. Because of steep slopes and the risk of erosion, these soils should be only occasionally cultivated and only if erosion control practices are used. The risk of erosion is somewhat greater in these soils than in those of capability unit IVe–1 because of the compact pan horizon. Erosion control practices should include contour stripcropping, the use of waterways, and the construction of diversion terraces spaced at intervals of 300 feet or less. The management requirements of the small areas of severely eroded Wethersfield soils are more restrictive than for the other soils in the unit. Areas used for hay and pasture should be reseeded in narrow strips. A suitable cropping system should include a row crop only 1 year in 6 years.

CAPABILITY UNIT IVes–1

This capability unit consists of gently sloping to rolling, well-drained, stony soils. These soils have developed on firm to very friable glacial till. They are moderately to rapidly permeable and have a moderate to high moisture-holding capacity. The soils in this unit are:

Brookfield stony fine sandy loam, 3 to 8 percent slopes.
Brookfield stony fine sandy loam, 8 to 15 percent slopes.
Charlton stony fine sandy loam, 3 to 8 percent slopes.
Charlton stony fine sandy loam, 8 to 15 percent slopes.
Cheshire stony fine sandy loam, 3 to 8 percent slopes.
Cheshire stony fine sandy loam, 8 to 15 percent slopes.
Gloucester stony fine sandy loam, 3 to 8 percent slopes.
Gloucester stony fine sandy loam, 8 to 15 percent slopes.
Narragansett stony silt loam, 3 to 8 percent slopes.
Narragansett stony silt loam, 8 to 15 percent slopes.

About 75 percent of the acreage is in cutover forest. Cleared areas are used mainly for hay and pasture, but small, scattered areas are used for tree fruits and cultivated crops (fig. 1). Stones severely limit the use of modern machinery to produce row crops on these soils. However, most areas can be used for hay, improved pasture, small grains, and tree fruits, and they can be cultivated to some extent. The soils are well suited to hay, pasture, and orchards if properly limed and fertilized, and to forestry.

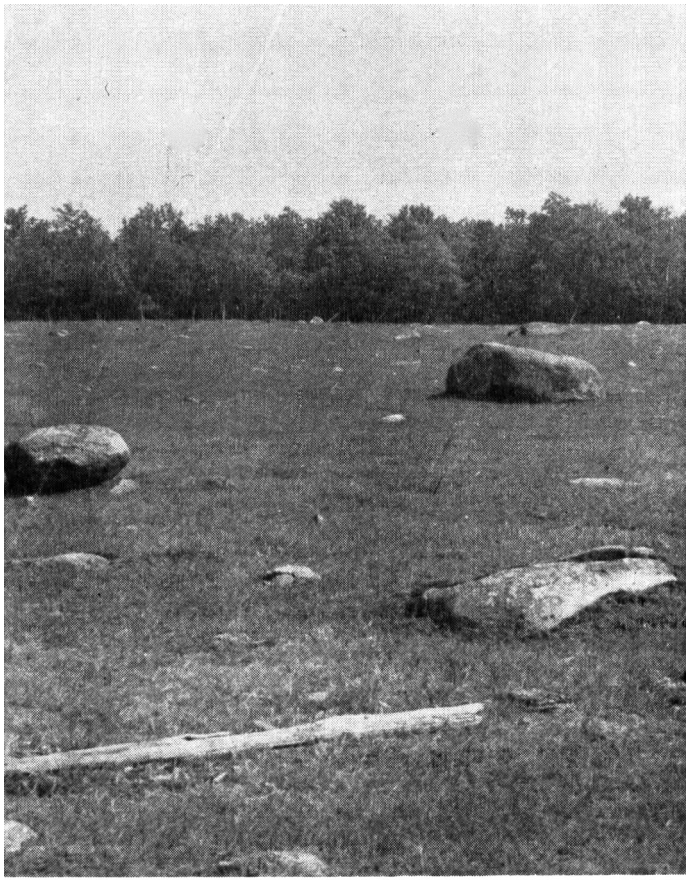

Figure 1.—**Improved pasture on Gloucester stony fine sandy loam.**

CAPABILITY UNIT IVes–2

This capability unit consists mainly of gently sloping to rolling, well-drained, stony soils. These soils have compact pan horizon at a depth of about 24 inches. They have developed on glacial till. They are moderately permeable above the pan and have a high moisture-holding capacity. The soils in this unit are:

Broadbrook stony silt loam, 0 to 3 percent slopes.
Broadbrook stony silt loam, 3 to 8 percent slopes.
Broadbrook stony silt loam, 8 to 15 percent slopes.
Paxton stony loam, 3 to 8 percent slopes.
Paxton stony loam, 8 to 15 percent slopes.
Paxton stony fine sandy loam, reddish substratum, 3 to 8 percent slopes.
Paxton stony fine sandy loam, reddish substratum, 8 to 15 percent slopes.
Wethersfield stony loam, 3 to 8 percent slopes.
Wethersfield stony loam, 8 to 15 percent slopes.

Most of these soils are in cutover forest. They have the same general limitations and are used in about the same way as the soils in capability unit IVes–1. However, the soils have a somewhat better moisture-holding capacity because of the pan, and they are slightly better suited to cultivated crops, hay, pasture, and woodlands.

CAPABILITY UNIT IVw–1

This capability unit consists of nearly level, poorly drained, silty soils on glaciolacustrine terraces. Surface soil textures are silt loam; lower horizon textures range from silty clay loam to silty clay. Surface drainage is slow, and internal drainage is slow to very slow. The soils in this unit are:

Scantic silt loam, 0 to 3 percent slopes.
Scantic silt loam, reddish variant, 0 to 3 percent slopes.

These soils are used mainly for pasture, most of which is unimproved. Some acreage is used for hay, and very small, scattered areas are used for silage corn, vegetables, and other crops. The soil is not suitable for cultivated crops unless it is drained. It is suitable, however, for water-tolerant legumes and grasses for hay and pasture if proper management, including use of lime and fertilizer, is used. Pastures should not be grazed when wet because trampling puddles and compacts the soil and cuts up the sod. Rushes, sedges, and weeds tend to crowd out the desirable grasses and legumes in unimproved pastures.

These soils are difficult to drain because the subsoils are fine textured and are slowly permeable. Drainage with tile and open ditches is not satisfactory. Leveling and bedding are the most practical ways to improve the drainage.

CAPABILITY UNIT IVs–1

This unit consists of gently sloping to rolling, excessively drained, and extremely droughty soils. They have developed over sand or sand and gravel. They are very rapidly permeable and have a low moisture-holding capacity. The soils in this unit are:

Hinckley loamy sand, 3 to 15 percent slopes.
Manchester loamy sand, 3 to 15 percent slopes.
Penwood loamy sand, 8 to 15 percent slopes.
Windsor loamy coarse sand, 8 to 15 percent slopes.
Windsor loamy fine sand, 8 to 15 percent slopes.

These soils are largely in scrubby forests, or they are idle. Small areas are used for tobacco, sweet corn, vegetables, and pasture. Because of droughtiness and very low fertility, these soils are not suited to cultivated crops unless irrigated and frequently given large quantities of fertilizer. They are best suited to early vegetables, early sweet corn, alfalfa, and other special crops. They are also well suited to woodlands. Unprotected slopes are subject to wind and water erosion. Fields should be cultivated along the contour and protected by waterways and diversion terraces.

CAPABILITY UNIT IVws–1

This unit consists of nearly level to gently sloping, stony, moderately well drained soils. They have developed on firm to very friable glacial till. Permeability is moderate to rapid, but drainage is restricted by a seasonal high water table. The soils in this unit are:

Acton stony fine sandy loam, 3 to 8 percent slopes.
Sutton stony loam, 0 to 3 percent slopes.
Sutton stony loam, 3 to 8 percent slopes.
Wapping stony silt loam, 0 to 3 percent slopes.
Wapping stony silt loam, 3 to 8 percent slopes.
Watchaug stony loam, 0 to 3 percent slopes.
Watchaug stony loam, 3 to 8 percent slopes.

About 75 percent of the acreage is in cutover forests. Cleared areas are used mainly for hay and pasture, and a few small areas are used for cultivated crops, tree fruits, and small fruits. Stones limit the use of modern machinery to produce row crops on these soils. However, most areas can be used for hay, improved pasture, small grains, orchards, and small fruits, and they can be cultivated to some extent. The soils are generally suitable for hay and pasture without drainage, but areas in orchards need drainage. Hayfields and pastures should be fertilized and limed according to soil tests.

CAPABILITY UNIT IVws–2

This unit consists of nearly level to gently sloping, moderately well drained, stony soils. They have developed over glacial till and have a compact pan layer at depths of 20 to 26 inches. These soils are moderately permeable above the pan layer, even though a seasonal water table above the pan obstructs internal drainage. The moisture-holding capacity is high. The soils in this unit are:

Ludlow stony loam, 3 to 8 percent slopes.
Rainbow stony silt loam, 0 to 3 percent slopes.
Rainbow stony silt loam, 3 to 8 percent slopes.
Woodbridge stony loam, 0 to 3 percent slopes.
Woodbridge stony loam, 3 to 8 percent slopes.
Woodbridge stony loam, reddish substratum, 3 to 8 percent slopes.

These soils are used for the same purpose and they have about the same use limitations as those in capability unit IVws–1. They are well suited to hay, pasture, and forestry. Internal drainage is somewhat slower because of the pan. Diversion terraces to intercept seepage would benefit these soils.

CAPABILITY UNIT Vw–1

This unit consists of nearly level, very poorly drained soils on uplands and terraces. In winter and spring, the water table is at or near the surface most of the time. The soils in this unit are:

Menlo silt loam, 0 to 3 percent slopes.
Scarboro loam, 0 to 3 percent slopes.
Whately loam, 0 to 3 percent slopes.

These soils are limited in use by very poor drainage; they are mainly in forest and unimproved pasture. Partly drained areas are fair for pasture if properly limed and fertilized. Because of sand and gravel in the substratum, the Scarboro soil is easier to drain than the Menlo and Whately soils. If adequately drained, some areas of the soils in this unit could be used for corn, late vegetables, and other crops and for hay and pasture. Drainage and fertilization are the major needs.

CAPABILITY UNIT Vw–2

This capability unit consists of nearly level, very poorly drained soils on glaciolacustrine terraces. Surface and internal drainage are very slow, and ground water stands on or near the surface most of the time. The soils in this unit are:

Biddeford silt loam, 0 to 3 percent slopes.
Biddeford silt loam, reddish variant, 0 to 3 percent slopes.

These soils are mainly in forest and brushy, unimproved pasture; some areas are idle. They are best suited

to forestry, unimproved pasture, and wildlife. They cannot be drained well enough to make them suitable for cultivation. However, most areas can be drained enough by open ditches to make them suitable for improved pasture.

CAPABILITY UNIT VIe–1

This capability unit consists of strongly sloping to steep soils on terrace breaks and in the highly dissected parts of the glaciofluvial and glaciolacustrine terraces. These soils are well drained to excessively drained, and they are moderately to very rapidly permeable. Runoff is very rapid. Some areas are moderately to severely eroded. The soils in this unit are:

Terrace escarpments, clay.
Terrace escarpments, sand and clay.
Terrace escarpments, sand and gravel.

Because of steepness, droughtiness, and the risk of erosion, these soils are not suitable for cultivation. They are best suited to pasture and woodland, and they are used mainly for these purposes. Some cleared areas are idle. Good pastures can be established on the clayey and the sandy and clayey terrace breaks if the soil is fertilized properly. Where possible pastures should be seeded across the slopes in strips about 100 feet wide.

CAPABILITY UNIT VIes–1

This unit consists of strongly sloping and hilly, stony, well-drained soils that have developed over firm to very friable glacial till. These soils are moderately to rapidly permeable, and they have a moderate to high moisture-holding capacity. The soils in this unit are:

Charlton stony fine sandy loam, 15 to 25 percent slopes.
Cheshire stony fine sandy loam, 15 to 25 percent slopes.
Gloucester stony fine sandy loam, 15 to 25 percent slopes.
Narragansett stony silt loam, 15 to 25 percent slopes.

These soils are mainly in cutover forest. Small areas have been cleared and are used mainly for unimproved pasture, or they are idle. Some very small areas are used for orchards and improved pasture. The soils are suited best to pasture and forestry, but some areas can be worked for orchards and improved pasture. Forage of good quality can be grown on improved pasture if lime and fertilizer are applied according to needs determined by soil tests.

CAPABILITY UNIT VIes–2

This capability unit consists of strongly sloping and hilly, well-drained, stony soils that have a compact pan layer at a depth of about 24 inches. They are moderately permeable and have a high moisture-holding capacity. Internal drainage is restricted somewhat by the pan layer. The soils in this unit are:

Broadbrook stony silt loam, 15 to 25 percent slopes.
Paxton stony fine sandy loam, reddish substratum, 15 to 25 percent slopes.
Paxton stony loam, 15 to 25 percent slopes.
Wethersfield stony loam, 15 to 25 percent slopes.

These soils are mainly in forests. Small acreages have been cleared and are used for orchards and unimproved pasture, or they are idle. Because of steepness and stones, these soils are suited best to orchards, pasture, and forest. They are better forest soils than those in capability unit VIes–1. They will produce good pastures if properly fertilized.

CAPABILITY UNIT VIw–1

This capability unit consists of very poorly drained, very frequently flooded soils of the flood plains that have developed from recent alluvium. Textures range from moderately coarse to medium. The soils in this unit are:

Saco sandy loam, 0 to 3 percent slopes.
Saco silt loam, 0 to 3 percent slopes.

Very frequent flooding and very poor drainage limit the uses of these soils to forestry, wildlife habitats, and unimproved pasture. Drainage is not generally practical because of flooding and the lack of suitable outlets. Pastures can be improved in places by applying fertilizers and by clipping weeds.

CAPABILITY UNIT VIws–1

This unit consists of nearly level, poorly drained, stony soils on uplands. They are medium textured and moderately permeable, but a high water table interferes with internal drainage. The soils in this unit are:

Leicester stony loam, 0 to 3 percent slopes.
Wilbraham stony silt loam, 0 to 3 percent slopes.

These soils are mainly in forest. Some of the acreage has been cleared and is used for unimproved pasture, or it is idle. Some of the pastures can be improved if lime and fertilizer are applied.

CAPABILITY UNIT VIws–2

This capability unit consists of very poorly drained, stony soils on uplands. Runoff and internal drainage are very slow because of a high water table. The soils in this unit are:

Menlo stony silt loam, 0 to 3 percent slopes.
Whitman stony loam, 0 to 3 percent slopes.

These soils are largely in forests, but small areas are in unimproved pasture, or are idle. Unimproved pastures furnish some grazing in dry periods. These soils are limited to pasture, forestry, and wildlife habitats because of stoniness and wetness.

CAPABILITY UNIT VIs–1

This capability unit consists of gently sloping to rolling, well drained and moderately well drained, very stony soils. These soils have developed over firm to very friable glacial till. They are moderately to rapidly permeable. The soils in this unit are:

Charlton very stony fine sandy loam, 3 to 15 percent slopes.
Cheshire very stony fine sandy loam, 3 to 15 percent slopes.
Gloucester and Brookfield very stony fine sandy loams, 3 to 15 percent slopes.
Narragansett and Broadbrook very stony silt loams, 3 to 15 percent slopes.
Sutton and Acton very stony loams, 3 to 15 percent slopes.

Because of the very stony surface, these soils are suited best to pasture and woodland. Scattered areas have been cleared and are used for unimproved pasture of low carrying capacity, or they are idle. Pastures on some areas can be improved by use of lime and fertilizer.

CAPABILITY UNIT VIs–2

This capability unit consists of very stony soils that are gently sloping to hilly or undulating to sloping and hilly and are well drained to moderately well drained. They

have developed over glacial till and have a compact pan layer at a depth of about 2 feet. They are moderately permeable above the pan layer and have a high moisture-holding capacity. The soils in this unit are:

Ludlow and Watchaug very stony soils, 3 to 15 percent slopes.
Paxton very stony loam, 3 to 15 percent slopes.
Wethersfield very stony loam, 3 to 15 percent slopes.
Woodbridge very stony soils, 3 to 15 percent slopes.

These soils are mainly in forest and should be managed for this purpose. Scattered areas have been cleared and are used for unimproved pasture of low carrying capacity, or they are idle. The soils in this unit can supply somewhat more moisture for growing plants and are therefore better suited to pasture and forestry than those in capability unit VIs–1. Pasture on some areas can be improved by use of lime and fertilizer.

CAPABILITY UNIT VIs–3

This unit consists of gently sloping to rolling, rocky, shallow soils. These soils are well drained to somewhat excessively drained. Outcrops of bedrock range from a few to about 20 per acre. Some areas have loose stones on the surface. The soil between outcrops ranges from a few inches to about 20 inches in thickness. The soils in this unit are:

Hollis rocky loam, 3 to 15 percent slopes.
Holyoke rocky silt loam, 3 to 15 percent slopes.
Sunderland rocky fine sandy loam, 3 to 15 percent slopes.

These soils are mainly in forest or unimproved pasture, but small areas are used for hay, improved pasture, orchards, and nursery stock. They are best suited to hay, pasture, and woodlands. Outcroppings of bedrock and loose stones and boulders make most areas difficult to work.

CAPABILITY UNIT VIIs–1

This capability unit consists of strongly sloping and hilly, well-drained, very stony soils. They have developed on firm to very friable glacial till. These soils are moderately to rapidly permeable, and they have a moderate to high moisture-holding capacity. The soils in this unit are:

Charlton very stony fine sandy loam, 15 to 35 percent slopes.
Cheshire very stony fine sandy loam, 15 to 35 percent slopes.
Gloucester and Brookfield very stony fine sandy loams, 15 to 35 percent slopes.
Narragansett and Broadbrook very stony soils, 15 to 35 percent slopes.

These soils are mainly in cutover forest. Small, scattered areas have been cleared and are used for unimproved pasture of low carrying capacity, or they are idle. Because of stoniness and steepness of slope, these soils should be managed primarily for forestry.

CAPABILITY UNIT VIIs–2

This capability unit consists of strongly sloping and hilly, well-drained, very stony soils that have a compact pan layer at a depth of about 24 inches. The soils are moderately permeable and have a high moisture-holding capacity. The soils in this unit are:

Paxton very stony loam, 15 to 35 percent slopes.
Wethersfield very stony loam, 15 to 35 percent slopes.

These soils are mainly in cutover forest. Small areas have been cleared and are used for unimproved pasture of low carrying capacity, or they are idle. Slopes and stones limit these soils to forestry, wildlife habitats, and unimproved pasture. They should be managed mainly for these purposes.

CAPABILITY UNIT VIIs–3

This capability unit consists of gently sloping to steep, well-drained, rocky and very rocky, shallow soils. Outcroppings of bedrock occupy up to 50 percent of the surface of the very rocky soils. The soils in this unit are:

Hollis rocky loam, 15 to 35 percent slopes.
Hollis very rocky loam, 3 to 15 percent slopes.
Hollis very rocky loam, 15 to 35 percent slopes.
Holyoke rocky silt loam, 15 to 35 percent slopes.
Holyoke very rocky silt loam, 3 to 15 percent slopes.
Holyoke very rocky loam, 15 to 35 percent slopes.
Sunderland rocky fine sandy loam, 15 to 35 percent slopes.

These rocky and very rocky soils are mainly in cutover forests. Small areas have been cleared and are used for unimproved pasture, or they are idle. Though somewhat droughty, these soils are fair for forests. They should be managed for forestry, wildlife, or recreation.

CAPABILITY UNIT VIIs–4

This capability unit consists of nearly level to very gently sloping, poorly and very poorly drained, very stony soils. The soils in this unit are:

Leicester, Whitman, and Ridgebury very stony soils, 0 to 5 percent slopes.
Wilbraham and Menlo very stony silt loams, 0 to 3 percent slopes.

About 85 percent of the acreage is in cutover forest (fig. 2); the rest has been cleared or partly cleared and is used for unimproved pasture, or it is idle. Unimproved pastures of native grasses and legumes furnish fair grazing, especially in dry seasons. These soils are not suitable for crops or improved pasture because they are stony and wet. The most practical uses are for forestry, unimproved pasture, and wildlife.

CAPABILITY UNIT VIIIw–1

This capability unit consists of soils that have severe limitations because of wetness.

Peats and Mucks.
Peats and Mucks, shallow.

These soils are limited in use mainly for wildlife habitats and water supplies. Some areas support a forest of elm, red maple, and other water-loving plants.

CAPABILITY UNIT VIIIs–1

The land types in this unit have little value for the production of crops, hay, pasture, or forests. They are:

Riverwash.
Rocky land, Hollis materials, 3 to 15 percent slopes.
Rocky land, Hollis materials, 15 to 35 percent slopes.
Rocky land, Holyoke materials, 3 to 15 percent slopes.
Rocky land, Holyoke materials, 15 to 35 percent slopes.

The use of these soils is limited mainly to recreation and to wildlife habitats.

Figure 2.—**Leicester, Whitman, and Ridgebury very stony soils.**

Estimated Yields

The estimated average acre yields that can be expected from the principal crops grown on soils in Hartford County, Conn., under two levels of management are given in table 1.

Yields are the averages that can be expected over several years. Those in any one year may be affected by many factors, including favorable or unfavorable weather, insects, and plant diseases. After the level of management is improved, several years may pass before yields are consistently increased.

Yields in columns A were obtained under prevailing or ordinary management. Under such management not enough lime, fertilizer, and manure are used to produce maximum yields, and on some farms the erosion control, drainage, and irrigation are inadequate. Improved varieties of crops, certified seed, and proper seedbed preparation are not always used. Insects and plant diseases are not well enough controlled. Some of the pastures are brushy, weedy, and unimproved.

Yields in columns B are those expected under improved management, which includes the application of enough lime, manure, and commercial fertilizer; the proper use of cropping systems and crop residues; drainage and irrigation when and where needed; the control of runoff, erosion, weeds, brush, insects, and plant diseases; proper seedbed preparation; and selection of suitable crops and varieties. Pastures have been improved by fertilization, liming, controlling brush and weeds, seeding of desirable forage plant mixtures, and regulating the grazing.

TABLE 1.—*Estimated average acre yields of crops*

[Yields in columns A are those expected under ordinary management; those in columns B, under improved management. Absence of yield indicates crop is seldom, if ever, grown]

Soil [1]	Shade-grown tobacco	Broad-leaf tobacco	Havana seed tobacco	Potatoes	Sweet corn	Silage corn		Alfalfa hay		Mixed hay		Permanent pasture		Rotation pasture	
	B	B	B	B	B	A	B	A	B	A	B	A	B	A	B
	Lb.	*Lb.*	*Lb.*	*Bu.*	*Doz.*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Cow-acre-days*	*Cow-acre-days*	*Cow-acre-days*	*Cow-acre-days*
Acton fine sandy loam, 0 to 3 percent slopes	------	------	------	------	------	11	16	2.0	3.5	1.1	2.1	40	75	160	230
Acton fine sandy loam, 3 to 8 percent slopes	------	------	------	------	------	11	16	2.0	3.5	1.1	2.1	40	75	160	230
Acton stony fine sandy loam, 3 to 8 percent slopes	------	------	------	------	------	----	----	-----	-----	-----	-----	30	60	-----	----
Agawam fine sandy loam, 0 to 3 percent slopes	1,200	1,700	1,725	550	1,300	9	14	2.5	4.0	.9	1.8	40	75	160	230
Agawam fine sandy loam, 3 to 8 percent slopes	1,150	1,650	1,675	550	1,300	9	14	2.5	4.0	.9	1.8	40	75	160	230
Agawam fine sandy loam, 8 to 15 percent slopes	1,100	1,600	1,625	400	1,200	7	12	2.0	3.5	.7	1.4	35	70	150	220
Agawam very fine sandy loam, 0 to 3 percent slopes	1,300	1,825	1,850	650	1,300	12	17	3.5	5.0	1.3	2.3	50	110	170	240
Agawam very fine sandy loam, 3 to 8 percent slopes	1,250	1,775	1,800	650	1,300	12	17	3.5	5.0	1.3	2.3	50	110	170	240
Agawam very fine sandy loam, 8 to 15 percent slopes	1,200	1,725	1,750	600	1,250	10	15	3.0	4.5	1.1	2.1	40	100	160	230
Agawam very fine sandy loam, overflow, 0 to 3 percent slopes	------	------	------	650	1,300	12	17	3.5	5.0	1.5	2.5	50	120	170	240

See footnote at end of table.

TABLE 1.—*Estimated average acre yields of crops*—Continued

[Yields in columns A are those expected under ordinary management; those in columns B, under improved management. Absence of yield indicates crop is seldom, if ever, grown]

Soil [1]	Shade-grown tobacco	Broadleaf tobacco	Havana seed tobacco	Potatoes	Sweet corn	Silage corn		Alfalfa hay		Mixed hay		Permanent pasture		Rotation pasture	
	B	B	B	B	B	A	B	A	B	A	B	A	B	A	B
	Lb.	*Lb.*	*Lb.*	*Bu.*	*Doz.*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Cow-acre-days*	*Cow-acre-days*	*Cow-acre-days*	*Cow-acre-days*
Alluvial land												30	65		
Belgrade silt loam, 0 to 3 percent slopes		1,650	1,675			11	16	3.0	4.5	1.5	2.5	50	120	180	250
Belgrade silt loam, 3 to 8 percent slopes		1,600	1,625			11	16	3.0	4.5	1.5	2.5	50	120	180	250
Belgrade silt loam, reddish variant, 0 to 3 percent slopes		1,650	1,675			11	16	3.0	4.5	1.5	2.5	50	120	180	250
Belgrade silt loam, reddish variant, 3 to 8 percent slopes		1,600	1,625			11	16	3.0	4.5	1.5	2.5	50	120	180	250
Berlin silt loam, 0 to 3 percent slopes						9	14			1.3	2.3	40	100	160	230
Berlin silt loam, 3 to 8 percent slopes						9	14			1.3	2.3	40	100	160	230
Berlin silt loam, 8 to 15 percent slopes						7	12			1.3	2.3	35	90	160	230
Bermudian sandy loam, 0 to 3 percent slopes		1,800	1,825		1,250	11	16	3.0	4.5	1.1	2.1	50	110	170	240
Bermudian silt loam, 0 to 3 percent slopes		1,750	1,775		1,300	13	18	3.0	4.5	1.5	2.5	50	120	180	250
Biddeford silt loam, 0 to 3 percent slopes												30	55		
Biddeford silt loam, reddish variant, 0 to 3 percent slopes												30	65		
Birchwood fine sandy loam, 0 to 3 percent slopes	1,000	1,625	1,650	550	1,100	9	14	1.5	3.0	1.1	2.1	40	75	150	220
Birchwood fine sandy loam, 3 to 8 percent slopes	950	1,575	1,600	550	1,100	9	14	1.5	3.0	1.1	2.1	40	75	150	220
Bowmansville silt loam, 0 to 3 percent slopes										.5	2.0	30	90	140	210
Branford silt loam, 0 to 3 percent slopes				650	1,300	12	17	3.5	5.0	1.3	2.3	50	110	170	240
Branford silt loam, 3 to 8 percent slopes				650	1,300	12	17	3.5	5.0	1.1	2.1	50	110	170	240
Broadbrook silt loam, 0 to 3 percent slopes	1,200	1,800	1,825	650	1,300	13	18	2.0	3.5	1.5	2.5	50	110	170	240
Broadbrook silt loam, 3 to 8 percent slopes	1,150	1,750	1,775	650	1,300	13	18	2.0	3.5	1.5	2.5	50	110	170	240
Broadbrook silt loam, 3 to 8 percent slopes, eroded	1,000	1,650	1,675	500	1,250	11	16	1.5	3.0	1.3	2.3	40	100	160	230
Broadbrook silt loam, 8 to 15 percent slopes	1,100	1,700	1,725	550	1,100	11	16	1.5	3.0	1.3	2.3	50	110	170	240
Broadbrook silt loam, 8 to 15 percent slopes, eroded								1.5	3.0	1.1	2.1	40	100	160	230
Broadbrook silt loam, 15 to 25 percent slopes										.9	1.8	40	75	150	220
Broadbrook stony silt loam, 0 to 3 percent slopes												40	75		
Broadbrook stony silt loam, 3 to 8 percent slopes												40	75		
Broadbrook stony silt loam, 8 to 15 percent slopes												35	70		
Broadbrook stony silt loam, 15 to 25 percent slopes												25	60		
Brookfield fine sandy loam, 3 to 8 percent slopes						9	14	2.5	4.0	.9	1.8	40	75	150	220
Brookfield fine sandy loam, 8 to 15 percent slopes						7	12	2.5	4.0	.9	1.8	40	75	150	220
Brookfield stony fine sandy loam, 3 to 8 percent slopes												35	70		
Brookfield stony fine sandy loam, 8 to 15 percent slopes												35	70		
Buxton silt loam, 0 to 3 percent slopes						9	14			1.3	2.3	40	100	160	230
Buxton silt loam, 3 to 8 percent slopes						9	14			1.3	2.3	40	100	160	230
Buxton silt loam, 8 to 15 percent slopes						7	12			1.1	2.1	40	100	160	230
Charlton fine sandy loam, 0 to 3 percent slopes					1,250	12	17	3.5	5.0	1.3	2.3	40	100	160	230
Charlton fine sandy loam, 3 to 8 percent slopes					1,250	12	17	3.5	5.0	1.3	2.3	40	100	160	230
Charlton fine sandy loam, 8 to 15 percent slopes					1,200	10	15	3.0	4.5	1.1	2.1	35	90	160	230

See footnote at end of table.

TABLE 1.—*Estimated average acre yields of crops*—Continued

[Yields in columns A are those expected under ordinary management; those in columns B, under improved management. Absence of yield indicates crop is seldom, if ever, grown]

Soil [1]	Shade-grown tobacco	Broad-leaf tobacco	Havana seed tobacco	Potatoes	Sweet corn	Silage corn		Alfalfa hay		Mixed hay		Permanent pasture		Rotation pasture	
	B	B	B	B	B	A	B	A	B	A	B	A	B	A	B
	Lb.	*Lb.*	*Lb.*	*Bu.*	*Doz.*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Cow-acre-days*	*Cow-acre-days*	*Cow-acre-days*	*Cow-acre-days*
Charlton fine sandy loam, 15 to 25 percent slopes										0. 9	1. 8	35	70	150	220
Charlton stony fine sandy loam, 3 to 8 percent slopes												40	75		
Charlton stony fine sandy loam, 8 to 15 percent slopes														40	75
Charlton stony fine sandy loam, 15 to 25 percent slopes												35	70		
Cheshire fine sandy loam, 0 to 3 percent slopes	1, 200	1, 750	1, 775	550	1, 250	12	17	3. 5	5. 0	1. 3	2. 3	40	100	160	230
Cheshire fine sandy loam, 3 to 8 percent slopes	1, 150	1, 700	1, 725	550	1, 250	12	17	3. 5	5. 0	1. 3	2. 3	40	100	160	230
Cheshire fine sandy loam, 3 to 8 percent slopes, eroded	1, 100	1, 650	1, 675	400	1, 150	10	15	2. 5	4. 0	. 9	1. 8	40	75	150	220
Cheshire fine sandy loam, 8 to 15 percent slopes				500	1, 200	10	15	3. 0	4. 5	1. 1	2. 1	35	90	160	230
Cheshire fine sandy loam, 8 to 15 percent slopes, eroded										. 7	1. 4	35	75	150	220
Cheshire fine sandy loam, 15 to 25 percent slopes, eroded										. 7	1. 4	35	75	150	220
Cheshire stony fine sandy loam, 3 to 8 percent slopes												40	75		
Cheshire stony fine sandy loam, 8 to 15 percent slopes												35	70		
Cheshire stony fine sandy loam, 15 to 25 percent slopes												35	70		
Ellington fine sandy loam, 0 to 3 percent slopes	1, 050	1, 700	1, 725	450	1, 200	11	16	2. 0	3. 5	1. 3	2. 3	40	100	160	230
Elmwood loamy sand, 0 to 3 percent slopes				500	1, 050	7	12	2. 0	3. 5	1. 1	2. 1	30	90	150	220
Elmwood sandy loam, 0 to 3 percent slopes	1, 000	1, 625	1, 650	500	1, 100	9	14	1. 5	3. 0	1. 1	2. 1	35	75	150	220
Elmwood sandy loam, 3 to 8 percent slopes	950	1, 575	1, 600	500	1, 100	9	14	1. 5	3. 0	1. 1	2. 1	35	75	150	220
Elmwood very fine sandy loam, 0 to 3 percent slopes	950	1, 600	1, 625	450	1, 100	9	14	1. 5	3. 0	1. 3	2. 3	35	90	160	230
Elmwood very fine sandy loam, 3 to 8 percent slopes	900	1, 550	1, 575	450	1, 100	9	14	1. 5	3. 0	1. 3	2. 3	35	90	160	230
Enfield silt loam, 0 to 3 percent slopes	1, 300	1, 825	1, 850	650	1, 300	13	18	3. 5	5. 0	1. 5	2. 5	50	110	170	240
Enfield silt loam, 0 to 3 percent slopes, eroded	1, 200	1, 700	1, 725	500	1, 200	9	14	3. 0	4. 5	1. 1	2. 1	35	90	160	230
Enfield silt loam, 3 to 8 percent slopes	1, 250	1, 775	1, 800	650	1, 300	13	18	3. 5	5. 0	1. 5	2. 5	50	110	170	240
Enfield silt loam, 3 to 8 percent slopes, eroded	1, 150	1, 650	1, 675	450	1, 050	7	12	2. 5	4. 0	.9	1. 8	35	75	150	220
Enfield silt loam, 8 to 15 percent slopes	1, 200	1, 725	1, 750	600	1, 200	11	16	3. 0	4. 5	1. 3	2. 3	50	110	170	240
Enfield silt loam, 8 to 15 percent slopes, eroded	1, 100	1, 600	1, 625	400	1, 050	7	12	2. 5	4. 0	. 9	1. 8	30	70	150	220
Enfield silt loam, overflow, 0 to 3 percent slopes		1, 825	1, 850	650	1, 250	13	18	3. 5	5. 0	1. 5	2. 5	50	120	180	250
Gloucester fine sandy loam, 0 to 3 percent slopes						9	14	2. 5	4. 0	. 9	1. 8	35	75	150	220
Gloucester fine sandy loam, 3 to 8 percent slopes						9	14	2. 5	4. 0	. 9	1. 8	35	75	150	220
Gloucester fine sandy loam, 8 to 15 percent slopes						7	12	2. 0	3. 5	. 7	1. 4	30	70	150	220
Gloucester fine sandy loam, 15 to 25 percent slopes										. 7	1. 4	30	70	140	210
Gloucester stony fine sandy loam, 3 to 8 percent slopes												35	70		
Gloucester stony fine sandy loam, 8 to 15 percent slopes												35	70		
Gloucester stony fine sandy loam, 15 to 25 percent slopes												30	65		
Hadley silt loam, 0 to 3 percent slopes		1, 800	1, 825	600	1, 300	13	18	3. 0	4. 5	1. 5	2. 5	50	120	180	250

See footnote at end of table.

TABLE 1.—*Estimated average acre yields of crops*—Continued

[Yields in columns A are those expected under ordinary management; those in columns B, under improved management. Absence of yield indicates crop is seldom, if ever, grown]

Soil [1]	Shade-grown tobacco	Broad-leaf tobacco	Havana seed tobacco	Potatoes	Sweet corn	Silage corn		Alfalfa hay		Mixed hay		Permanent pasture		Rotation pasture	
	B	B	B	B	B	A	B	A	B	A	B	A	B	A	B
	Lb.	*Lb.*	*Lb.*	*Bu.*	*Doz.*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Cow-acre-days*	*Cow-acre-days*	*Cow-acre-days*	*Cow-acre-days*
Hartford fine sandy loam, 0 to 3 percent slopes	1, 250	1, 750	1, 775	550	1, 250	11	16	3. 0	4. 5	1. 1	2. 1	35	90	160	230
Hartford fine sandy loam, 3 to 8 percent slopes	1, 200	1, 700	1, 725	550	1, 250	11	16	3. 0	4. 5	1. 1	2. 1	35	90	160	230
Hartford sandy loam, 0 to 3 percent slopes	1, 200	1, 700	1, 725	450	1, 200	9	14	2. 5	4. 0	. 9	1. 8	35	75	150	220
Hartford sandy loam, 3 to 8 percent slopes	1, 150	1, 650	1, 675	450	1, 200	9	14	2. 5	4. 0	. 9	1. 8	35	75	150	220
Hartford sandy loam, 8 to 15 percent slopes	1, 100	1, 600	1, 625	400	1, 100	7	12	2. 0	3. 5	. 7	1. 4	30	70	150	220
Hinckley gravelly sandy loam, 0 to 3 percent slopes	1, 050	1, 625	1, 650	-----	1, 050	6	10	2. 5	4. 0	. 7	1. 4	25	50	130	200
Hinckley gravelly sandy loam, 3 to 15 percent slopes	1, 000	1, 550	1, 575	-----	1, 000	6	10	2. 0	3. 5	. 5	1. 0	25	50	130	200
Hinckley loamy sand, 3 to 15 percent slopes	950	1, 500	1, 525	-----	-------	5	9	1. 5	3. 0	. 5	1. 0	25	50	130	200
Hollis rocky loam, 3 to 15 percent slopes	-------	-------	-------	-----	-------	----	----	-----	-----	-----	-----	35	70	-----	----
Hollis rocky loam, 15 to 35 percent slopes	-------	-------	-------	-----	-------	----	----	-----	-----	-----	-----	35	70	-----	----
Holyoke rocky silt loam, 3 to 15 percent slopes	-------	-------	-------	-----	-------	----	----	-----	-----	-----	-----	35	70	-----	----
Holyoke rocky silt loam, 15 to 35 percent slopes	-------	-------	-------	-----	-------	----	----	-----	-----	-----	-----	35	70	-----	----
Leicester loam, 0 to 3 percent slopes	-------	-------	-------	-----	-------	----	----	-----	-----	. 5	1. 5	30	70	140	210
Leicester stony loam, 0 to 3 percent slopes	-------	-------	-------	-----	-------	----	----	-----	-----	-----	-----	25	50	-----	----
Limerick silt loam, 0 to 3 percent slopes	-------	-------	-------	-----	-------	----	----	-----	-----	. 5	2. 0	30	70	140	210
Ludlow loam, 0 to 3 percent slopes	950	1, 550	1, 575	-----	-------	9	14	1. 5	3. 0	1. 3	2. 3	35	90	160	230
Ludlow loam, 3 to 8 percent slopes	900	1, 500	1, 525	-----	-------	9	14	1. 5	3. 0	1. 3	2. 3	35	90	160	230
Ludlow stony loam, 3 to 8 percent slopes	-------	-------	-------	-----	-------	----	----	-----	-----	-----	-----	30	60	-----	----
Manchester gravelly loam, 0 to 3 percent slopes	-------	-------	-------	400	1, 150	9	14	3. 0	4. 5	1. 1	2. 1	35	90	160	230
Manchester gravelly loam, 3 to 15 percent slopes	-------	-------	-------	-----	1, 050	7	12	2. 5	4. 0	. 9	1. 8	30	70	150	220
Manchester gravelly sandy loam, 0 to 3 percent slopes	1, 050	1, 625	1, 650	400	1, 050	6	10	2. 5	4. 0	. 7	1. 4	25	50	130	200
Manchester gravelly sandy loam, 3 to 15 percent slopes	1, 000	1, 550	1, 575	-----	1, 000	6	10	2. 0	3. 5	. 5	1. 0	25	50	130	200
Manchester loamy sand, 3 to 15 percent slopes	950	1, 500	1, 525	-----	-------	5	9	-----	-----	. 5	1. 0	25	50	130	200
Melrose sandy loam, 0 to 3 percent slopes	1, 200	1, 750	1, 775	550	1, 250	11	16	2. 5	4. 0	1. 1	2. 1	35	90	160	230
Melrose sandy loam, 3 to 8 percent slopes	1, 150	1, 700	1, 725	550	1, 250	11	16	2. 5	4. 0	1. 1	2. 1	35	90	160	230
Melrose very fine sandy loam, 0 to 3 percent slopes	1, 250	1, 800	1, 825	600	1, 250	12	17	3. 0	4. 5	1. 3	2. 3	50	110	170	240
Melrose very fine sandy loam, 3 to 8 percent slopes	1, 200	1, 750	1, 775	600	1, 250	12	17	3. 0	4. 5	1. 3	2. 3	50	110	170	240
Menlo silt loam, 0 to 3 percent slopes	-------	-------	-------	-----	-------	----	----	-----	-----	-----	-----	25	50	-----	----
Menlo stony silt loam, 0 to 3 percent slopes	-------	-------	-------	-----	-------	----	----	-----	-----	-----	-----	25	50	-----	----
Merrimac fine sandy loam, 0 to 3 percent slopes	1, 250	1, 750	1, 775	550	1, 250	11	16	3. 0	4. 5	1. 1	2. 1	35	90	160	230
Merrimac fine sandy loam, 3 to 8 percent slopes	1, 200	1, 700	1, 725	550	1, 250	11	16	3. 0	4. 5	1. 1	2. 1	35	90	160	230
Merrimac fine sandy loam, 8 to 15 percent slopes	1, 150	1, 650	1, 675	500	1, 200	9	14	2. 5	4. 0	. 9	1. 8	30	70	150	220
Merrimac fine sandy loam, overflow, 0 to 3 percent slopes	-------	-------	-------	-----	1, 250	11	16	3. 0	4. 5	1. 1	2. 1	35	90	160	230
Merrimac sandy loam, 0 to 3 percent slopes	1, 200	1, 700	1, 725	450	1, 200	9	14	2. 5	4. 0	. 9	1. 8	35	75	150	220

See footnote at end of table.

TABLE 1.—*Estimated average acre yields of crops*—Continued

Yields in columns A are those expected under ordinary management; those in columns B, under improved management. Absence of yield indicates crop is seldom, if ever, grown]

Soil [1]	Shade-grown tobacco	Broad-leaf tobacco	Havana seed tobacco	Potatoes	Sweet corn	Silage corn		Alfalfa hay		Mixed hay		Permanent pasture		Rotation pasture	
	B	B	B	B	B	A	B	A	B	A	B	A	B	A	B
	Lb.	*Lb.*	*Lb.*	*Bu.*	*Doz.*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Cow-acre-days*	*Cow-acre-days*	*Cow-acre-days*	*Cow-acre-days*
Merrimac sandy loam, 3 to 8 percent slopes	1, 150	1, 650	1, 675	450	1, 200	9	14	2. 5	4. 0	0. 9	1. 8	35	75	150	220
Merrimac sandy loam, 8 to 15 percent slopes	1, 100	1, 600	1, 625	400	1, 100	7	12	2. 0	3. 5	. 7	1. 4	30	70	150	220
Narragansett silt loam, 0 to 3 percent slopes	1, 250	1, 825	1, 850	650	1, 300	13	18	3. 5	5. 0	1. 5	2. 5	50	110	170	240
Narragansett silt loam, 3 to 8 percent slopes	1, 200	1, 775	1, 800	650	1, 300	13	18	3. 5	5. 0	1. 5	2. 5	50	110	170	240
Narragansett silt loam, 3 to 8 percent slopes, eroded	1, 100	1, 675	1, 700	500	1, 200	11	16	2. 5	4. 0	1. 3	2. 3	40	100	160	230
Narragansett silt loam, 8 to 15 percent slopes	1, 150	1, 725	1, 750	550	1, 250	11	16	2. 5	4. 0	1. 3	2. 3	40	100	160	230
Narragansett silt loam, 8 to 15 percent slopes, eroded	------	------	------	-----	------	----	----	2. 5	4. 0	1. 1	2. 1	35	90	160	230
Narragansett silt loam, 15 to 25 percent slopes	------	------	------	-----	------	----	----	-----	-----	. 9	1. 8	35	90	160	230
Narragansett stony silt loam, 3 to 8 percent slopes	------	------	------	-----	------	----	----	-----	-----	-----	-----	40	75	-----	----
Narragansett stony silt loam, 8 to 15 percent slopes	------	------	------	-----	------	----	----	-----	-----	-----	-----	40	75	-----	----
Narragansett stony silt loam, 15 to 25 percent slopes	------	------	------	-----	------	----	----	-----	-----	-----	-----	30	65	-----	----
Ninigret fine sandy loam, 0 to 3 percent slopes	1, 100	1, 700	1, 725	550	1, 200	11	16	2. 0	3. 5	1. 1	2. 1	40	100	160	230
Ninigret fine sandy loam, 3 to 8 percent slopes	1, 050	1, 650	1, 675	550	1, 200	11	16	2. 0	3. 5	1. 1	2. 1	40	100	160	230
Ninigret very fine sandy loam, 0 to 3 percent slopes	1, 050	1, 650	1, 675	600	1, 200	11	16	2. 0	3. 5	1. 3	2. 3	50	110	170	240
Ninigret very fine sandy loam, 3 to 8 percent slopes	1, 000	1, 600	1, 625	600	1, 200	11	16	2. 0	3. 5	1. 3	2. 3	50	110	170	240
Ondawa sandy loam, 0 to 3 percent slopes	------	1, 800	1, 825	550	1, 250	11	16	2. 5	4. 0	1. 1	2. 1	40	100	160	230
Paxton fine sandy loam, reddish substratum, 3 to 8 percent slopes	------	------	------	-----	------	12	17	2. 0	3. 5	1. 5	2. 5	50	110	170	240
Paxton fine sandy loam, reddish substratum, 8 to 15 percent slopes	------	------	------	-----	------	12	17	1. 5	3. 0	1. 1	2. 1	50	110	170	240
Paxton fine sandy loam, reddish substratum, 15 to 25 percent slopes	------	------	------	-----	------	----	----	-----	-----	. 9	1. 8	35	90	160	230
Paxton loam, 3 to 8 percent slopes	------	------	------	-----	------	12	17	2. 0	3. 5	1. 5	2. 5	50	110	170	240
Paxton loam, 8 to 15 percent slopes	------	------	------	-----	------	12	17	1. 5	3. 0	1. 1	2. 1	50	110	170	240
Paxton loam, 15 to 25 percent slopes, eroded	------	------	------	-----	------	----	----	-----	-----	. 9	1. 8	35	90	160	230
Paxton stony fine sandy loam, reddish substratum, 3 to 8 percent slopes	------	------	------	-----	------	----	----	-----	-----	-----	-----	40	75	-----	----
Paxton stony fine sandy loam, reddish substratum, 8 to 15 percent slopes	------	------	------	-----	------	----	----	-----	-----	-----	-----	35	70	-----	----
Paxton stony fine sandy loam, reddish substratum, 15 to 25 percent slopes	------	------	------	-----	------	----	----	-----	-----	-----	-----	30	65	-----	----
Paxton stony loam, 3 to 8 percent slopes	------	------	------	-----	------	----	----	-----	-----	-----	-----	40	75	-----	----
Paxton stony loam, 8 to 15 percent slopes	------	------	------	-----	------	----	----	-----	-----	-----	-----	35	70	-----	----
Paxton stony loam, 15 to 25 percent slopes	------	------	------	-----	------	----	----	-----	-----	-----	-----	30	65	-----	----
Peats and Mucks, shallow phase	------	------	------	-----	------	----	----	-----	-----	-----	-----	25	50	-----	----
Penwood loamy sand, 0 to 3 percent slopes	1, 050	1, 625	1, 650	-----	1, 100	5	9	2. 5	4. 0	. 5	1. 0	30	60	130	200
Penwood loamy sand, 3 to 8 percent slopes	1, 000	1, 575	1, 600	-----	1, 050	5	9	2. 5	4. 0	. 5	1. 0	25	50	130	200
Penwood loamy sand, 8 to 15 percent slopes	------	------	------	-----	1, 000	----	----	2. 0	3. 5	. 5	1. 0	25	50	130	200
Podunk sandy loam, 0 to 3 percent slopes	------	1, 650	1, 675	-----	------	11	16	-----	-----	1. 1	2. 1	40	100	160	230

See footnote at end of table.

TABLE 1.—*Estimated average acre yields of crops*—Continued

Yields in columns A are those expected under ordinary management; those in columns B, under improved management. Absence of yield indicates crop is seldom, if ever, grown]

Soil [1]	Shade-grown tobacco	Broad-leaf tobacco	Havana seed tobacco	Potatoes	Sweet corn	Silage corn		Alfalfa hay		Mixed hay		Permanent pasture		Rotation pasture	
	B	B	B	B	B	A	B	A	B	A	B	A	B	A	B
	Lb.	*Lb.*	*Lb.*	*Bu.*	*Doz.*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Cow-acre-days*	*Cow-acre-days*	*Cow-acre-days*	*Cow-acre-days*
Poquonock loamy sand, 3 to 8 percent slopes	1, 100	1, 650	1, 675	450	1, 200	7	12	2. 5	4. 0	0. 9	1. 8	30	90	150	220
Poquonock loamy sand, 8 to 15 percent slopes	1, 050	1, 600	1, 625	400	1, 100	5	10	2. 5	4. 0	. 7	1. 4	30	70	140	210
Poquonock sandy loam, 0 to 3 percent slopes	1, 200	1, 725	1, 750	500	1, 250	11	16	3. 0	4. 5	1. 1	2. 1	35	90	160	230
Poquonock sandy loam, 3 to 8 percent slopes	1, 150	1, 675	1, 700	500	1, 250	11	16	3. 0	4. 5	1. 1	2. 1	35	90	160	230
Poquonock sandy loam, 8 to 15 percent slopes	1, 100	1, 625	1, 650	450	1, 200	9	14	2. 5	4. 0	1. 1	2. 1	30	70	150	220
Rainbow silt loam, 0 to 3 percent slopes	950	1, 575	1, 600	550	1, 100	9	14	1. 5	3. 0	1. 3	2. 3	35	90	160	230
Rainbow silt loam, 3 to 8 percent slopes	900	1, 525	1, 550	550	1, 100	9	14	1. 5	3. 0	1. 3	2. 3	35	90	160	230
Rainbow stony silt loam, 0 to 3 percent slopes												30	60		
Rainbow stony silt loam, 3 to 8 percent slopes												30	60		
Ridgebury loam, 0 to 3 percent slopes						9	14			. 5	2. 0	30	65		
Rowland silt loam, 0 to 3 percent slopes						11	16			1. 3	2. 3	40	100	160	230
Rumney sandy loam, 0 to 3 percent slopes						9	14			. 5	1. 5	30	70	140	210
Saco silt loam, 0 to 3 percent slopes												25	50	130	200
Saco sandy loam, 0 to 3 percent slopes												25	50	130	200
Scantic silt loam, 0 to 3 percent slopes						9	14			. 5	2. 0	30	65	140	210
Scantic silt loam, reddish variant, 0 to 3 percent slopes						9	14			1. 0	2. 0	30	65	140	210
Scarboro loam, 0 to 3 percent slopes												30	55		
Sudbury fine sandy loam, 0 to 3 percent slopes	1, 050	1, 700	1, 725	550	1, 150	11	16	2. 0	3. 5	1. 1	2. 1	35	90	160	230
Suncook loamy sand, 0 to 3 percent slopes		1, 650	1, 675							. 5	1. 0	25	50	130	200
Sunderland rocky fine sandy loam, 3 to 15 percent slopes												35	70		
Sunderland rocky fine sandy loam, 15 to 35 percent slopes												30	60		
Sutton loam, 0 to 3 percent slopes						11	16	2. 0	3. 5	1. 3	2. 3	40	100	160	230
Sutton loam, 3 to 8 percent slopes						11	16	2. 0	3. 5	1. 3	2. 3	40	100	160	230
Sutton stony loam, 0 to 3 percent slopes												30	60		
Sutton stony loam, 3 to 8 percent slopes												30	60		
Swanton sandy loam, 0 to 3 percent slopes						9	14			. 5	2. 0	30	70	140	210
Swanton very fine sandy loam, 0 to 3 percent slopes						9	14			. 5	2. 0	30	70	140	210
Terrace escarpments, sand and clay										. 7	1. 4	25	50		
Tisbury silt loam, 0 to 3 percent slopes	1, 050	1, 700	1, 725	550	1, 200	11	16	2. 0	3. 5	1. 3	2. 3	40	100	160	230
Tisbury silt loam, 3 to 8 percent slopes	1, 000	1, 650	1, 675	550	1, 200	11	16	2. 0	3. 5	1. 3	2. 3	40	100	160	230
Wallington silt loam, 0 to 3 percent slopes						9	14			1. 0	2. 0	35	70	150	220
Wallington silt loam, reddish variant, 0 to 3 percent slopes						9	14			1. 0	2. 0	35	70	150	220
Walpole loam, 0 to 3 percent slopes						11	16			. 5	2. 0	30	70	140	210
Walpole sandy loam, 0 to 3 percent slopes	950	1, 575	1, 600			11	16			. 5	1. 5	30	70	140	210
Wapping silt loam, 0 to 3 percent slopes	1, 050	1, 650	1, 675	550	1, 100	11	16	2. 0	3. 5	1. 3	2. 3	35	90	160	230
Wapping silt loam, 3 to 8 percent slopes	1, 000	1, 600	1, 650	550	1, 100	11	16	2. 0	3. 5	1. 3	2. 3	35	90	160	230
Wapping stony silt loam, 0 to 3 percent slopes												30	60		

See footnote at end of table.

TABLE 1.—*Estimated average acre yields of crops*—Continued

Yields in columns A are those expected under ordinary management; those in columns B, under improved management. Absence of yield indicates crop is seldom, if ever, grown]

Soil [1]	Shade-grown tobacco	Broad-leaf tobacco	Havana seed tobacco	Potatoes	Sweet corn	Silage corn		Alfalfa hay		Mixed hay		Permanent pasture		Rotation pasture	
	B	B	B	B	B	A	B	A	B	A	B	A	B	A	B
	Lb.	*Lb.*	*Lb.*	*Bu.*	*Doz.*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Cow-acre-days*	*Cow-acre-days*	*Cow-acre-days*	*Cow-acre-days*
Wapping stony silt loam, 3 to 8 percent slopes												30	60		
Watchaug loam, 0 to 3 percent slopes				500	1,150	11	16	2.5	4.0	1.1	2.1	35	90	160	230
Watchaug loam, 3 to 8 percent slopes				500	1,150	11	16	2.5	4.0	1.1	2.1	35	90	160	230
Watchaug stony loam, 0 to 3 percent slopes												30	60		
Watchaug stony loam, 3 to 8 percent slopes												30	60		
Wethersfield loam, 0 to 3 percent slopes	1,150	1,750	1,775		1,150	12	17	2.0	3.5	1.5	2.5	50	110	170	240
Wethersfield loam, 3 to 8 percent slopes	1,100	1,700	1,725		1,150	12	17	2.0	3.5	1.5	2.5	50	110	170	240
Wethersfield loam, 3 to 8 percent slopes, eroded	1,050	1,600	1,625		1,050	10	15	1.5	3.0	1.3	2.3	40	100	160	230
Wethersfield loam, 8 to 15 percent slopes		1,650	1,675			10	15	1.5	3.0	1.3	2.3	50	110	170	240
Wethersfield loam, 8 to 15 percent slopes, eroded								1.5	3.0	.9	1.8	35	90	160	230
Wethersfield loam, 15 to 25 percent slopes										.9	1.8	35	75	150	220
Wethersfield loam, 15 to 25 percent slopes, severely eroded										.7	1.4	35	75	150	220
Wethersfield stony loam, 3 to 8 percent slopes												40	75		
Wethersfield stony loam, 8 to 15 percent slopes												35	70		
Wethersfield stony loam, 15 to 25 percent slopes												35	70		
Whately loam, 0 to 3 percent slopes												30	60		
Whitman stony loam, 0 to 3 percent slopes												25	50		
Wilbraham silt loam, 0 to 3 percent slopes										.5	2.0	30	65	140	210
Wilbraham stony silt loam, 0 to 3 percent slopes												30	55		
Windsor loamy coarse sand, 0 to 3 percent slopes	1,050	1,625	1,650		1,100	5	9	2.5	4.0	.5	1.0	30	60	130	200
Windsor loamy coarse sand, 3 to 8 percent slopes	1,000	1,575	1,600		1,100	5	9	2.5	4.0	.5	1.0	25	50	130	200
Windsor loamy coarse sand, 8 to 15 percent slopes	950	1,525	1,550		1,050			2.0	3.5	.5	1.0	25	50	130	200
Windsor loamy fine sand, 0 to 3 percent slopes	1,050	1,625	1,650		1,100	5	9	2.5	4.0	.5	1.0	30	60	130	200
Windsor loamy fine sand, 3 to 8 percent slopes	1,000	1,575	1,600		1,100	5	9	2.5	4.0	.5	1.0	30	60	130	200
Windsor loamy fine sand, 8 to 15 percent slopes	950	1,525	1,550					2.0	3.5	.5	1.0	25	50	130	200
Winooski silt loam, 0 to 3 percent slopes		1,650	1,675			11	16	2.0	3.5	1.3	2.3	40	100	160	230
Woodbridge loam, 0 to 3 percent slopes						9	14	1.5	3.0	1.3	2.3	35	90	160	230
Woodbridge loam, 3 to 8 percent slopes						9	14	1.5	3.0	1.3	2.3	35	90	160	230
Woodbridge loam, reddish substratum, 0 to 3 percent slopes						9	14	1.5	3.0	1.3	2.3	35	90	160	230
Woodbridge loam, reddish substratum, 3 to 8 percent slopes						9	14	1.5	3.0	1.3	2.3	35	90	160	230
Woodbridge stony loam, 0 to 3 percent slopes												30	60		
Woodbridge stony loam, 3 to 8 percent slopes												30	60		
Woodbridge stony loam, reddish substratum, 3 to 8 percent slopes												30	60		

[1] The very stony soil types, miscellaneous land types, and Peats and Mucks are omitted from this table because they are generally not used for the stated crops.

Yield data were obtained from the State agricultural experiment stations and farmers cooperating with them, the county agent, marketing and conservation agencies, and some of the farmers. Experiments at Windsor in Hartford County, Storrs in Tolland County, and Mt. Carmel in New Haven County have been conducted on several of the major soils that occur in Hartford County. Yields on the other soils have been estimated.

Yields of tobacco, potatoes, and sweet corn are estimated only under columns B because most farmers growing these crops have to operate at a high level of management to compete in the market. The yields of other vegetables grown in the county are not identified by soil types and, consequently, are not included in the table. However, they are given in the section Additional Facts About Hartford County. Yields of nursery stock could not be readily determined and have not been included in the yield table. They would have to be stated in terms of the number of years to maturity, which varies because of the many kinds of trees, shrubs, and flowering plants grown.

Some of the data in table 1 are explained as follows: Yields of potatoes are for the Katahdin variety, U.S. No. 1 and No. 2 grades. The Green Mountain variety of potatoes produces slightly higher yields, but it is grown less frequently in Hartford County. The yields of silage corn include all field moisture; those of alfalfa hay and of mixed hay (timothy and red clover) include only 15 percent of field moisture, which is the storage moisture content.

Rotation pasture consists of a mixture of ladino clover and grasses. A rotation pasture is used one or more years as part of a crop rotation or cropping system, as contrasted with one used permanently for pasture. Permanent pasture is used for seasonal grazing every year, but it does not include woodland pasture nor meadows that are grazed following an early spring cutting of hay. The yields of permanent pasture and of rotation pasture were projected from forage production studies at the University of Connecticut (*12*). The term "cow-acre days" is the number of days per year 1 acre will graze a cow, giving 25 pounds of milk (3.5 percent fat) per day, without injury to the pasture.

Forests [5]

Hartford County is in the transition between the Northern Hardwood and the Central Hardwood forest zones (*32*). It has some of the characteristics of both zones, and it contains more hardwood species than are commonly found in many parts of Connecticut. Hemlock, white pine, and pitch pine are also in the county.

The first settlers in Connecticut had vast forests of oak and other hardwoods with pure or mixed stands of hemlock, white pine, and pitch pine. The proportion of conifers was probably higher in Hartford County than in the counties to the east and west.

The first task of the pioneer was to clear the land. This was accomplished mainly by burning the forests. The wood ashes were used in making soap or left to enrich the soil. By 1800, the surrounding virgin forests had been nearly depleted, but Connecticut was still exporting wood for the building of ships and other construction (*18*).

The demand for wood by railroads and many industries from 1800 to 1850 caused a heavy drain on forests. Most of the virgin timber left was cut, and some areas previously cut over were harvested for the second time.

The migration of people to the West about 1860 was the beginning of a downward trend in the acreage of farmland and a corresponding increase in forest land. During the next 50 years, most of the forest land was depleted by the clear cutting of young trees. About 1910 the chestnut blight threatened the destruction of chestnut trees, and the salvage of usable wood raised the yield of forest products to an all-time high. Timber production has decreased in the last 40 years except in the two world wars when timber products of all kinds were needed in great quantities. The 1938 hurricane also helped cause a major change in forest composition. It blew down hardwoods and conifers of all ages and sizes but was particularly destructive to the older stands of white pine.

Nearly all the virgin timber has been cut or burned at one time or another. The present species of trees grow mainly on unfavorable sites because of chance seeding or because of their resistance to fire.

Hartford County has the smallest percentage of forest land in the State. Of the 473,600 acres in the county, only 233,000 acres, or 49 percent, is commercial forest land. Ninety percent of the commercial forest acreage is privately owned; the rest belongs to State or municipal governments. More than half the private owners have less than 100 acres of forest, and 36 percent own between 100 and 500 acres (*13*).

Steep slopes of the Eastern and Western Highlands and steep slopes and crests on the traprock ridges of the Central Lowland are largely in forests. A large part of the nearly level to undulating Connecticut River Valley or Central Lowland is used for cultivated crops or pasture. The forested parts of the Central Lowland are either too wet, droughty, steep, or stony for field or forage crop management. Many of the more moderate, less stony slopes in the Eastern and Western Highlands have been cleared and are used for tilled crops or permanent pasture.

The forested soils of the county vary widely in parent material and topographic position. As a rule, the texture and depth of soil, the slope, and the relative wetness and stoniness are the main characteristics that determine whether a soil is suitable for crops or for forestry. Areas that are too steep or too stony for the use of tillage machinery are mostly in natural forest cover. Soils that are too droughty or too wet are likely to stay in forest, or they are idle, unless the owner can afford to drain or irrigate them. Much good agricultural land has been allowed to revert to forests after it was cleared.

A survey in Hartford County shows that several soil types are mainly in forest. They are the shallow Holyoke, Sunderland, and Hollis soils. Trees do not grow well on these soils because of lack of moisture in the shallow rooting zone.

Slopes over 15 percent and the very stony phases of the Gloucester, Narragansett, Cheshire, Wethersfield, Charlton, Brookfield, and Paxton soils are also mainly in forest. Forest growth on these soils ranges from excel-

[5] H. W. HICKOK, Forestry Department, Conn. Agr. Expt. Sta., assisted in the preparation of this section.

lent to fair, depending upon moisture relationships. Stones and boulders do not prevent forest growth if bedrock is deep enough. The best forest growth occurs on soils that provide favorable amounts of moisture and adequate aeration for tree roots.

A large percentage of the very coarse textured Windsor and Penwood soils on water or wind deposits are forested or idle. These soils are very droughty, and only the species that can tolerate dryness make satisfactory growth.

The poorly drained mineral soils—the Whitman, Menlo, Scarboro, and Biddeford—on uplands and terraces are generally covered by trees that can tolerate wetness. Poorly drained soils may be artificially drained and cleared for cultivation or for pasture if stones do not interfere. Soils with intermediate drainage characteristics are used for forest when they cannot be farmed because of slopes, stoniness, and drainage conditions.

Because the forests of Hartford County are primarily of disturbance origin, it is often difficult to correlate tree species with specific soil conditions. Field observations, however, show that some tree species thrive better on some sites than on others. White pine, pitch pine, and hemlock grow better than hardwoods on soils that have a low moisture content.

White, black, scarlet, chestnut, and red oaks, hickory, aspen, and black and white birches are the predominant tree species in the county. They can tolerate a wide range in soil moisture conditions and occur from the tops of ridges to the bottoms of valleys on both coarse- and fine-textured soils. Their presence on very adverse sites is caused mainly by past disturbance rather than by choice.

Tulip, white ash, yellow birch, beech, and sugar maple require more moisture and can grow well under moderately well drained conditions, but they need adequate aeration as well.

Red maple, black ash, balsam fir, sycamore, blackgum, swamp white oak, pin oak, and elm are fairly tolerant of excessive moisture and commonly grow in low, poorly drained areas. They also grow on the better aerated soils in recently abandoned fields.

Black spruce, coast cedar, and arborvitae normally grow on low-lying peat and muck soils, which have high water tables most of the time.

The common shrubs in Hartford County are bittersweet, blackberry, blueberry, chokeberry, groundpine, mountain-laurel, greenbrier, sweet pepper bush, poisonivy, hardhack, sumac, and low juniper.

Abandoned fields are invaded by weeds and grass; later by bushes and trees. Neglected pastures are invaded by redcedar, juniper, sumac, gray birch, sweetfern, and bayberry. The redcedar-gray birch stage is followed by red maple, dogwood, hophornbeam, chokeberry, shadbush, sassafras, and aspen. Following these, oak, hickory, birch, ash, tulip, and sugar maple become prominent. Evergreens may also invade old fields if seed trees are near.

For nearly three centuries the forests have supplied wood for construction and fuel. They have been severely cut and frequently devastated by fire. Today there is a great need of forests for watersheds, conservation of the soil, wildlife habitats, and recreation.

The State manages more than 10,000 acres of park and forest lands in Hartford County. These lands are Tunxis State Forest consisting of 8,071 acres in Hartland; Nassahegan State Forest, 1,315 acres in Burlington; and Penwood State Park, 839 acres in Bloomfield. One of the main purposes of the Tunxis State Forest is to provide watershed protection for the Barkhamsted Reservoir, which is the main supply of water for the city of Hartford. Recreation facilities are also provided in this forest as well as in the Nassahegan State Forest and Penwood State Park.

Only a few owners of private forests manage their property, although the acreage of private forest lands far exceeds that of public forests. Private owners, however, are beginning to improve them through planting and selective cutting.

The primary need in the management of forest land is to select and encourage the kinds of trees that will grow under the existing environment. Many species will grow in a wide range of conditions, but the best growth is obtained on soils having a favorable moisture-aeration relationship. To evaluate a site thoroughly, soil texture, depth to hardpan, natural drainage, and topographic position should be known.

Table 2 shows estimated site qualities of groups of soils for forest trees. The site qualities are (I) excellent for tree growth, (II) very good, (III) good, (IV) fair, and (V) poor. The main kinds of trees are classified in 5 groups (A, B, C, D, and E) according to their tolerance of various soil moisture conditions. For example, trees in group A tolerate well-drained soils; those in group E tolerate bog conditions. Trees in the stated groups most likely grow under these moisture conditions, but they may also grow on other sites. Most trees can survive under a wide range of soil moisture conditions, but occurrence outside the normal range is generally the result of a disturbance or a chance seeding. The trees listed in group B (table 2) commonly grow in a wider range in site conditions than those in any other group, and they are less affected by local site conditions than trees in the other groups.

The term "site quality" is used to designate the capacity of a specified site to grow trees. The existence of trees in a site does not necessarily mean that the requirements for optimum growth are present. For example, pine and hemlock grow on many droughty areas, and it has been assumed that they grow best under these conditions. In reality, pine and hemlock grow best in moderately well drained soils. However, in this site, hardwoods compete with and crowd out the pine and hemlock unless the hardwoods are eliminated through management. This competition does not occur on the more droughty soils, consequently pine and hemlock can survive and grow fairly rapidly because they need less available moisture than the hardwoods. Coniferous plantations are generally established on droughty sites because they need less management, even though the annual growth is considerably less.

Nearly all groups of trees grow best in the moderately well drained soils. These soils have more favorable moisture relationships than less well-drained soils. The water table is near enough to the surface to provide moisture for roots. In addition, the upper horizons are adequately aerated. Site quality for trees decreases on

TABLE 2.—*Estimated site quality of forest soils*

[Absence of site estimate indicates the trees in the group generally do not grow on the soils of the group]

Soil groups	Group A. Trees can tolerate soils low in available moisture. (White pine; hemlock; planted pines)	Group B. Trees can tolerate wide range in moisture conditions. (Red, white, black, scarlet, and chestnut oaks; black and white birches, hickory, aspen, planted fir, and spruce)	Group C. Trees require ample moisture and aeration. (Birch, beech, maple, tulip, and white ash)	Group D. Trees can tolerate excessive moisture. (Elm, sycamore, cottonwood, blackgum, red maple, black ash, balsam fir, pin oak, and swamp white oak)	Group E. Trees normally grow in bogs. (Arborvitae, black spruce, and coast cedar)
Excessively drained:					
Shallow to bedrock	Fair to poor (IV to V).	Existence level	Existence level	Existence level	
Rocky land, Hollis materials.					
Rocky land, Holyoke materials.					
Coarse sands and gravels	Fair (IV)	Good to poor (III to V).	Existence level	Existence level	
Hinckley loamy sand.					
Hinckley gravelly sandy loams.					
Manchester gravelly loams.[1]					
Manchester gravelly sandy loams.					
Manchester loamy sand.					
Penwood loamy sands.					
Suncook loamy sand.					
Windsor loamy coarse sands.					
Windsor loamy fine sands.					
Somewhat excessive to well drained:					
Loose, open substrata	Good to fair (III to IV).	Very good to fair (II to IV).	Good to poor (III to V).	Poor (V)	
Agawam fine sandy loams.					
Agawam very fine sandy loams.					
Bermudian silt loam.[1]					
Branford silt loams.[1]					
Brookfield fine sandy loams.[2 3]					
Charlton fine sandy loams.[3]					
Cheshire fine sandy loams.[3]					
Enfield silt loams.[1]					
Gloucester fine sandy loams.[2 3]					
Hadley silt loam.[1]					
Hartford fine sandy loams.					
Hartford sandy loams.[2]					
Hollis rocky loams.[2]					
Hollis very rocky loams.[2]					
Holyoke rocky silt loams.[2]					
Holyoke very rocky silt loam.[2]					
Merrimac fine sandy loams.					
Merrimac sandy loams.[2]					
Narragansett silt loams.[1 3]					
Ondawa sandy loam.[2]					
Sunderland rocky fine sandy loams.					
Compact or clayey substrata	Very good to good (II and III).	Excellent (I)	Very good to good (II and III).	Very good to fair (II to IV).	Not suitable.
Broadbrook silt loams.[3]					
Melrose sandy loams.[2]					
Melrose very fine sandy loams.					
Paxton loams.[3]					
Paxton fine sandy loams, reddish substratum.[3]					
Poquonock loamy sands.[2]					
Poquonock sandy loams.[2]					
Wethersfield loams.[3]					
Moderately well drained:					
Loose, open substrata	Excellent (I)	Excellent (I)	Excellent (I)	Excellent (I)	Excellent (I).
Acton fine sandy loams.[2 3]					
Belgrade silt loams.					
Belgrade silt loams, reddish variant phases.					
Ellington fine sandy loam.[2]					
Ninigret fine sandy loams.[2]					
Ninigret very fine sandy loams.[2]					
Podunk sandy loam.[2]					
Rowland silt loam.[1]					
Sudbury fine sandy loam.					
Sutton loams.[3]					
Tisbury silt loams.					

See footnotes at end of table.

TABLE 2.—*Estimated site quality of forest soils*—Continued

[Absence of site estimate indicates the trees in the group generally do not grow on the soils of the group]

Soil groups	Group A. Trees can tolerate soils low in available moisture. (White pine; hemlock; planted pines)	Group B. Trees can tolerate wide range in moisture conditions. (Red, white, black, scarlet, and chestnut oaks; black and white birches, hickory, aspen, planted fir, and spruce)	Group C. Trees require ample moisture and aeration. (Birch, beech, maple, tulip, and white ash)	Group D. Trees can tolerate excessive moisture. (Elm, sycamore, cottonwood, blackgum, red maple, black ash, balsam fir, pin oak, and swamp white oak)	Group E. Trees normally grow in bogs. (Arborvitae, black spruce, and coast cedar)
Moderately well drained—Continued					
Loose, open substrata—Continued					
Wapping silt loams.[3]					
Watchaug loams.[3]					
Winooski silt loam.[1]					
Compact or clayey substrata	Excellent (I)	Excellent (I)	Excellent (I)	Excellent (I)	Excellent (I).
Berlin silt loams.					
Birchwood fine sandy loams.					
Buxton silt loams.					
Elmwood loamy sand.[2]					
Elmwood sandy loams.[2]					
Elmwood very fine sandy loams.					
Ludlow loams.[3]					
Rainbow silt loams.[3]					
Woodbridge loams.[3]					
Woodbridge loams, reddish substratum phases.[3]					
Poorly drained	Excellent to good (I to III).	Very good (II)	Very good (II)	Excellent (I)	Excellent to very good (I and II).
Bowmansville silt loam.					
Leicester loam.[3]					
Limerick silt loam.					
Ridgebury loam.[3]					
Rumney sandy loam.[2]					
Scantic silt loam.					
Scantic silt loam, reddish variants.					
Swanton sandy loam.[2]					
Swanton very fine sandy loam.					
Wallington silt loam.					
Wallington silt loam, reddish variants.					
Walpole loam.					
Walpole sandy loam.[2]					
Wilbraham silt loam.[3]					
Very poorly drained:					
Mineral soils	Fair (IV)	Good (III)	Fair (IV)	Very good (II)	Very good to good (II and III).
Biddeford silt loam.					
Biddeford silt loam, reddish variants.					
Menlo silt loam.[3]					
Saco sandy loam.[2]					
Saco silt loam.					
Scarboro loam.					
Whately loam.					
Whitman stony loam.[3]					
Organic soils					Good to fair (III and IV).
Peats and Mucks.					

[1] Soils have a higher moisture-holding capacity than other members of soil group.

[2] Soils have a lower moisture-holding capacity than other members of soil group.

[3] Includes stony and very stony soils of these series.

the drier and wetter soils for all tree groups. Groups B, C, and D are present in excessively drained sites at an existence level only.

The soil types in Hartford County have been grouped on a catenary basis—from excessively drained to very poorly drained. The excessively drained, well drained, and moderately well drained soils are subdivided according to whether the substrata are loose and open, clayey, or compact. This property affects the moisture-supplying potential of the soils. The poorly drained and very poorly drained soils are not subdivided because the high water table overcompensates the effect of the substratum characteristics.

Another consideration in the soil groupings is the effect of texture on the moisture-holding capacity. Soils within a group that have more favorable or less favorable moisture-holding capacities than the average for the group are indicated by a table footnote. For exam-

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ple, the soils in the group that are well drained and have loose, open substrata have developed from a wide variety of parent material. The Agawam, Charlton, Cheshire, Hartford, and Merrimac fine sandy loams have an average moisture-holding capacity for the group. The Bermudian, Branford, Enfield, Hadley, and Narragansett silt loams have a higher moisture-holding capacity, and they are considered better soils for tree growth. The Brookfield, Gloucester, Hartford, Merrimac, and Ondawa fine sandy loams and sandy loams; the shallow Hollis and Sunderland fine sandy loams; and the Holyoke silt loam have less favorable moisture-holding capacities because they have moderately coarse substrata or are shallow to bedrock.

The manager of forest lands should consider that although conifers grow well on moderately well drained soils, they should be encouraged on drier sites because the competition with hardwoods is less. Selective cutting and planting on excessively drained, sandy and gravelly soils should be planned to produce a stand in which conifers make up more than half and the less-exacting hardwoods the rest.

Well drained and moderately well drained soils should support stands consisting of more than 50 percent hardwoods. Pine and hemlock should make up the rest. Pine and hemlock can be established on these sites in greater numbers if the hardwood trees are removed from the stand before they can compete with the conifers.

Red maple, elm, pin oak, and swamp white oak are favored on the very poorly drained soils because they tolerate wet conditions.

The very shallow, excessively drained Rocky land types are difficult to manage. Trees grow very poorly and barely survive on these land types. Steep slopes and rockiness usually prevent intensive management. Forests on these sites, however, are important for their value as scenery and for soil and water conservation and should, therefore, be maintained and protected.

TABLE 3.—*Physical properties and mechanical*

Soil and parent material	Horizon and depth	Physical properties		
		Volume weight	Moisture—field capacity	Available moisture-holding capacity
		gm. per cc.	*Vol. pct.*	*Vol. pct.*
Agawam very fine sandy loam: (Water-deposited terrace)	A_p, 0 to 10 inches	1. 39	25. 3	18. 1
	B_{21}, 10 to 16 inches	1. 41	21. 7	16. 0
	B_{22}, 16 to 25 inches	1. 33	19. 5	15. 2
Buxton silt loam: [1] (Glaciolacustrine terrace)	A_1, 0 to 2.5 inches	. 94	36. 3	24. 7
	B_{21}, 2.5 to 9 inches	1. 37	40. 7	26. 6
	B_{22}, 9 to 14 inches	1. 40	43. 5	23. 1
Cheshire fine sandy loam: (Glacial till)	A_p, 0 to 10 inches	1. 42	28. 1	17. 4
	B_{21}, 10 to 14 inches	1. 44	28. 8	17. 6
	B_{22}, 14 to 21 inches	1. 58	24. 4	13. 8
Enfield silt loam: [2] (Silt over water-deposited terrace)	A_p, 0 to 8 inches	1. 33	----------	----------
	B_{21}, 8 to 18 inches	1. 32	----------	----------
	B_{22}, 18 to 23 inches	1. 32	----------	----------
	D, 23 to 36 inches	1. 65	----------	----------
Merrimac sandy loam: (Water-deposited terrace)	A_p, 0 to 10 inches	1. 42	28. 6	22. 3
	B_{21}, 10 to 15 inches	1. 61	22. 5	15. 3
	B_{22}, 15 to 24 inches	1. 47	21. 0	15. 0
Narragansett silt loam: (Silt over glacial till)	A_p, 0 to 10 inches	1. 32	34. 7	25. 1
	B_{21}, 10 to 14 inches	1. 32	29. 9	23. 4
	B_{22}, 14 to 18 inches	1. 38	21. 0	15. 7
Paxton fine sandy loam: [2] (Glacial till)	A_p, 0 to 8 inches	1. 06	----------	----------
	B_{21}, 8 to 14 inches	1. 18	----------	----------
	B_{22}, 14 to 20 inches	1. 33	----------	----------
	B_3, 20 to 25 inches	1. 59	----------	----------
	C_{1m}, 25 to 45 inches	1. 76	----------	----------
Wethersfield silt loam: [1] (Glacial till)	A_1, 0 to 4 inches	1. 21	32. 3	20. 5
	B_{21}, 4 to 12 inches	1. 50	29. 3	20. 7
	B_{22}, 12 to 24 inches	1. 67	26. 8	16. 1
Windsor loamy coarse sand: (Water-deposited terrace)	A_p, 0 to 8 inches	1. 47	19. 5	14. 1
	B_{21}, 8 to 14 inches	1. 62	15. 7	11. 6
	B_{22}, 14 to 23 inches	1. 53	14. 5	10. 8

[1] Soil in forest.

[2] Mechanical analyses by the USDA, Soil Survey Laboratory, Beltsville, Md.; sample numbers for Enfield silt loam are S52 Conn–2–2–1 through S52 Conn–2–2–4; Paxton fine sandy loam, S49 Conn–7–7–1 through S49 Conn–7–1–5.

Fields abandoned in the past 25 years have been invaded by redcedar, gray birch, red maple, aspen, and pin cherry. These are fairly short-lived species, and should be replaced by the longer-lived beeches, birches, maples, hemlock, pines, oaks, and hickories. Soil characteristics determine which of these species should be favored.

Soil-Moisture Storage Capacities

The ability of a soil to store moisture depends on its texture, the amount and distribution of pore space, and the content of organic matter. Growing plants depend on the soil for their moisture. Consequently, plants can live on soils with large moisture-holding capacities even during rainless periods. They cannot grow normally during such periods on soils with a low capacity to store moisture unless supplemental moisture is added through irrigation. In order to determine when and how much to irrigate, something must be known about the physical properties that control the moisture-holding capacity.

The quantity of water that soils can hold in reserve for growing plants can be estimated by laboratory methods. Table 3 shows the results of laboratory analyses, which the Connecticut Agricultural Experiment Station in New Haven obtained in an inventory of physical properties of soils in the State. Representative soils developed in a wide range of parent materials were selected for analysis. All textural analyses follow the U.S. Department of Agriculture scheme of classification. The percentage of silt and clay was determined by the pipette method.

For the determinations of available moisture-holding capacity in table 3, estimates of field capacity and permanent wilting point were made by subjecting the soil samples to a tension of ⅓ atmosphere and 15 atmospheres, respectively. Available moisture-holding capacity is the difference between these two percentages of moisture in the soil on a volume basis.

analyses of some Connecticut soils

Physical properties—Con.		Mechanical analyses						
Capillary porosity	Percolation rate	Very coarse sand (2–1 mm.)	Coarse sand (1–0.5 mm.)	Medium sand (0.5–0.25 mm.)	Fine sand (0.25–0.10 mm.)	Very fine sand (0.10–0.05 mm.)	Silt (0.05–0.002 mm.)	Clay (less than 0.002 mm.)
Vol. pct.	*In. per hr.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*
42. 0	2. 3	0. 6	2. 6	2. 8	31. 4	25. 9	35. 1	1. 6
38. 4	1. 7	. 2	1. 1	1. 2	31. 5	32. 7	32. 9	. 4
38. 6	3. 9	. 1	. 9	1. 2	30. 8	34. 4	32. 2	. 4
50. 2	5. 9	. 2	1. 5	2. 5	8. 9	3. 0	67. 3	16. 6
45. 1	. 5	. 1	. 8	1. 7	5. 9	2. 3	65. 9	23. 3
46. 1	. 2	----------	. 5	. 7	3. 1	2. 0	62. 8	30. 9
33. 9	2. 3	5. 8	13. 1	6. 7	17. 4	8. 1	40. 9	8. 0
37. 4	3. 2	4. 9	10. 7	5. 7	14. 8	8. 0	48. 4	7. 5
29. 1	1. 4	6. 2	13. 6	7. 1	18. 9	8. 8	38. 7	6. 7
42. 6	. 5	2. 0	4. 5	4. 6	9. 6	20. 0	53. 1	6. 2
45. 0	. 7	2. 2	4. 0	3. 9	7. 6	18. 0	60. 1	4. 2
40. 9	1. 2	3. 0	5. 7	5. 4	10. 5	21. 3	50. 9	3. 2
29. 1	3. 9	7. 6	13. 0	10. 3	20. 0	21. 7	24. 0	2. 5
37. 7	2. 3	5. 3	20. 3	11. 3	21. 7	11. 8	25. 6	4. 0
31. 2	1. 3	5. 4	17. 0	9. 1	20. 0	14. 5	30. 8	3. 2
30. 2	7. 5	5. 7	16. 5	9. 2	20. 0	14. 2	30. 8	3. 6
41. 5	1. 2	1. 4	3. 2	2. 5	10. 1	22. 2	55. 3	5. 3
43. 5	1. 2	1. 2	3. 1	3. 9	16. 5	24. 5	49. 6	1. 2
42. 4	2. 2	2. 9	5. 1	4. 0	17. 2	23. 0	47. 0	. 8
43. 0	----------	5. 2	7. 0	6. 6	20. 4	15. 1	35. 6	10. 1
36. 3	----------	5. 1	7. 4	7. 3	22. 0	15. 8	36. 7	5. 7
36. 0	----------	6. 1	8. 5	7. 7	24. 0	16. 6	32. 8	4. 3
32. 0	----------	6. 1	8. 0	7. 8	23. 8	16. 9	14. 5	8. 1
30. 9	----------	5. 8	10. 0	9. 5	27. 0	17. 4	24. 4	5. 9
40. 0	1. 3	3. 3	4. 1	1. 9	8. 0	11. 8	60. 4	10. 5
36. 9	. 5	3. 3	4. 9	2. 3	9. 9	12. 7	59. 4	7. 5
33. 3	. 1	2. 1	4. 0	2. 0	9. 2	13. 3	57. 6	11. 8
37. 2	8. 5	5. 6	25. 7	16. 0	28. 7	7. 5	14. 9	1. 6
27. 5	4. 8	7. 5	23. 5	17. 2	29. 0	7. 0	13. 8	2. 0
26. 8	11. 7	9. 2	23. 6	16. 8	28. 0	7. 0	14. 2	1. 2

Field capacity is related to soil texture and capillary pore space. Water held in the soil after rainfall is stored in the small (capillary) pores. Part of this water is available to growing plants. Water filling large (noncapillary) pores after rainfall soon drains out of the soil into the water table below and is not generally available to plant roots. Coarse-textured soils, such as Windsor loamy coarse sand, are low in capillary pore space. Therefore, such soils cannot hold much water for plants. Medium-textured soils, such as Wethersfield loam and Narragansett silt loam, have more capillary pores and can hold more water than coarse-textured soils. Fine-textured soils, such as Buxton silt loam with a silty clay loam or clay loam subsoil, have even more capillary pore space than the medium-textured soils. These soils do not have enough noncapillary pores to allow excess water to drain away, and they are often waterlogged. Prolonged saturation reduces plant growth because the proper balance between moisture supply and aeration is not maintained.

We must know more about a soil than the field capacity because the water in the very finest capillary pores is not available to plants. Water in these pores is held by the soil with a tension greater than that which can be exerted by the plant roots to extract soil water. At the point where the roots are unable to extract any more water from the soil, the tension on the remaining water approaches about 15 atmospheres. This remaining water is unavailable for plant use, and the amount remaining is called the permanent wilting point.

A more useful measure than either field capacity or permanent wilting point is the available moisture-holding capacity. This is the amount of water in the soil that can be taken up by plants at rates significant to their growth. Available moisture-holding capacity for any particular soil is approximately equal to the difference between the amount of water in that soil at field capacity and the amount remaining at the permanent wilting point. Available moisture-holding capacity, like field capacity and permanent wilting point, varies widely among different soils. These differences are related to differences in texture and capillary pore space.

It is important to know how much water is available to the plant and how it is released. Fine-textured soils, although having higher available moisture-holding capacities, tend to hold the available moisture with greater force than coarse-textured soils. The coarse-textured Windsor, Merrimac, and Agawam soils have lower available moisture-holding capacities than the Buxton, Wethersfield, and Narragansett soils, but they release more of their moisture at lower tensions and in less time. Coarse-textured soils must be irrigated more often during periods of drought. The fine-textured soils, on the other hand, release their moisture more slowly; consequently, they are more drought resistant. Crops growing in them can survive drought longer without irrigation.

A common practice in the irrigation of coarse-textured soils is to apply an inch of water per week during droughty weather. The application of smaller amounts of water at more frequent intervals may be more satisfactory for plant growth, but the practice is normally prohibitive because of the extra cost in time and labor. Medium-textured soils can be irrigated with larger quantities of water and less frequently than the coarse-textured soils. Fine-textured soils are rarely, if ever, irrigated.

Available moisture-holding capacities are often expressed for convenience in applying irrigation water in terms of inches of water available within a specified depth of soil. Table 4 lists seven textural classes of soils and gives the moisture-holding capacities of each in three layers and to a total depth of 18 inches, which is the root zone in cultivated fields. The series for which the textural class was sampled is shown in parentheses. The data can be projected to other series having soils of a similar textural class. Minor variations can be expected, depending on the dominant clay mineral and the content of organic matter.

TABLE 4.—*Available moisture-holding capacity of some representative soil textural classes expressed in terms of inches of water available in the upper 18 inches of soil*

Soil textural class and series	Capacity of plow zone [1]—0 to 8 inches deep	Capacity of plow pan—8 to 12 inches deep	Capacity of subsoil—12 to 18 inches deep	Total capacity—to a depth of 18 inches
	Inches	*Inches*	*Inches*	*Inches*
Loamy coarse sand (Windsor)	1.0	0.4	0.5	1.9
Sandy loam (Merrimac)	1.3	.6	.9	2.8
Fine sandy loam (Cheshire)	1.3	.7	.9	2.9
Very fine sandy loam (Agawam)	1.4	.8	1.0	3.2
Loam (Wethersfield)	1.6	.7	.9	3.2
Silt loam (Narragansett)	1.9	.9	.8	3.6
Loam and clay loam (Buxton)	[2] 1.7	.8	1.2	3.7

[1] Having the average content of organic matter, 2 to 4 percent.
[2] Plow zone is loam; subsoil is a clay loam.

These available moisture-holding capacities can be used in the timing of irrigation. For example, assume that tobacco is growing on Merrimac sandy loam and a heavy rain has fallen. It is known that tobacco has a shallow root system largely restricted to the plow zone, or upper 8 inches of the soil. Available moisture in this zone is shown in table 4 as 1.3 inches. The plants transpire at least an inch of water in a week of warm, clear weather. Therefore, the tobacco will be affected by drought by the end of a week unless additional moisture is added as rain or irrigation water. For another example, assume that a deep-rooted forage crop is growing on Narragansett silt loam. Available moisture in this soil to a depth of 18 inches is shown in the table as 3.6 inches of water. If it transpired an inch of moisture per week, this deep-rooted crop would not be affected severely by drought for more than 3 weeks after a heavy rain. This is the so-called bookkeeping method of timing irrigation.

Engineering Interpretations [6]

This soil survey report can be used by engineers to:

1. Make soils and land use studies that will aid in the selection and development of industrial, business, residential, and recreational sites.
2. Make estimates of runoff and erosion characteristics for use in designing drainage structures and in planning dams and other structures for soil and water conservation.
3. Aid in selecting highway and airport locations and in planning detailed surveys of intended locations.
4. Locate sand and gravel for use in structures.
5. Correlate pavement performance with types of soil and thus develop information that will be useful in designing and maintaining pavements.
6. Determine the suitability of soil units for cross-country movement of vehicles and construction equipment.

Each kind of soil has, throughout its extent, several characteristics that are described in this section. The test data from representative soils and the general statements about each soil, therefore, can be used to interpret engineering properties of soils for preliminary project planning. The descriptions and data, however, cannot eliminate the need for sampling and testing soils at specific sites for construction design.

Soil test data

Samples from 18 profiles of 6 extensive soil series in Hartford County were tested by the Division of Physical Research, Bureau of Public Roads, according to standard procedures of the American Association of State Highway Officials (AASHO) (*1*). One profile of each series is modal, that is, near the central concept of the series; the other two are from soils having profiles within the range established for the series. The results of these tests are given in table 5. Although the information is specific for each profile, it is intended for use only in the interpretations of the engineering properties of the series as a whole.

The engineering soil classifications in this table are based on mechanical analyses and on tests of the liquid and plastic limits of the soils. Mechanical analyses were made by combined sieve and hydrometer methods.

The liquid-limit and plastic-limit tests measure the effect of water on the consistence of the soil material. As the moisture content of a clayey soil increases from a very dry state, the material changes from a solid to a semisolid or plastic state. As the moisture content is further increased, the material changes from a plastic to a liquid state. The plastic limit is the moisture content at which the material passes from a solid to a plastic state. The liquid limit is the moisture content at which the material passes from a plastic to a liquid state. The plasticity index is the numerical difference between the liquid limit and the plastic limit. It indicates the range of moisture content within which a soil material is in a plastic condition.

Table 5 also gives moisture-density compaction data for the tested soils. If a soil material is compacted at successively higher moisture contents, assuming that the compactive effort remains constant, the density of the compacted material will increase until the optimum moisture content is reached. After that, the density decreases with increase in moisture content. The highest dry density obtained in the compaction test is termed maximum dry density. Moisture-density data are important in earthwork, for, as a rule, optimum stability is obtained if the soil is compacted to about the maximum dry density when it is approximately the optimum moisture content.

Most highway engineers classify soil materials according to the system approved by the American Association of State Highway Officials (*1*). In this system, soil materials are classified in seven principal groups. The groups range from A-1, which is gravelly soil of high bearing capacity, to A-7, which consists of clay soil having a low strength when wet. In each group, the relative engineering value of the soil material is indicated by a group index number. Group indexes range from 0 for the best material to 20 for the poorest. The group index number is shown in parentheses following the soil group symbol in the next to last column in table 5.

Some engineers prefer to use the Unified soil classification system (*31*). In this system, soil material is divided into 15 classes: 8 classes are for coarse-grained material, 6 for fine-grained, and 1 for highly organic material. Mechanical analyses are used to determine the GW, GP, SW, and SP classes of material; mechanical analyses, liquid limit, and plasticity index are used to determine GM, GC, SM, SC, and fine-grained materials. The Unified classification of soils in Hartford County tested in the laboratory is given in the last column in table 5.

Engineering data

A brief description of the soils of Hartford County and their physical properties are given in table 6. The physical properties are estimates based on field observations and experience and on interpretations of actual tests by the Soil Conservation Service and the Bureau of Public Roads. Each soil series is classified according to the AASHO and the Unified systems. Many soils have more than one grouping under these systems because of the allowable textural range at the series level or because of textural changes within the profile. Textural variations are generally noted by giving the classification separately for the solum and for the substratum.

In table 6, estimates of the depth to bedrock of upland soils are not reliable because of the undulating character of the bedrock. Unless otherwise stated, bedrock, as a rule, occurs below depths of 5 to 10 feet.

Erosion hazard refers to the susceptibility of a soil to erosion if disturbed in normal tillage, in use as a construction site, or in use for construction material.

The depth to seasonal water table applies to normal water tables or to perched water tables over hardpan or impervious strata of clay. It is estimated from the depth to the mottled layer, which indicates that soil is saturated part of the time.

Permeability classes are interpreted in inches of water per hour as follows: Very rapid, more than 10 inches; rapid, 2 to 10 inches; moderate, 2 to 0.8 inch; slow, 0.8 to 0.2 inch; and very slow, less than 0.2 inch.

[6] Prepared with the assistance of MEYER D. HELFGOTT, engineering specialist, SCS.

TABLE 5.—*Engineering*

Soil name and location	Parent material	Bureau of Public Roads report no.	Depth	Horizon	Moisture-density [2]		Mechanical analysis [3]	
					Maximum dry density	Optimum moisture	Discarded part (estimated) of field sample	
							Larger than 3 inches	1 inch to 3 inches
			In.		*Lb. per cu. ft.*	*Pct.*	*Pct.*	*Pct.*
Cheshire stony fine sandy loam:								
3 miles S. of Plainville Center. (Modal profile.)	Glacial till	S32090	0– 2	A_1	97	20	12	2
		S32091	3–24	B_{21}	118	11	15	5
		S32092	24–40	C	122	11	5	10
0. 5 mile SE. of Keeney School. (Intergrades to Gloucester.)	Glacial till	S32093	0. 75–6. 5	A_p	114	13	2	3
		S32094	6. 5–24	B_{21}	123	10	5	15
		S32095	24–60	C	127	7	10	20
1 mile NE. of Wapping. (Eolian influence.)	Glacial till	S32096	0. 5– 4	A_p	98	19	--------	5
		S32097	4–24	B_2	111	15	--------	10
		S32098	24–40	C	122	9	--------	20
Narragansett silt loam:								
2.4 miles SE. of Scitico. (Modal profile.)	Glacial till	S32099	0– 6	A_p	93	23	1	4
		S32100	6–20	B_{21}	106	16	2	8
		S32101	26–40	D	110	13	5	10
Narragansett stony silt loam:								
2.5 miles NW. of West Suffield. (More cobbles and stones.)	Glacial till	S32102	0–5. 25	A_p	96	20	17	8
		S32103	5. 25–16	B_{21}	115	13	23	7
		S32104	22–40	D	124	9	15	10
0.6 mile N. of Buckland. (Shallower silty mantle.)	Glacial till	S32105	0. 5–6	A_p	99	19	--------	4
		S32106	6–24	B_{21}	114	13	--------	5
		S32107	27–40	D	125	8	--------	10
Scantic silt loam, reddish variant:								
1.25 miles W. of East Berlin Center.	Lacustrine terrace.	S31674	0– 6	A_p	73	39	--------	--------
		S31675	9–26	B_{2g}	108	19	--------	--------
		S31676	26–60	C	107	20	--------	--------
1.25 miles NE. of Norton Pond. (Modal; coarse fragments.)	Lacustrine terrace.	S31677	0– 7	A_p	81	31	--------	--------
		S31678	11–34	B_{21g}	112	16	--------	--------
		S31679	40–54	D	128	9	2	8
1 mile W. of Wolf Pit Hill. (Coarse fragments throughout profile.)	Lacustrine terrace.	S31680	0– 7	A_p	88	26	--------	2
		S31681	10–36	B_{2g}	111	16	--------	3
		S31682	36–52	D	126	10	15	35
Walpole sandy loam:								
Connecticut Agricultural Experiment Station Farm. (Modal profile.)	Terrace	S31686	0–10	A_p	108	17	--------	--------
		S31687	10–22	B_2	117	13	--------	--------
		S31688	25–60	C or D	102	17	--------	--------
Walpole fine sandy loam:								
1.6 miles NW. of Marlboro Center. (Modal; coarse fragments.)	Terrace	S31683	0–8	A_p	91	24	2	3
		S31684	11–24	B_{2g}	118	13	2	6
		S31685	24–48	C_g or D	122	10	2	8
1.75 miles SE. of East Windsor Hill. (Coarse textured.)	Terrace	S31689	0–7	A_1	92	23	--------	--------
		S31690	10–18	B_{2g}	108	14	--------	--------
		S31691	18–60	C_g	108	14	--------	--------
Wethersfield stony loam:								
0.3 mile W. of Gale Pond on Route 185. (Modal profile.)	Glacial till	S32108	0–5	A_2	105	18	--------	5
		S32109	5–22	B_2	118	13	--------	5
		S32110	22–60	C_m and B_{23m}	122	12	--------	5
Wethersfield loam:								
2.7 miles SW. of State Veterans Home. (More fragments in B_2 horizon.)	Drumlin	S32111	0–7	A_p	95	23	2	3
		S32112	7–22	B_{21}	112	15	2	5
		S32113	26–48	C_m or B_{23m}	120	13	--------	5
0.9 mile SE. of Woodland School in East Hartford. (Sandier profile.)	Glacial till	S32114	0. 5–6	A_p	101	19	--------	5
		S32115	6–22	B_2	122	10	--------	5
		S32116	22–40	C_m or B_{23m}	126	11	--------	5

See footnotes at end of table.

test data [1]

Mechanical analysis [3]—Continued										Liquid limit	Plasticity index	Classification	
Percentage passing sieve [4]						Percentage smaller than [4]						AASHO [5]	Unified [6]
3 in.	¾ in.	No. 4 (4.76 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.				
88	86	84	83	77	45	41	26	14	10	33	6	A-4(3)	ML.
85	79	74	71	65	35	30	21	11	8	(7)	(7)	A-4(1)	SM.
95	84	78	72	62	40	35	22	12	7	20	3	A-4(1)	SM.
98	94	91	88	75	48	42	27	14	10	22	4	A-4(3)	SM-SC.
95	79	74	71	60	38	33	21	12	9	18	2	A-4(1)	SM.
90	69	64	59	47	21	17	9	5	4	(7)	(7)	A-2-4(0)	SM.
100	95	95	95	87	63	55	33	16	13	(7)	(7)	A-4(6)	ML.
100	89	85	83	76	58	51	30	14	11	24	3	A-4(5)	ML.
100	79	72	69	59	30	26	14	8	4	(7)	(7)	A-2-4(0)	SM.
99	95	95	95	93	82	71	37	16	11	36	6	A-4(8)	ML.
98	90	90	90	87	74	68	35	14	11	27	3	A-4(8)	ML.
95	85	81	78	69	27	17	6	3	2	(7)	(7)	A-2-4(0)	SM.
83	75	74	73	65	50	45	25	12	9	(7)	(7)	A-4(5)	ML.
77	70	66	62	54	39	35	21	8	8	(7)	(7)	A-4(3)	ML.
85	75	70	66	55	32	27	17	8	5	(7)	(7)	A-4(1)	SM.
100	96	96	96	89	71	63	36	17	12	33	4	A-4(7)	ML.
100	94	91	89	82	60	51	28	16	13	23	2	A-4(5)	ML.
100	90	84	79	63	29	23	14	10	6	(7)	(7)	A-2-4(0)	SM.
------	------	--------	100	99	95	93	80	52	30	74	20	A-7-5(16)	MH or OH.
------	------	--------	--------	100	97	95	87	54	29	39	16	A-6(10)	CL.
------	------	--------	100	99	95	94	88	63	38	37	15	A-6(10)	CL.
------	------	--------	--------	100	95	92	70	34	23	55	9	A-5(11)	MH or OH.
------	------	--------	100	99	91	88	63	34	25	31	10	A-4(8)	ML-CL.
98	84	60	50	38	23	21	16	9	6	21	4	A-2-4(0)	GM-GC.
100	98	98	98	97	91	87	61	29	18	49	14	A-7-5(11)	ML.
100	97	96	95	93	88	84	59	32	23	33	12	A-6(9)	CL.
85	49	38	30	20	16	14	8	5	3	23	5	A-1-a(0)	GM-GC.
------	------	100	99	76	42	39	26	15	11	31	6	A-4(1)	SM.
------	------	100	99	71	34	30	21	12	9	24	4	A-2-4(0)	SM-SC.
------	------	--------	100	91	6	5	4	2	2	(7)	(7)	A-3(0)	SP-SM.
98	91	88	86	71	48	44	27	14	11	48	12	A-7-5(4)	SM.
98	89	83	80	64	38	33	22	11	8	26	4	A-4(1)	SM-SC.
98	87	80	77	60	24	19	10	6	4	(7)	(7)	A-2-4(0)	SM.
------	------	--------	100	97	36	28	17	10	6	(7)	(7)	A-4(0)	SM.
------	------	--------	100	95	30	21	11	7	6	(7)	(7)	A-2-4(0)	SM.
------	------	--------	100	93	18	12	5	4	3	(7)	(7)	A-2-4(0)	SM.
100	94	82	76	70	59	53	35	21	13	33	7	A-4(5)	ML.
100	92	83	77	67	52	46	30	17	12	24	5	A-4(3)	ML-CL.
100	92	86	83	76	64	58	42	26	19	23	8	A-4(6)	CL.
98	95	88	82	73	62	58	43	23	13	43	8	A-5(6)	ML.
98	92	82	75	66	55	51	36	20	13	26	5	A-4(4)	ML-CL.
100	94	86	81	70	57	53	40	25	17	27	10	A-4(4)	CL.
100	95	93	91	81	55	51	33	18	13	35	5	A-4(4)	ML.
100	95	93	89	74	45	40	27	15	10	20	3	A-4(2)	SM.
100	95	92	89	74	44	39	29	20	15	24	8	A-4(2)	SC.

TABLE 5.—*Engineering*

Soil name and location	Parent material	Bureau of Public Roads report no.	Depth	Horizon	Moisture-density [2]		Mechanical analysis [3]	
					Maximum dry density	Optimum moisture	Discarded part (estimated) of field sample	
							Larger than 3 inches	1 inch to 3 inches
			In.		*Lb. per cu. ft.*	*Pct.*	*Pct.*	*Pct.*
Windsor fine sand:								
2.2 miles NE. of Bloomfield Center.	Terrace	S31695	0–8	A_p	108	14		
		S31696	10–22	B_{22}	107	13		
		S31697	26–60	C	103	17		
Windsor fine or medium sand:								
2 miles SE. of East Windsor Hill. (Undulating to sloping phase.)	Dune on terrace	S31698	0. 5–6	A_p	108	15		
		S31699	6–22	B_2	106	15		
		S31700	22–60	C	104	16		
Windsor loamy coarse sand:								
2 miles W. of Windsor Locks Center. (Coarse textured.)	Terrace	S31692	0–9	A_p	120	11		
		S31693	9–20	B_2	122	11		
		S31694	24–60	C	112	17		

[1] Tests performed by the Bureau of Public Roads in accordance with standard procedures of the American Association of State Highway Officials (AASHO) (*1*).

[2] Based on Moisture-density Relations of Soils Using 5.5-pound Rammer and 12-inch Drop. AASHO Designation T 99–57, Method A.

[3] Mechanical analyses according to the American Association of State Highway Officials Designation T 88. Results by this procedure frequently may differ somewhat from results that would have been obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHO procedure, the fine material is analyzed by the hydrometer method and the various grain-size fractions are calculated on the basis of all the material, including that coarser than 2 millimeters in diameter. In the SCS soil survey procedure, the fine material is analyzed by the pipette method and the material coarser than 2 millimeters in

TABLE 6.—*Brief descriptions of soils and their*

[Additional information is in text regarding data in columns on thickness of solum, erosion hazard, depth to

Soil series and topographic position	Map symbols	Thickness of solum	Dominant texture		Classification			
					AASHO		Unified	
			Solum	Substratum	Solum	Substratum	Solum	Substratum
Soils of Uplands: [1]		*Inches*						
Acton	Aca, AcB, AdB	22–28	Fine sandy loam; stony fine sandy loam.	Very friable gravelly loamy sand and sand.	A–7 or A–4.	A–2	SM	SM
Brookfield	BtB, Btc, BvB, BvC.	24–28	Fine sandy loam; stony fine sandy loam.	Very friable, highly micaceous gravelly fine sandy loam and loamy sand.	A–2	A–2	SM	SM
Charlton	CaA, CaB, CaC, CaD, ChB, ChC, ChD, CrC, CrD.	24–30	Fine sandy loam; stony fine sandy loam; very stony fine sandy loam.	Firm to very friable gravelly fine sandy loam and sandy loam.	A–4	A–4 or A–2.	SM or ML.	SM

See footnotes at end of table.

test data [1]—Continued

Mechanical analysis [3]—Continued										Liquid limit	Plasticity index	Classification	
Percentage passing sieve [4]					Percentage smaller than [4]							AASHO [5]	Unified [6]
3 in.	¾ in.	No. 4 (4.76 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.				
			100	95	24	19	11	7	5	(7)	(7)	A–2–4(0)	SM.
			100	98	30	21	10	5	4	(7)	(7)	A–2–4(0)	SM.
			100	95	13	9	6	4	4	(7)	(7)	A–2–4(0)	SM.
			100	89	13	9	7	6	5	(7)	(7)	A–2–4(0)	SM.
			100	90	10	8	6	5	4	(7)	(7)	A–3(0)	SP–SM.
			100	92	5	5	5	4	3	(7)	(7)	A–3(0)	SP–SM.
		99	97	63	21	19	13	9	6	(7)	(7)	A–2–4(0)	SM.
		100	98	66	24	20	15	9	6	(7)	(7)	A–2–4(0)	SM.
		98	91	38	4	4	3	2	2	(7)	(7)	A–1–b(0)	SP.

diameter is excluded from calculations of grain-size fractions. The mechanical analyses used in this table are not suitable for use in naming texture classes for soils.

[4] Based on total material. Laboratory test data corrected for amount discarded in field sampling.

[5] Based on Standard Specifications for Highway Materials and Methods of Sampling and Testing (Pt. 1, Ed. 7): The Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes. AASHO Designation M145–49 (*1*).

[6] Based on the Unified Soil Classification System, Technical Memorandum No. 3–357, Volume 1, Waterways Experiment Station, Corps of Engineers, March 1953 (*31*).

[7] Nonplastic.

estimated engineering classifications and physical properties

seasonal water table, permeability classes, and available moisture in solum. Leaders indicate data not available]

Solum: Percent passing—			Substratum: Percent passing—			Range in predominant slopes	Erosion hazard	Depth to seasonal water table	Drainage class	Permeability		Available moisture in solum
200 sieve (0.074 mm.)	10 sieve (2.0 mm.)	4 sieve (4.76 mm.)	200 sieve (0.074 mm.)	10 sieve (2.0 mm.)	4 sieve (4.76 mm.)					Solum	Substratum	
Percent	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*		*Inches*				*Inches per ft. of depth*
25–40	70–85	45–90	5–20	50–75	55–80	1–10	Low	2–20	Moderately well drained.	Rapid	Very rapid	1. 6–2. 0.
5–20	50–75	55–80	10–25	50–70	60–85	3–35	Medium	Deep	Somewhat excessively drained.	Rapid	Rapid to very rapid.	1. 6–2. 0.
35–55	70–85	75–90	30–40	55–70	65–80	2–35	Medium	Deep	Well drained	Moderate to rapid.	Moderate to rapid.	1. 8–2. 2.

TABLE 6.—*Brief descriptions of soils and their estimated*

Soil series and topographic position	Map symbols	Thickness of solum	Dominant texture		Classification			
					AASHO		Unified	
			Solum	Substratum	Solum	Substratum	Solum	Substratum
Soils of Uplands—Con.		*Inches*						
Cheshire	CsA, CsB, CsB2, CsC, CsC2, CsD2, CtB CtC, CtD, CvC, CvD.	24–30	Fine sandy loam; stony fine sandy loam; very stony fine sandy loam.	Firm to very friable gravelly sandy loam and loamy sand.	A–4	A–4 or A–2.	SM or ML.	SM
Gloucester	GcA, GcB, GcC, GcD, GsB, GsC, GsD, GvC, GvD.	22–26	Fine sandy loam; stony fine sandy loam; very stony fine sandy loam.	Very friable gravelly loamy sand and sand.	A–2 or A–4.	A–2	SM	SM
Hollis	HoC, HoD, HsC, HsE.	0–24	Rocky loam; very rocky loam.	Generally shallow over schist, gneiss, or granite bedrock.	A–4		SM or ML.	
Holyoke	HtC, HtD, HyC, HzE.	0–24	Rocky silt loam; very rocky silt loam; very rocky loam.	Generally shallow over basalt bedrock.	A–4		ML or ML–CL.	
Leicester	LcA, LeA, LdA	24–30	Loam; stony loam; very stony soil.	Firm to very friable gravelly sandy loam and loamy sand.	A–4	A–4 or A–2.	SM or ML.	SM
Ludlow	LoA, LoB, LsB, LwC.	20–30	Loam; stony loam; very stony soils.	Very firm and compact loam.	A–4	A–4	SM or ML.	SM or ML.
Menlo	MoA, MpA	18–24	Silt loam; stony silt loam.	Very firm and compact gravelly loam.	A–4	A–4	ML or ML–CL.	SM or ML.
Paxton	PbB, PbC, PbD2, PdB, PdC, PdD, PeC, PeD.	22–30	Loam; stony loam; very stony loam.	Very firm and compact gravelly loam and sandy loam.	A–4	A–2 or A–4.	SM or ML.	SM
Paxton, reddish substratum phases.	PaB, PaC, PaD, PcB, PcC, PcD.	22–30	Fine sandy loam; stony fine sandy loam.	Very firm and compact gravelly fine sandy loam and sandy loam.	A–2 or A–4.	A–2 or A–4.	SM	SM
Ridgebury	RdA	20–24	Loam	Very firm and compact gravelly loam and sandy loam.	A–4	A–2 or A–4.	SM or ML.	SM
Rocky land, Hollis materials.	RhC, RhE		Bedrock is exposed on more than 50 percent of the surface.					
Rocky land, Holyoke materials.	RkC, RkE		Bedrock is exposed on more than 50 percent of the surface.					
Sunderland	SuC, SuE	0–24	Rocky fine sandy loam.	Generally shallow over red sandstone, shale, and conglomerate bedrock.	A–4		ML or SM.	
Sutton and Acton	SvA, SvB, SwA, SwB, SxC.	22–30	Loam; stony loam; very stony loam.	Firm to very friable gravelly fine sandy loam and sandy loam.	A–4	A–4 or A–2.	SM or ML.	SM

See footnotes at end of table.

engineering classifications and physical properties—Continued

Solum: Percent passing—			Substratum: Percent passing—			Range in predominant slopes	Erosion hazard	Depth to seasonal water table	Drainage class	Permeability		Available moisture in solum
200 sieve (0.074 mm.)	10 sieve (2.0 mm.)	4 sieve (4.76 mm.)	200 sieve (0.074 mm.)	10 sieve (2.0 mm.)	4 sieve (4.76 mm.)					Solum	Substratum	
Percent	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*		*Inches*				*Inches per ft. of depth*
35–55	70–85	75–90	30–40	55–70	65–80	2–35	Medium	Deep	Well drained	Moderate to rapid.	Moderate to rapid.	1. 8–2. 2.
5–40	65–80	75–90	5–20	50–70	55–80	2–35	Medium	Deep	Somewhat excessively drained.	Rapid	Very rapid.	1. 6–2. 0.
35–55	65–80	70–85				3–45	Low to medium.	Deep	Somewhat excessively drained.	Moderate to bedrock.		2. 0–2. 4.
50–65	70–85	75–90				3–45	Low to medium.	Deep	Somewhat excessively drained.	Moderate to bedrock.		2. 4–2. 8.
30–55	65–85	70–90	20–40	50–70	60–80	0–5	Low	0–8	Poorly drained	Moderate	Moderate to rapid.	1. 8–2. 2.
45–65	70–85	75–90	40–65	65–80	70–85	1–15	Medium	12–20	Moderately well drained.	Moderate	Slow to very slow.	2. 0–2. 4.
50–70	70–85	75–90	40–65	65–80	70–85	0–3	Low	On surface.	Very poorly drained surface.	Moderate	Slow to very slow.	2. 4–2. 8.
40–55	75–85	80–90	25–40	65–80	70–90	2–45	High	Deep [2]	Well drained	Moderate	Slow to very slow.	2. 0–2. 4.
30–45	70–85	75–90	25–40	65–80	70–90	2–35	High	Deep [2]	Well drained	Moderate	Slow to very slow.	1. 0–2. 2.
40–60	75–85	80–90	25–40	65–80	70–85	0–5	Low	0–12	Poorly drained	Moderate	Slow to very slow.	2. 0–2. 4.
						3–45			Excessively drained.			
						3–45			Excessively drained.			
35–55	65–80	70–85				3–35	Low to medium.		Somewhat excessively drained.	Moderate or rapid.	Moderate or rapid.	1. 6–2. 0.
35–55	70–85	75–90	30–40	55–70	65–80	0–15	Low to medium.	10–20	Moderately well drained.	Moderate	Moderate to rapid.	2. 0–2. 4.

TABLE 6.—*Brief descriptions of soils and their estimated*

Soil series and topographic position	Map symbols	Thickness of solum	Dominant texture		Classification			
					AASHO		Unified	
			Solum	Substratum	Solum	Substratum	Solum	Substratum
Soils of Uplands—Con.		*Inches*						
Watchaug	WgA, WgB, WhA, WhB.	22–30	Loam; stony loam.	Firm to very friable gravelly sandy loam and loamy sand.	A–4	A–4 or A–2.	ML or SM.	SM
Wethersfield	WkA, WkB, WkB2, WkC, WkC2, WkD, WkD3, WmB, WmC, WmD., WnC, WnD	22–30	Loam; stony loam; very stony loam.	Very firm and compact gravelly loam.	A–4	A–4	SM or ML.	SM or ML.
Whitman	WpA	8–16	Stony loam	Very firm to very friable gravelly loam to loamy sand.	A–2 or A–4.	A–2	SM	SM
Wilbraham and Menlo.	WrA, WsA, WtA	20–30	Silt loam; stony silt loam; very stony silt loam.	Very firm and compact gravelly loam.	A–4	A–4	ML or ML–CL.	SM or ML.
Woodbridge	WxA, WxB, WzA, WzB, WzbC.	20–30	Loam; stony loam; very stony soils.	Very firm and compact gravelly loam and sandy loam.	A–4	A–2 or A–4.	SM or ML.	SM
Woodbridge, reddish substratum phases.	WyA, WyB, WzaB.	20–30	Loam; stony loam	Very firm and compact gravelly loam and sandy loam.	A–2 or A–4.	A–2 or A–4.	SM	SM
Soils of Uplands over nonconforming substrata:								
Birchwood	BhA, BhB	24–30	Fine sandy loam	Very firm and compact gravelly loam.	A–4 or A–2.[3]	A–4 [3]	SM [3]	SM or ML.[3]
Broadbrook	BrA, BrB, BrB2, BrC, BrC2, BrD, BsA, BsB, BsC, BsD.	20–36	Silt loam; stony silt loam.	Very firm and compact gravelly loam.	A–4 [3]	A–4 [3]	ML [3]	SM or ML.[3]
Narragansett	NaA, NaB, NaB2, NaC, NaC2, NaD, NgB, NgC, NgD.	20–36	Silt loam; stony silt loam.	Firm to friable gravelly sandy loam and loamy sand.	A–4 [3]	A–2 [3]	ML [3]	SM [3]
Narragansett and Broadbrook.	NkC, NmD	20–36	Very stony silt loams; very stony soils.	Firm to friable gravelly sandy loam and loamy sand.	A–4 [3]	A–2 [3]	ML [3]	SM [3]
Poquonock	PpB, PpC, PuA, PuB, PuC.	24–40	Loamy sand; sandy loam.	Very firm and compact gravelly loam.	A–4 or A–2.[3]	A–4 [3]	SM or SP–SM.[3]	SM or ML.[3]
Rainbow	RaA, RaB, RbA, RbB.	24–36	Silt loam; stony silt loam.	Very firm and compact gravelly loam.	A–4 [3]	A–4 [3]	ML [3]	SM or ML.[3]
Wapping	WeA, WeB, WfA, WfB.	24–36	Silt loam; stony silt loam.	Firm to very friable gravelly sandy loam and loamy sand.	A–4 [3]	A–2 [3]	ML [3]	SM or SP–SM.[3]

See footnotes at end of table.

engineering classifications and physical properties—Continued

Solum: Percent passing—			Substratum: Percent passing—			Range in predominant slopes	Erosion hazard	Depth to seasonal water table	Drainage class	Permeability		Available moisture in solum
200 sieve (0.074 mm.)	10 sieve (2.0 mm.)	4 sieve (4.76 mm.)	200 sieve (0.074 mm.)	10 sieve (2.0 mm.)	4 sieve (4.76 mm.)					Solum	Substratum	
Percent	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*		*Inches*				*Inches per ft. of depth*
35–55	70–85	75–90	30–40	55–70	65–80	0–8	Low to medium.	12–20	Moderately well drained.	Moderate	Moderate to rapid.	2. 0–2. 4.
45–65	70–85	75–90	40–65	65–80	70–85	2–35	High	Deep [2]	Well drained	Moderate	Slow to very slow.	2. 0–2. 4
25–50	65–85	75–90	5–35	50–70	69–80	0–3	Low	On surface.	Very poorly drained.	Moderate	Moderate to slow.	2. 0–2. 4.
50–70	70–85	75–90	40–65	65–80	70–85	0–4	Low	0 to 8	Poorly drained	Moderate	Moderate to very slow.	2. 4–2. 8.
40–55	75–85	80–90	25–40	65–80	70–90	0–15	Medium	12 to 20	Moderately well drained.	Moderate	Slow to very slow.	2. 0–2. 4.
30–45	70–85	75–90	25–40	65–80	70–90	0–8	Medium	12 to 20	Moderately well drained.	Moderate	Slow to very slow.	2. 0–2. 4.
30–50	70–85	75–90	40–65	65–80	70–85	0–8	Low to medium.	8 to 20	Moderately well drained.	Rapid	Slow to very slow.	1. 8–2. 2.
50–75	65–90	70–95	40–65	65–80	70–85	1–35	High	Deep [2]	Well drained	Moderate	Slow to very slow.	2. 4–2. 8.
50–75	65–90	70–95	20–35	65–80	70–85	0–35	High	Deep	Well drained	Moderate	Moderate to rapid.	2. 4–2. 8.
50–75	65–90	70–95	20–35	65–80	70–85	0–35	High	Deep	Well drained	Moderate	Moderate to rapid.	2. 4–2. 8.
10–40	65–80	70–90	40–65	65–80	70–85	1–25	Medium	Deep [2]	Well drained	Rapid to very rapid.	Slow to very slow.	1. 0–1. 8.
50–75	65–90	70–95	40–65	65–80	70–85	0–8	Medium to low.	8 to 20	Moderately well drained.	Moderate	Slow to very slow.	2. 4–2. 8.
50–75	65–90	70–95	20–35	65–80	70–85	0–8	Medium to low.	10 to 20	Moderately well drained.	Moderate	Moderate to rapid.	2. 4–2. 8.

TABLE 6.—*Brief descriptions of soils and their estimated*

Soil series and topographic position	Map symbols	Thickness of solum	Dominant texture		Classification			
					AASHO		Unified	
			Solum	Substratum	Solum	Substratum	Solum	Substratum
Terrace soils—wind- and water-deposited materials:		*Inches*						
Agawam	AfA, AfB, AfC, AgA, AgB, AgC, AkA.	24–36	Fine sandy loam; very fine sandy loam.	Loamy sand and sand; generally free of gravel to 4 or 5 feet.	A–4	A–2	SM or ML.	SM or SP–SM.
Branford	BoA, BoB	18–30	Silt loam	Sand and gravel from red Triassic sandstone, shale, conglomerate, and Triassic basalt.	A–4	A–2	SM or ML.	SM
Ellington	EfA	24–30	Fine sandy loam	Sand and gravel from red Triassic rocks.	A–4	A–1–b or A–2.	SM or ML.	SM or SP–SM.
Enfield	EsA, EsA2, EsB, EsB2, EsC, EsC2, EwA.	18–30	Silt loam	Coarse sand and gravel.	A–4 [3]	A–1–B or A–2.[3]	ML [3]	SM or SP–SM.[3]
Hartford	HdA, HdB, HfA, HfB, HfC.	18–30	Fine sandy loam; sandy loam.	Sand and gravel from red Triassic rocks.	A–2 or A–4.	A–1–b or A–2.	SM	SM or SP–SM.
Hinckley	HkA, HkC, HnC	6–18	Gravelly sandy loam; loamy sand.	Sand and gravel from granite, gneiss, and schist.	A–4 or A–2.	A–1–a or A–1–b or A–2.	SM or GM.	GM or SM
Manchester	McA, McC, MgA, MgC, MhC.	6–18	Gravelly loam; gravelly sandy loam; loamy sand.	Sand and gravel from Triassic rocks.	A–4 or A–2.	A–1–a or A–1–b.	SM or GM.	GM or SM.
Merrimac	MrA, MrB, MrC, MsA, MyA, MyB, MyC.	18–30	Fine sandy loam; sandy loam.	Sand and gravel derived principally from granite, gneiss, and schist.	A–2 or A–4.	A–1–b or A–2.	SM	SM or SP–SM.
Ninigret	NnA, NnB, NsA, NsB.	24–36	Fine sandy loam; very fine sandy loam.	Generally loamy sand and sand with thin strata of fine-textured material in places.	A–4	A–2 or A–4.	SM or ML.	SP–SM or SM.
Penwood	PnA, PnB, PnC	18–24	Loamy sand	Coarse to fine sand with some gravel in places.	A–2	A–2 or A–1–b.	SM	SP–SM or SM.
Scarboro	SeA	18–24	Loam	Loamy sand and sand with some gravel in places.	A–2 or A–4.	A–2	SM or ML.	SM or SP–SM.
Sudbury	SsA	24–30	Fine sandy loam	Sand and gravel from granite, gneiss, and schist.	A–2 or A–4.	A–1–b or A–2.	SM	SM or SP–SM.

See footnotes at end of table.

engineering classifications and physical properties—Continued

Solum: Percent passing—			Substratum: Percent passing—			Range in predominant slopes	Erosion hazard	Depth to seasonal water table	Drainage class	Permeability		Available moisture in solum
200 sieve (0.074 mm.)	10 sieve (2.0 mm.)	4 sieve (4.76 mm.)	200 sieve (0.074 mm.)	10 sieve (2.0 mm.)	4 sieve (4.76 mm.)					Solum	Substratum	
Percent	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*		*Inches*				*Inches per ft. of depth*
30–55	80–95	90–100	10–30	90–95	95–100	0–15	Low to medium.	Deep	Well drained to somewhat excessively drained.	Moderate to rapid.	Rapid to very rapid.	1. 6–2. 2.
45–60	65–80	75–90	5–25	40–65	50–70	1–15	Low to medium.	Deep	Well drained	Moderate	Very rapid.	2. 4–2. 8.
35–55	65–70	75–90	5–25	40–65	50–70	0–5	Low	12 to 20	Moderately well drained.	Moderate to rapid.	Rapid to very rapid.	1. 8–2. 2.
55–75	70–90	75–95	3–20	40–70	50–95	0–15	High	Deep	Well drained	Moderate	Very rapid.	2. 4–2. 8.
30–50	70–90	80–95	3–20	40–70	50–95	0–15	Low to medium.	Deep	Well drained to somewhat excessively drained.	Moderate to rapid.	Very rapid.	1. 6–2. 2.
10–40	50–70	60–85	3–20	35–60	45–70	2–15	Low to medium.	Deep	Excessively drained.	Rapid to very rapid.	Very rapid.	1. 0–1. 6.
10–40	50–70	60–85	3–20	35–60	45–70	2–15	Low to medium.	Deep	Excessively drained.	Rapid to very rapid.	Very rapid.	1. 0–1. 6.
30–50	70–90	80–95	3–20	40–70	50–95	0–15	Low to medium.	Deep	Somewhat excessively drained to well drained.	Moderate to rapid.	Very rapid.	1. 6–2. 2.
30–55	80–95	90–100	20–40	90–95	95–100	0–8	Low	10 to 20	Moderately well drained.	Moderate to rapid.	Moderate to rapid.	1. 6–2. 2.
10–30	95–100	95–100	5–15	90–100	95–100	1–15	Low (medium wind erosion).	Deep	Excessively drained.	Very rapid.	Very rapid.	1. 0–1. 6.
25–55	65–90	70–100	5–25	65–90	75–95	0–3	Low	On surface.	Very poorly drained.	Moderate to rapid.	Rapid to very rapid.	2. 0–2. 4.
30–50	70–90	80–95	3–20	40–70	50–95	0–3	Low	10 to 20	Moderately well drained.	Moderate to rapid.	Very rapid.	1. 6–2. 2.

TABLE 6.—*Brief descriptions of soils and their estimated*

Soil series and topographic position	Map symbols	Thickness of solum	Dominant texture		Classification			
					AASHO		Unified	
			Solum	Substratum	Solum	Substratum	Solum	Substratum
Terrace soils—Con.		*Inches*						
Terrace escarpments.	Tg	6–18	Sand and gravel	Sand and gravel.	A–1–a or A–2 or A–4.	A–1 or A–2 or A–4.	SM or GM.	SM or ML.
Tisbury	TsA, TsB	24–30	Silt loam	Coarse sand and gravel.	A–4 [3]	A–1–b or A–2.[3]	ML [3]	SM or SP–SM.[3]
Walpole	WcA, WdA	20–30	Loam; sandy loam.	Loamy sand, sand, and gravel.	A–2 or A–4.	A–1 or A–2.	SM or ML.	SM or SP–SM.
Windsor	WuA, WuB, WuC, WvA, WvB, WvC.	18–24	Loamy coarse sand; loamy fine sand.	Coarse to fine sand with some gravel in places.	A–2	A–2 or A–1–b.	SM	SP–SM or SM.
Terrace soils—lacustrine silt and clay:								
Belgrade	BaA, BaB	20–30	Silt loam	Friable silt and very fine sand; gray or red in color.	A–4	A–4	ML or ML–CL.	SM or ML.
Belgrade, reddish variant.	BbA, BbB	20–30	Silt loam	Friable silt and very fine sand; gray or red in color.	A–4	A–4	ML or ML–CL.	SM or ML.
Berlin	BcA, BcB, BcC	24–30	Silt loam surface layer over silty clay loam.	Red varved silt and clay.	A–6 or A–7.	A–6 or A–7.	CL or ML–CL or MH.	CL or ML–CL or MH.
Biddeford	BfA	20–24	Silt loam surface layer over silty clay loam.	Gray varved silt and clay.	A–6 or A–7.	A–6 or A–7.	CL or ML–CL or MH.	CL or ML–CL or MH.
Biddeford, reddish variant.	BgA	16–24	Silt loam surface layer over silty clay loam.	Red varved silt and clay.	A–6 or A–7.	A–2 or A–6 or A–7.	CL or ML–CL or MH.	SC or CL or MH.
Buxton	BxA, BxB, BxC	24–36	Silt loam surface layer over silty clay loam.	Gray varved silt and clay.	A–6 or A–7.	A–6 or A–7.	CL or ML–CL or MH.	CL or ML–CL or MH.
Scantic	ScA	24–30	Silt loam surface layer over silty clay loam.	Gray varved silt and clay.	A–6 or A–7.	A–6 or A–7.	CL or ML–CL or MH.	CL or ML–CL or MH.
Scantic, reddish variant.	SdA	24–30	Silt loam surface layer over silty clay loam.	Red varved silt and clay.	A–6 or A–7.	A–6 or A–7.	CL or ML–CL or MH.	SC or CL or MH.
Terrace escarpments.	Tc	6–12	Clayey	Red or gray varved silt and clay.	A–6 or A–7.	A–6 or A–7.	CL or ML–CL or MH.	CL
Wallington	WaA	20–30	Silt loam	Friable silt and very fine sand—gray or red in color.	A–4	A–4	ML or ML–CL.	SM or ML.

See footnotes at end of table.

engineering classifications and physical properties—Continued

Solum: Percent passing			Substratum: Percent passing			Range in predominant slopes	Erosion hazard	Depth to seasonal water table	Drainage class	Permeability		Available moisture in solum
200 sieve (0.074 mm.)	10 sieve (2.0 mm.)	4 sieve (4.76 mm.)	200 sieve (0.074 mm.)	10 sieve (2.0 mm.)	4 sieve (4.76 mm.)					Solum	Substratum	
Percent	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*		*Inches*				*Inches per ft. of depth*
10–40	50–80	70–90	3–70	40–70	50–95	15–45	Medium	Deep	Somewhat excessively drained.	Moderate to very rapid.	Very rapid.	
55–75	70–90	75–95	3–20	40–70	50–95	0–8	Medium to low.	8 to 20	Moderately well drained.	Moderate	Very rapid.	2. 4–2. 8.
30–50	70–100	80–100	5–25	7–100	8–100	0–3	Low	0 to 8	Poorly drained	Moderate to rapid.	Rapid to very rapid.	1. 6–2. 4.
10–30	95–100	95–100	5–15	90–100	95–100	0–15	Low (medium wind erosion).	Deep	Excessively drained.	Very rapid.	Very rapid.	1. 0–1. 6.
60–70	80–90	85–100	40–60	80–85	85–95	0–8	Medium	10 to 20	Moderately well drained.	Moderate to slow.	Moderate to slow.	2. 4–2. 8.
60–70	80–90	85–100	40–60	80–85	85–95	3–8	Medium	10 to 20	Moderately well drained.	Moderate to slow.	Moderate to slow.	2. 4–2. 8.
70–80	80–90	85–100	75–90	85–95	90–100	2–15	High	12 to 20	Moderately well drained.	Moderate to slow.	Very slow	2. 6–2. 8.
70–80	80–95	85–100	80–90	85–95	95–100	0–3	Low	On surface.	Very poorly drained.	Moderate to slow.	Very slow	2. 6–2. 8.
80–90	90–95	95–100	25–95	30–100	35–100	0–3	Low	On surface.	Very poorly drained.	Moderate to slow.	Very slow	2. 6–2. 8.
65–80	75–90	80–100	80–90	85–95	95–100	2–15	High	12 to 20	Moderately well drained.	Moderate to slow.	Very slow	2. 6–2. 8.
65–80	75–90	80–100	80–90	85–95	95–100	0–4	Medium to low.	0 to 8	Poorly drained	Moderate to slow.	Very slow	2. 6–2. 8.
80–90	90–95	95–100	25–95	30–100	35–100	0–3	Low	0 to 8	Poorly drained	Moderate to slow.	Very slow	2. 6–2. 8.
65–90	75–95	80–100	80–90	85–95	95–100	15–45	High	12 to 20	Moderately well drained.	Moderate to slow.	Very slow.	
60–70	80–90	85–100	40–60	80–85	85–95	0–3	Medium to low.	0 to 8	Poorly drained	Moderate to slow.	Moderate to slow.	2.4–2.8.

TABLE 6.—*Brief descriptions of soils and their estimated*

Soil series and topographic position	Map symbols	Thickness of solum	Dominant texture		Classification			
					AASHO		Unified	
			Solum	Substratum	Solum	Substratum	Solum	Substratum
Terrace soils—Con.		*Inches*						
Wallington, reddish variant.	WbA	20–30	Silt loam	Friable silt and very fine sand interbedded; in places sand and gravel—reddish in color.	A–4	A–4	ML or ML–CL.	SM or ML.
Terrace soils—lacustrine sand over silt and clay:								
Elmwood	EmA, EnA, EnB, EoA, EoB	24–42	Loamy sand; sandy loam; very fine sandy loam.	Varved silt and clay.	A–4 or A–2.[3]	A–6 or A–7.[3]	SM [3]	CL or ML–CL or MH.[3]
Melrose	MmA, MmB, MnA, MnB.	30–42	Sandy loam; very fine sandy loam.	Varved silt and clay.	A–4 or A–2.[3]	A–6 or A–7.[3]	SM [3]	CL or ML–CL or MH.[3]
Swanton	SyA, SzA	24–36	Sandy loam; very fine sandy loam.	Varved silt and clay.	A–4 or A–2.[3]	A–6 or A–7.[3]	SM [3]	CL or ML–CL or MH.[3]
Terrace escarpments.	Te	6–24	Sand and clay	Varved silt and clay.	A–2–4 or A–4.[3]	A–6 or A–7.[3]	SM or SP–SM.	CL or ML–CL or MH.
Whately	WoA	18–36	Loam	Varved silt and clay.	A–2 or A–4.[3]	A–6 or A–7.[3]	SM [3]	CL or ML–CL or MH.[3]
Alluvial soils:								
Alluvial land	Am		Silt loam to sandy loam.	Variable fine sandy loam to loamy sand with some gravel in places.	A–4 or A–2.[3]	A–6 or A–7.[3]	SM or ML.	CL or ML–CL or MH.
Bermudian	BdA, BeA	24–36	Sandy loam; silt loam.	Variable fine sandy loam to loamy sand and sand with gravel in places.	A–4	A–4 or A–2.	SM or ML.	SM
Bowmansville	BmA	24–36	Silt loam	Variable fine sandy loam to loamy sand and sand with gravel in places.	A–4	A–4 or A–2.	SM or ML.	SM
Hadley	HaA	24–36	Silt loam	Variable very fine sandy loam to loamy sand with some gravel in places.	A–4	A–4 or A–2.	ML	ML or SM.
Limerick	LmA	24–36	Silt loam	Variable very fine sandy loam to loamy sand with some gravel in places.	A–4	A–4 or A–2.	ML	ML or SM.

See footnotes at end of table.

engineering classifications and physical properties—Continued

Solum: Percent passing			Substratum: Percent passing			Range in predominant slopes	Erosion hazard	Depth to seasonal water table	Drainage class	Permeability		Available moisture in solum
200 sieve (0.074 mm.)	10 sieve (2.0 mm.)	4 sieve (4.76 mm.)	200 sieve (0.074 mm.)	10 sieve (2.0 mm.)	4 sieve (4.76 mm.)					Solum	Substratum	
Percent	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*		*Inches*				*Inches per ft. of depth*
60–70	80–90	85–100	40–60	80–85	85–95	0–3	Medium to low.	0 to 8	Poorly drained	Moderate to slow.	Moderate to slow.	2.4–2.8.
20–50	75–95	90–100	50–70	75–95	90–100	0–8	Low to medium.	10 to 20	Moderately well drained.	Moderate to rapid.	Slow to very slow.	1.0–2.2.
20–50	75–95	90–100	50–70	75–95	90–100	0–8	Low to medium.	30 to 36	Well drained	Moderate to rapid.	Slow to very slow.	1.6–2.2.
20–50	75–95	90–100	50–70	75–95	90–100	0–3	Low	0 to 8	Poorly drained	Moderate to rapid.	Slow to very slow.	1.6–2.2.
10–40	70–85	80–95	50–70	75–95	90–100	15–45	High	30 to 36	Well drained	Moderate to very rapid.	Slow to very slow.	
20–50	70–85	80–95	50–70	75–95	90–100	0–3	Low	On surface.	Very poorly drained.	Moderate to rapid.	Slow to very slow.	1.8–2.2.
(4)	(4)	(4)	(4)	(4)	(4)	0–3	Low		(4)	(4)	(4)	
35–70	70–85	75–95	20–50	60–75	70–95	0–3	Low	Deep	Well drained	Moderate to rapid.	Rapid to very rapid.	1.6–2.8.
35–70	70–85	75–95	20–50	60–75	70–95	0–3	Low	0 to 8	Poorly drained	Moderate	Rapid to very rapid.	1.6–2.8.
50–70	80–95	95–100	30–60	60–80	70–90	0–3	Low	Deep	Well drained	Moderate	Rapid to very rapid.	2.4–2.8.
50–70	80–95	95–100	30–60	60–80	70–90	0–3	Low	0 to 8	Poorly drained	Moderate	Moderate to very rapid.	2.4–2.8.

TABLE 6.—*Brief descriptions of soils and their estimated*

Soil series and topographic position	Map symbols	Thickness of solum	Dominant texture		Classification			
					AASHO		Unified	
			Solum	Substratum	Solum	Substratum	Solum	Substratum
Alluvial soils—Con.		*Inches*						
Ondawa	OnA	24–30	Sandy loam	Generally loamy sand and sand with some gravel in places.	A–2 or A–4.	A–2 or A–1–b.	SM	SM or SP–SM.
Podunk	PoA	24–30	Sandy loam	Generally loamy sand and sand with some gravel in places.	A–2 or A–4.	A–2 or A–1–b.	SM	SM or SP–SM.
Riverwash	Re		Sand, gravel, and cobbles.	Variable but generally coarse-textured material.	(4)	(4)	(4)	(4)
Rowland	RoA	24–36	Silt loam	Variable fine sandy loam to loamy sand and sand with some gravel in places.	A–4	A–4 or A–2.	SM or ML.	SM
Rumney	RuA	18–36	Sandy loam	Generally loamy sand and sand with gravel in places.	A–2 or A–4.	A–2 or A–1–b.	SM	SM or SP–SM.
Saco	SaA, SbA	24–36	Sandy loam; silt loam.	Variable silt loam to coarse sand and gravel.	A–4	A–4 or A–2 or A–1–b.	ML or SM.	ML or SM or SP–SM.
Suncook	StA	18–24	Loamy sand	Loamy sand, sand, and gravel with lenses of fine sandy loam in places.	A–2	A–2 or A–1–b.	SM	SM or SP–SM.
Winooski	WwA	24–36	Silt loam	Variable very fine sandy loam to loamy sand with some gravel in places.	A–4	A–4 or A–2.	ML	ML or SM.
Organic soils: Peats and Mucks	PkA, PmA			Deposits of decomposed or undecomposed material derived from reeds, sedges, and sphagnum moss; often mixed with woody debris.			Pt	

[1] Upland soils range from nonstony to stony. Nonstony soils in fields may have had stones removed from surface layer, but stony or very stony conditions may exist in the subsoils and substrata.

[2] May have a perched water table above the hardpan in winter and early in spring.

engineering classifications and physical properties—Continued

Solum: Percent passing			Substratum: Percent passing			Range in predominant slopes	Erosion hazard	Depth to seasonal water table	Drainage class	Permeability		Available moisture in solum
200 sieve (0.074 mm.)	10 sieve (2.0 mm.)	4 sieve (4.76 mm.)	200 sieve (0.074 mm.)	10 sieve (2.0 mm.)	4 sieve (4.76 mm.)					Solum	Substratum	
Percent	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*		*Inches*				*Inches per ft. of depth*
30–45	70–90	80–95	10–30	40–70	50–90	0–3	Low	Deep	Well drained	Rapid	Rapid to very rapid.	1.6–2.0.
30–45	70–90	80–95	10–30	40–70	50–90	0–3	Low	8 to 20	Moderately well drained.	Rapid	Rapid to very rapid.	1.6–2.0.
-------	------	------	------	------	------	0–3	Low	----------	Excessively drained.	Very rapid.	Very rapid.	(4).
35–70	70–85	75–95	20–50	60–75	70–95	0–3	Low	8 to 20	Moderately well drained.	Moderate	Rapid to very rapid.	1.6–2.8.
30–45	70–90	80–95	10–30	40–70	50–90	0–3	Low	0 to 8	Poorly drained	Rapid	Rapid to very rapid.	1.6–2.0.
35–70	70–85	75–95	15–60	60–75	70–95	0–3	Low	On surface.	Very poorly drained.	Moderate to rapid.	Moderate to very rapid.	1.6–2.8.
10–25	70–85	80–90	5–20	50–80	60–95	0–3	Low	Deep	Excessively drained.	Very rapid.	Very rapid.	1.0–1.6.
50–70	80–95	95–100	30–60	60–80	70–90	0–3	Low	8 to 20	Moderately well drained.	Moderate	Moderate to very rapid.	2.4–2.8.
-------	------	------	------	------	------	0–3	Low	On surface.	Very poorly drained.	Very rapid.	Very rapid.	

[3] Soil has lithologic change in profile. Solum occurs as a mantle over a substratum of different geologic origin.

[4] Variable.

Available moisture in solum applies to the dominant textural class in the series. If a series consists of more than one textural class, the range has been expanded to include all classes.

The suitability of the soils for some engineering uses and soil characteristics that affect earth construction are given in table 7. The soils were evaluated on the basis of test data shown in table 5; the estimates shown in table 6; and experiences in field use.

In most construction areas, the topsoil is stripped off

TABLE 7.—*The suitability of the soils for some engineering*

Soil series and topographic position	Map symbols	Soil suitabilities for—				Suitability for winter grading
		Topsoil	Sand and gravel	Road subgrade	Road fill	
Soils of Uplands:						
Acton	AcA, AcB, AdB	Poor	Poor	Good	Good	Poor
Brookfield	BtB, BtC, BvB, BvC	Poor	Fair	Good	Good	Good
Charlton	CaA, CaB, CaC, CaD, ChB, ChC, ChD, CrC, CrD.	Poor to fair	Fair	Good	Good	Fair
Cheshire	CsA, CsB, CsB2, CsC, CsC2, CsD2, CtB, CtC, CtD, CvC, CvD.	Poor to fair	Fair	Good	Good	Fair
Gloucester	GcA, GcB, GcC, GcD, GsB, GsC, GsD, GvC, GvD.	Poor	Fair	Good	Good	Good
Hollis	HoC, HoD, HsC, HsE.	Poor	Not suitable	Poor	Fair [1]	Poor
Holyoke	HtC, HtD, HyC, HzE	Poor	Not suitable	Poor	Fair [1]	Poor
Leicester	LcA, LeA, LdA	Poor	Poor	Not suitable	Not suitable	Not suitable
Ludlow	LoA, LoB, LsB, LwC	Poor to fair	Poor	Poor	Fair	Not suitable
Menlo	MoA, MpA	Poor	Poor	Not suitable	Not suitable	Not suitable
Paxton	PbB, PbC, PbD2, PdB, PdC, PdD, PeC, PeD.	Poor to fair	Poor	Poor	Fair	Fair
Paxton, reddish substratum phases.	PaB, PaC, PaD, PcB, PcC, PcD.	Poor to fair	Poor	Poor	Fair	Fair
Ridgebury	RdA	Poor	Poor	Not suitable	Not suitable	Not suitable
Rocky land, Hollis materials	RhC, RhE	Not suitable	Not suitable			Not suitable
Rocky land, Holyoke materials.	RkC, RkE	Not suitable	Not suitable			Not suitable
Sunderland	SuC, SuE	Not suitable	Not suitable	Poor	Fair [1]	Poor
Sutton and Acton	SvA, SvB, SwA, SwB, SxC.	Poor to fair	Poor	Fair	Good	Poor
Watchaug	WgA, WgB, WhA, WhB.	Poor to fair	Poor to fair	Fair	Good	Poor
Wethersfield	WkA, WkB, WkB2, WkC, WkC2, WkD, WkD3, WmB, WmC, WmD, WnC, WnD.	Poor to fair	Poor	Poor	Fair	Fair
Whitman	WpA	Poor	Poor	Not suitable	Not suitable	Not suitable

[1] Unsuitable as source of borrow material.

and then sold or replaced after construction is completed. Some former forest and agricultural areas have topsoil that is too thin for profitable stripping. Good topsoil should be free of stones, have a medium texture, and contain a fair amount of organic matter.

Stones limit the usefulness of upland soils as a source of topsoil. The stony and very stony soil types are not as good for topsoil as the nonstony types. The quality of the topsoil from the soils on terraces depends upon texture. The medium-textured Agawam, Branford, En-

uses and soil characteristics that affect earth construction

Susceptibility to frost action	Soil characteristics affecting—			
	Construction of farm ponds		Artificial drainage	Vertical alinement of roads
	Impounding area	Embankments		
Medium	Excessive seepage	Adequate strength and stability; rapidly permeable.	Seasonal high water table; suitable for tile systems and intercepting drainage ditches.	
Low	Excessive seepage	Adequate strength and stability; rapidly permeable.	Natural drainage adequate	
Low	Slow seepage	Adequate strength and stability; moderately permeable.	Natural drainage adequate	
Low	Slow seepage	Adequate strength and stability; moderately permeable.	Natural drainage adequate	
Low	Excessive seepage	Adequate strength and stability; rapidly permeable.	Natural drainage adequate	
Low	Excessive seepage; soil too shallow and too steep.	Inadequate strength and stability; moderately permeable.	Natural drainage adequate	Shallow over bedrock.
Low	Excessive seepage; soil too shallow and too steep.	Inadequate strength and stability; moderately permeable.	Natural drainage adequate	Shallow over bedrock.
High	Slow seepage during periods of low water table.	Adequate strength and stability; slowly permeable.	High water table; suitable for tile and open ditch systems.	
Medium	Slow seepage because of compaction.	Adequate strength and stability; moderately to slowly permeable.	High water table. Intercepting drainage ditches are better than tile systems.	Subject to seepage and slide above pan.
High	Moderate to very slow seepage if underlain by hardpan.	Moderate strength and stability; fairly impermeable.	Permanent high water table. Random and intercepting drainage ditches are better than tile systems.	
Medium	Very slow seepage because of hardpan.	Stable only on mild slopes; substratum can be used for impermeable structures.	Natural drainage adequate	Subject to seepage and slide above pan.
Medium	Very slow seepage because of hardpan.	Stable only on mild slopes; can be used for impermeable structures.	Natural drainage adequate	Subject to seepage and slide above pan.
High	Very slow seepage because of hardpan.	Moderately stable; impermeable.	Perched water table; open drains better than tile systems.	
Low				
Low				
Low	Excessive seepage; too shallow and too steep.	Adequate strength and stability; rapidly permeable.	Natural drainage adequate	Shallow over bedrock.
Medium	Moderate to excessive seepage.	Adequate strength and stability; moderately permeable.	Seasonal high water table; suitable for tile.	
Medium	Moderate seepage during periods of low water table.	Adequate strength and stability; moderately permeable.	Seasonal high water table; suitable for tile and intercepting drainage ditches.	
Medium	Very slow seepage because of hardpan.	Stable only on mild slopes; substrata may be used for impermeable structures.	Natural drainage adequate	Subject to seepage and slide above pan.
High	Very slow seepage because of permanently high water table.	Adequate strength and stability; variable permeability.	Permanent high water table; intercepting ditches and random ditches best.	

TABLE 7.—*The suitability of the soils for some engineering uses*

Soil series and topographic position	Map symbols	Soil suitabilities for—				Suitability for winter grading
		Topsoil	Sand and gravel	Road subgrade	Road fill	
Soils of Uplands—Continued						
Wilbraham and Menlo	WrA, WsA, WtA	Poor	Poor	Not suitable	Not suitable	Not suitable
Woodbridge	WxA, WxB, WzA, WzB, WzbC.	Poor to fair	Poor	Poor	Fair	Poor
Woodbridge, reddish substratum phases.	WyA, WyB, WzaB	Poor to fair	Poor	Poor	Fair	Poor
Soils of Uplands over nonconforming substrata:						
Birchwood	BhA, BhB	Poor to fair	Poor	Solum fair; substratum poor.	Solum fair; substratum poor.	Fair
Broadbrook	BrA, BrB, BrB2, BrC, BrC2, BrD, BsA, BsB, BsC, BsD.	Fair	Poor	Poor	Solum poor; substratum fair.	Fair
Narragansett	NaA, NaB, NaB2, NaC, NaC2, NaD, NgB, NgC, NgD.	Fair	Poor to fair	Solum poor; substratum good.	Solum poor; substratum good.	Fair
Narragansett and Broadbrook.	NkC, NmD	Fair	Poor to fair	Solum poor; substratum good.	Solum poor; substratum good.	Fair
Poquonock	PpB, PpC, PuA, PuB, PuC.	Poor to fair	Poor	Solum good; substratum poor.	Solum good; substratum fair.	Good
Rainbow	RaA, RaB, RbA, RbB	Poor to fair	Poor	Solum poor; substratum poor.	Solum poor; substratum fair.	Poor
Wapping	WeA, WeB, WfA, WfB.	Poor to fair	Poor to fair	Solum poor; substratum good.	Solum poor; substratum good.	Poor
Terrace soils—wind- and water-deposited materials:						
Agawam	AfA, AfB, AfC, AgA, AgB, AgC, AkA.	Fair to good	Fair to good	Good	Good	Good
Branford	BoA, BoB	Good	Good	Solum fair; substratum good.	Solum fair; substratum good.	Good
Ellington	EfA	Fair	Fair	Good	Good	Fair
Enfield	EsA, EsA2, EsB, EsB2, EsC, EsC2, EwA.	Good	Good	Solum poor; substratum good.	Solum poor; substratum good.	Fair
Hartford	HdA, HdB, HfA, HfB, HfC.	Fair	Good	Good	Good	Good
Hinckley	HkA, HkC, HnC	Poor	Good	Good	Good	Good
Manchester	McA, McC, MgA, MgC, MhC.	Poor	Good	Good	Good	Good
Merrimac	MrA, MrB, MrC, MsA, MyA, MyB, MyC.	Fair	Good	Good	Good	Good
Ninigret	NnA, NnB, NsA, NsB.	Fair to good	Poor	Good	Good	Fair
Penwood	PnA, PnB, PnC	Poor	Fair	Good	Good	Good
Scarboro	SeA	Poor	Poor	Not suitable	Not suitable	Not suitable
Sudbury	SsA	Fair	Fair	Good	Good	Fair
Terrace escarpments	Tg	Not suitable	Good	Good	Good	Good
Tisbury	TsA, TsB	Good	Fair	Solum poor; substratum good.	Solum poor; substratum good.	Poor

and soil characteristics that affect earth construction—Continued

Susceptibility to frost action	Soil characteristics affecting—			
	Construction of farm ponds		Artificial drainage	Vertical alinement of roads
	Impounding area	Embankments		
High	Slow to moderate seepage	Moderate strength and stability; moderate to slow permeability.	Perched water table; open drains better than tile systems.	
Medium to high.	Seepage very slow because of hardpan.	Moderately stable; may be used for impervious structures.	Perched water table; intercepting ditches better than tile systems.	Subject to seepage and slide above pan.
Medium to high.	Seepage very slow because of hardpan.	Moderately stable; may be used for impervious structures.	Perched water table; intercepting ditches better than tile systems.	Subject to seepage and slide above pan.
Medium	Very slow seepage because of hardpan.	Surface sand moderately stable; moderately permeable.	Perched water table; soil suitable for intercepting ditches and random tile systems.	Subject to seepage and slide above pan.
Medium	Very slow seepage in underlying hardpan.	Surface silts unstable; moderately permeable.	Natural drainage adequate	Subject to seepage and slide above pan.
Low	Excessive seepage	Surface silts unstable; moderately permeable.	Natural drainage adequate	Erosive.
Low	Excessive seepage	Surface silts unstable; moderately permeable.	Natural drainage adequate	Erosive.
Low	Very slow seepage in underlying hardpan.	Surface sands have adequate strength and stability; rapidly permeable.	Natural drainage adequate	Subject to seepage and slides above pan.
Medium	Very slow seepage in underlying hardpan.	Surface silts unstable; moderately permeable.	Perched water table; suitable for intercepting ditches and random tile systems.	Subject to seepage and slides above pan.
Medium	Excessive seepage	Surface silts unstable; moderately permeable.	Seasonal high water table; suitable for intercepting ditches and tile systems.	Erosive.
Low	Excessive seepage	Adequate strength and stability; rapidly permeable.	Natural drainage adequate	
Low	Excessive seepage	Adequate strength and stability; rapidly permeable.	Natural drainage adequate	
Medium	Excessive seepage	Adequate strength and stability; rapidly permeable.	Seasonal high water table; suitable for tile.	
Low	Excessive seepage	Surface silts unstable; moderately permeable.	Natural drainage adequate	Erosive.
Low	Excessive seepage	Adequate strength and stability; rapidly permeable.	Natural drainage adequate	
Low	Excessive seepage	Adequate strength and stability; very rapidly permeable.	Natural drainage adequate	
Low	Excessive seepage	Adequate strength and stability; very rapidly permeable.	Natural drainage adequate	
Low	Excessive seepage	Adequate strength and stability; rapidly permeable.	Natural drainage adequate	
Medium	Excessive seepage	Adequate strength and stability; rapidly permeable.	Seasonal high water table; suitable for tile.	
Low	Excessive seepage	Adequate strength and stability; rapidly permeable.	Natural drainage adequate	
High	Moderate seepage	Adequate strength and stability; rapidly permeable.	Permanent high water table; suitable for open ditches and tile.	
Medium	Excessive seepage	Adequate strength and stability; rapidly permeable.	Seasonal high water table; suitable for tile.	
Low				
Medium	Excessive seepage	Surface silts unstable; moderately permeable.	Seasonal high water table; suitable for tile.	Erosive.

TABLE 7.—*The suitability of the soils for some engineering uses*

Soil series and topographic position	Map symbols	Soil suitabilities for—				Suitability for winter grading
		Topsoil	Sand and gravel	Road subgrade	Road fill	
Walpole	WcA, WdA	Fair	Fair to poor	Not suitable	Not suitable	Poor
Windsor	WuA, WuB, WuC, WvA, WvB, WvC.	Poor	Fair	Good	Good	Fair
Terrace soils—lacustrine silt and clay:						
Belgrade	BaA, BaB	Good	Not suitable	Not suitable	Poor	Not suitable
Belgrade, reddish variant	BbA, BbB	Good	Not suitable	Not suitable	Poor	Not suitable
Berlin	BcA, BcB, BcC	Poor to fair	Not suitable	Not suitable	Not suitable	Not suitable
Biddeford	BfA	Poor	Not suitable	Not suitable	Not suitable	Not suitable
Biddeford, reddish variant	BgA	Poor	Not suitable	Not suitable	Not suitable	Not suitable
Buxton	BxA, BxB, BxC	Poor to fair	Not suitable	Not suitable	Not suitable	Not suitable
Scantic	ScA	Poor	Not suitable	Not suitable	Not suitable	Not suitable
Scantic, reddish variant	SdA	Poor	Not suitable	Not suitable	Not suitable	Not suitable
Terrace escarpments	Tc	Not suitable	Not suitable	Not suitable	Not suitable	Not suitable
Wallington	WaA	Fair	Not suitable	Not suitable	Not suitable	Not suitable
Wallington, reddish variant	WbA	Fair	Not suitable	Not suitable	Not suitable	Not suitable
Terrace soils—lacustrine sand over silt and clay:						
Elmwood	EmA, EnA, EnB, EoA, EoB.	Fair to good	Not suitable	Solum good to fair; substratum not suitable.	Solum good to fair; substratum not suitable.	Poor
Melrose	MmA, MmB, MnA, MnB.	Fair to good	Not suitable	Solum good to fair; substratum not suitable.	Solum good to fair; substratum not suitable.	Fair
Swanton	SyA, SzA	Fair to poor	Not suitable	Not suitable	Not suitable	Not suitable
Terrace escarpments	Te	Not suitable	Not suitable	Solum fair; substratum unsuitable.	Solum good to fair; substratum unsuitable.	Fair
Whately	WoA	Poor	Not suitable	Not suitable	Not suitable	Not suitable

and soil characteristics that affect earth construction—Continued

Susceptibility to frost action	Soil characteristics affecting—			
	Construction of farm ponds		Artificial drainage	Vertical alinement of roads
	Impounding area	Embankments		
High	Excessive seepage during periods of low water table.	Adequate strength and stability; moderately to rapidly permeable.	High water table; suitable for open ditches and tile.	
Low	Excessive seepage	Adequate strength and stability; rapidly permeable.	Natural drainage adequate	
Medium	Slow seepage	Unstable; may be used for impervious structures.	High water table; open ditches better than tile.	Erosive.
Medium	Slow seepage	Unstable; may be used for impervious structures.	High water table; open ditches better than tile.	Erosive.
High	Very slow seepage	Unstable; may be used for impervious structures.	High water table; suitable for open ditches and diversion terraces; not suitable for tile.	Erosive; subject to slide.
High	Very slow seepage	Unstable; may be used for impervious structures.	Permanent high water table; difficult to drain because of tight silt and clay; use random ditches only.	
High	Very slow seepage	Unstable; may be used for impervious structures.	Permanent high water table; difficult to drain because of tight silt and clay; use random ditches only.	
High	Very slow seepage	Unstable; may be used for impervious structures.	High water table; suitable for open ditches and diversion terraces; not suitable for tile.	Erosive; subject to slide.
High	Very slow seepage	Unstable; may be used for impervious structures.	High water table; suitable for open ditches and bedding; not suitable for tile.	
High	Very slow seepage	Unstable; may be used for impervious structures.	High water table; suitable for open ditches and bedding; not suitable for tile.	
High	Areas too steep	Unstable; may be used for impervious structures.		Erosive; subject to slide.
High	Very slow seepage	Unstable; may be used for impervious structures.	High water table; open ditches are better than tile.	
High	Very slow seepage	Unstable; may be used for impervious structures.	High water table; open ditches are better than tile.	
Medium to high.	Very slow seepage because of underlying silts and clays.	Surface sand has adequate strength and is permeable; clay is unstable and impervious.	Perched water table; suitable for diversion ditches and tile.	Subject to seepage and slide.
Low to medium.	Very slow seepage because of underlying silts and clays.	Surface sand has adequate strength and is permeable; clay is unstable and impervious.	Natural drainage adequate	Subject to seepage and slide.
High	Very slow seepage because of underlying silts and clays.	Surface sand has moderate strength; clay is unstable and impervious.	High water table; suitable for open-ditch and random tile systems.	
Low to medium.	Too steep	Silts and clays in substrata may be used for impervious structures.		Subject to seepage and slide.
High	Very slow seepage because of underlying silts and clays.	Surface sands have adequate strength and are permeable; clays are unstable and impervious.	Permanent high water table; suitable for open ditches but not for tile.	

TABLE 7.—*The suitability of the soils for some engineering uses*

Soil series and topographic position	Map symbols	Soil suitabilities for—				Suitability for winter grading
		Topsoil	Sand and gravel	Road subgrade	Road fill	
Alluvial soils:						
Alluvial land	Am	Good to fair	Poor	Not suitable	Poor	Poor
Bermudian	BdA, BeA	Good	Poor	Fair to poor	Fair to poor	Poor
Bowmansville	BmA	Fair	Poor	Fair to poor	Fair to poor	Not suitable
Hadley	HaA	Good	Poor	Poor	Poor	Poor
Limerick	LmA	Fair	Poor	Not suitable	Not suitable	Not suitable
Ondawa	OnA	Fair	Poor	Good to fair	Good to fair	Fair
Podunk	PoA	Fair	Poor	Good to fair	Good to fair	Poor
Riverwash	Re	Not suitable	Fair	Good	Good	Not suitable
Rowland	RoA	Good	Poor	Not suitable	Not suitable	Not suitable
Rumney	RuA	Fair	Poor	Not suitable	Not suitable	Not suitable
Saco	SaA, SbA	Poor	Poor	Not suitable	Not suitable	Not suitable
Suncook	StA	Poor	Fair	Good to fair	Good to fair	Fair
Winooski	WwA	Good	Poor	Poor	Poor	Not suitable
Organic soils:						
Peats and Mucks	PkA, PmA	Not suitable; may be used as a topsoil amendment.	Not suitable	Not suitable	Not suitable	Not suitable

field, and Tisbury soils are good sources of topsoil because they are free of stones and have an adequate moisture-holding capacity. The Windsor, Penwood, Manchester, Hinckley, Merrimac, and Hartford soils are only fair to poor for topsoil because they contain excess sand, have a low moisture-holding capacity, and are droughty. They are satisfactory as amendments for loosening moderately fine textured silty clay loam or clay loam.

The soils of the glaciolacustrine terraces are generally not good sources of topsoil because they are very high in silt and clay. New turf cannot be easily established because the soil is difficult to work and becomes very hard and compact on drying. These characteristics inhibit germination and survival of young plants. Topsoil from the Belgrade and Wallington glaciolacustrine soils is more satisfactory because it contains a higher percentage of fine sand and is more friable.

The quality of topsoil from the alluvial soils varies. Medium and moderately coarse textured alluvium is more satisfactory than coarse-textured alluvium.

The poorly drained and very poorly drained soils generally have rich, dark-colored surface horizons. These soils, however, are not necessarily good sources of topsoil. It is not the dark color that makes a soil desirable, but its texture, content of organic matter, and absence of stones. Color is not a reliable indicator of the amount of organic matter in soils.

The best source of sand and gravel is from the soils underlain by deposits of sand and gravel. Mixtures of sand and gravel can be obtained best from the Hinckley and Manchester soils. The upland soils are generally poor sources of sand and gravel. However, the Charlton, Cheshire, and Gloucester soils are fair sources because they have developed on moderately coarse to coarse-textured gravelly till. The glaciolacustrine soils are not

and soil characteristics that affect earth construction—Continued

Susceptibility to frost action	Soil characteristics affecting—			
	Construction on farm ponds		Artificial drainage	Vertical alinement of roads
	Impounding area	Embankments		
Low to high				
Low	Excessive seepage	Moderately stable; rapidly permeable.	Natural drainage adequate	Subject to flooding.
High	Excessive seepage during periods of low water table.	Moderately stable; rapidly permeable.	High water table and flooding; random ditches best.	Subject to flooding.
Low to medium.	Excessive seepage	Moderately stable; rapidly permeable.	Natural drainage adequate	Subject to flooding.
High	Excessive seepage during periods of low water table.	Moderate strength and stability; rapidly permeable.	High water table and flooding; random ditches best.	Subject to flooding.
Low	Excessive seepage	Adequate strength and stability; rapidly permeable.	Natural drainage adequate	Subject to flooding.
Medium	Excessive seepage	Adequate strength and stability; rapidly permeable.	High water table and flooding; suitable for open ditches and tile.	Subject to flooding.
				Subject to flooding.
Medium to high.	Excessive seepage	Moderate strength and stability; rapidly permeable.	High water table and flooding; suitable for open ditches and tile.	Subject to flooding.
High	Excessive seepage during periods of low water table.	Adequate strength and stability; rapidly permeable.	High water table and flooding; random ditches best.	Subject to flooding.
High	Moderate seepage during periods of low water table.	Moderate strength and stability; rapidly permeable.	Permanent high water table and flooding; random ditches are best.	
Low	Excessive seepage	Adequate strength and stability; rapidly permeable.	Natural drainage adequate	Subject to flooding.
Medium to high.	Excessive seepage	Moderate strength and stability; rapidly permeable.	High water table and flooding; suitable for open ditches and tile.	Subject to flooding.
High			Permanent high water table; open ditches best.	

suitable sources because of the predominance of fine-textured material.

The suitability of the soils as sources of road subgrade material is indicated by the AASHO and Unified classifications. Soils that have been rated A–1–a, A–1–b, and A–2 or SP, SP–SM, and SM are considered to be good sources. Those classified A–4 or ML are considered fair to poor, and those classified A–6 and A–7 or ML–CL, CL, and MH are not suitable. All poorly drained and very poorly drained soils are rated not suitable because they are generally in depressions that are filled in for road construction. Some poorly drained and very poorly drained soils might have satisfactory textures for road subgrade material, but they are seldom, if ever, used for it.

In many of the soils of uplands and terraces the substrata are the best sources of road subgrade material. The sola may consist of material that is too fine in texture for subgrade material. In such cases, stripping of the sola would be beneficial.

The only soils that are not suitable for road fill are peats and mucks, those that are high in clay, and those containing stumps and brush debris. Glaciolacustrine silts and clays are generally not suitable unless coarse material is mixed with the fine material and adequate drainage is provided. The poorly drained and very poorly drained soils have not been designated as suitable for road fill because they are generally in topographic depressions that are filled in for highway construction.

Soils that are most suitable for winter grading are the loamy sands, sandy loams, and gravelly sandy loams. The fine sandy loams and very fine sandy loams are fairly well to poorly suited to winter grading. Loams, silt loams, and silty clay loams and all poorly drained and very poorly drained soils are not suitable for winter

grading because they generally contain large amounts of moisture at that time of year.

Well-drained soils generally are the least susceptible to frost heaving. However, those that are underlain by hardpan are moderately susceptible to heaving. Most moderately well drained soils are moderately susceptible. The silty clay loams are an exception because they are normally highly susceptible. The poorly drained and very poorly drained soils are highly susceptible to heaving because they are high in moisture.

The characteristics of each soil series have been evaluated in terms of their suitability for farm ponds and drainage systems. Soils that are most suitable for reservoir areas have a high water table most of the time, or they are underlain by relatively impervious silt and clay or by hardpan. Some of the poorly drained and very poorly drained upland till soils and glaciofluvial terrace soils are underlain by coarse-textured material. In these, the seasonal fluctuation of the water table is considerable. These soils are less favorable for farm ponds because of seepage in periods when the water table is low. Seepage losses, however, can be minimized through proper excavation and by lining the surface with impervious material.

Embankments and dams of a farm pond should consist of materials that have strength and stability and that are impervious to water. Coarse- and medium-textured soils have adequate strength and stability, but they allow rapid to moderate seepage of water. On the other hand, the fine-textured soils that are high in silt and clay are not strong or stable enough, but seepage losses are very low. Soil can be made fairly impervious through compaction or by adding layers of silt and clay. Soils that are not strong or stable enough can be improved by adding layers of coarser textured material.

The main purpose of establishing drainage systems is to lower the water table and create a more favorable balance between air and moisture in the soil. Soils with impeded drainage that are underlain by loose and friable parent material generally are not difficult to drain by conventional tile systems. Glaciolacustrine soils and those with slowly permeable pan horizons are somewhat difficult to drain. Tile systems are not effective in the silty glaciolacustrine soils because they are very slowly permeable. Open intercepting drain ditches are generally more effective for these soils.

Drainage of peats and mucks is not a common practice in the county, but in small areas, open ditches are generally used. Drainage by use of tile is unsatisfactory unless the tile is placed in a mineral layer. If laid in the organic material, the system breaks readily because of uneven settling.

Urban Development

Hartford County may be considered a good example of commercial, industrial, and residential expansion upon an area that has developed highly specialized types of agriculture.

The reasons for industrial and urban encroachment on agricultural land are (1) greater demand for manufactured goods of all kinds, (2) gradual increase in the cost of producing agricultural commodities, and (3) decline in net income from farming. Many farmers find it more profitable to sell some or all of their land for urban development than to compete with industry for high-priced labor and maintain their farms on a narrow margin of profit.

The gradual shift from agriculture to urban development has been progressing for about three decades. It has reached noticeable proportions in the cities and towns of Hartford, East Hartford, Manchester, Glastonbury, New Britain, Bristol, Windsor Locks, Windsor, Enfield, Southington, and Plainville. Probably the growth of the aircraft industry and the development of the insurance business in Hartford are the main causes of the expansion of business and industry in Hartford County.

Business and industry have gradually spread beyond the commercial and industrial districts. They have acquired land in the suburbs and rural areas and have built modern factories, laboratories, and offices on spacious, landscaped grounds with ample parking facilities.

Industrial and commercial expansion has created new jobs and increased the need for homes; consequently, residential expansion has been as rapid as that of industry. Many new houses are built in large housing developments, where uniformity of construction, material, and design decrease building costs. A larger suburban population has created a greater demand for shopping centers, schools, parks, golf courses, and drive-in theaters.

It is important to consider the site for any type of industrial, home, and highway construction. The nearly level to gently sloping, deep, well-drained soils that are fairly free of stones and boulders are generally considered the best. These are also the soils that are generally well suited to agriculture.

Two areas were selected for a study of soils and land use in Hartford County (*22*). One area consisted of the adjacent towns of Southington and Plainville in the southwestern part of the county, and the other consisted of the adjacent towns of Suffield and Windsor Locks in the north-central part of the county. These areas differ somewhat in physical features and in types of agriculture, but they are the same size and have been exposed to the same pressure of expanding industry and population. In 1951, 14 percent of the Southington-Plainville area and 10 percent of the Suffield-Windsor Locks area were in urban developments. The term "urban" includes farmsteads, residential areas, commercial and industrial building sites, golf courses, airfields, dumps, gravel pits, and quarries. In both areas, 65 percent of the urban development was on predominantly well-drained terrace soils. However, only 13 percent of the expansion in Southington-Plainville section and 20 percent in the Suffield-Windsor Locks section were on the more rolling stony and rocky upland soils. The rest of the expansion had occurred on miscellaneous land types.

The trend in the use of some soil types for industrial and housing expansion can be explained by data in table 8. This table gives the rating of the soils for urban development and shows some soil characteristics that affect the use of a soil or site for this purpose.

The infiltration rate (table 8) may be poor because of a hardpan, a high water table, or silt and clay in the

substratum. Internal drainage in pervious sand and gravel can be improved through use of tile drainage systems. Soils that have a high water table caused by impervious layers may be difficult to drain, and drainage systems may not be efficient.

Excavation in upland till soils should not be difficult because bedrock is generally at depths of more than 10 feet. It may be less because of some local conditions. Bedrock of red shale and sandstone in the Central Lowlands is less difficult to excavate than the harder granite, gneiss, and schist in the Eastern and Western Highlands. The surface of a soil may lack stones because they have been removed for farming. The soil below the surface may be very stony.

Surface gradients of less than 15 percent generally do not interfere with construction except where bank stabilization is necessary. Erosion control practices may have to be used on topsoil if slopes have been graded.

The deep, well to excessively drained, stone-free terrace soils have the fewest limitations to urban development. They are in greatest demand by urban developers. Excessively drained terrace soils are very droughty and difficult to manage for crops, but they are good for urban development. These are the Windsor, Penwood, Manchester, and Hinckley soils. The well-drained terrace soils, as the Agawam, Branford, Enfield, Hartford, and Merrimac, are highly productive agricultural soils. They are potentially good construction sites, but they are more difficult to acquire. The moderately well drained terrace soils, as the Ellington, Ninigret, Sudbury, and Tisbury, generally have internal drainage problems caused by a high water table early in spring. Internal drainage can generally be improved by the use of tile drainage systems; consequently, the agricultural value of the land is not too seriously curtailed.

The poorly drained and very poorly drained terrace soils, as the Walpole and Scarboro, present problems if used for agriculture or for building sites. Many areas may be readily drained for either use. The impervious silt and clay soils of the glaciolacustrine terraces—the Buxton, Berlin, Belgrade, and Wallington—are generally not suitable for urban development, mainly because of surface and internal drainage problems. Septic tanks and dry wells are difficult to maintain in proper working order. These soils, however, are suitable for silage crops, hay, and pasture in support of dairying.

The competition for land in the uplands has not been as great as elsewhere, but it is increasing. The Eastern and Western Highlands and the basalt ridges that dissect the Central Lowland support a less intensified type of agriculture than the terraces in the Central Lowland. In these uplands and ridges, dairying and some poultry raising are the predominant kinds of agriculture. Most of the land is still in forests or woodlots. Steepness, shallowness, stoniness, and drainage are the limiting factors in these areas. Soils affected by these conditions are not profitable for agriculture and generally not suitable for urban development. Site ratings in table 8 for these soils are given as a range in most cases because there are several limiting factors, any or all of which may be present in a given location.

The upland soils best suited for urban development are the well-drained, level to gently sloping soils that have been cleared of stone. These are the Brookfield, Charlton, Cheshire, Gloucester, and Narragansett soils. The upland Paxton, Woodbridge, Wethersfield, Ludlow, Broadbrook, and Rainbow soils have developed on compact glacial till, and they are generally less desirable as building sites because of erosion and compactness that interfere with the functioning of septic tanks.

Some of the upland sites have esthetic values for homeowners, although they have definite limitations for building of foundations. The Hollis, Holyoke, and Sunderland soils usually occur in areas of moderate to strong relief and provide scenery or some wooded seclusion. Shallowness to bedrock, however, is a serious limitation on these soils.

The poorly drained and very poorly drained upland soils, as the Leicester, Ridgebury, Wilbraham, Menlo, and Whitman, are generally not used for urban development because of the cost of correcting drainage conditions. When such soils are used for building sites, tile drainage systems are seldom established. Instead, the low spots are generally filled in. The poor drainage conditions are not corrected by this practice, however, unless the mantle of fill material is deep enough to provide adequate subsurface drainage around basement foundations.

Because soil characteristics impose limitations on economical land use, planning and zoning boards will find that a knowledge of their soils is helpful in determining the best use of land. This knowledge should also be helpful in anticipating remedial measures. Land that is submarginal for agriculture but suitable for building can be used for pleasant homesites, and the most fertile soils can be preserved for production of food. To achieve this goal, a knowledge of the soils in the town is essential.

A great store of basic knowledge has been accumulated by soil scientists. This can be used in planning the development of the urban, recreational, and agricultural uses of land in Hartford County.

Descriptions of the Soils

In this section the soil series and soils mapped in Hartford County are described. A profile representative of each series is described in detail. Except for the texture, all soils in one series have essentially the same kind of profile. The differences, if any, are pointed out.

The suitability of each soil for agriculture is explained to the extent that present knowledge permits. The approximate acreage of each soil is shown in table 9. The symbols in parentheses following the color of the soil refer to Munsell notations of hue, value, and chroma. A list of the soils and their map symbols is given in the Guide to Mapping Units and Capability Units at the end of the report. The location and distribution of the soils are shown on the soil map in the back of the report.

Additional information about the soils in this county is given in the section Use and Management of the Soils.

TABLE 8.—*Soil data*

[Additional information is in text. Absence of data in columns indicates the characteristic is not a problem,

Topographic position and soil series	Map symbols	Rating for urban development	Drainage limitations
Upland till:			
Loose to firm substrata:			
Acton	AcA, AcB, AdB	Fair to poor	Slight
Brookfield	BtB, BtC, BvB, BvC	Good to poor	
Charlton	CaA, CaB, CaC, CaD, ChB, ChC, ChD, CrC, CrD	Good to poor	
Cheshire	CsA, CsB, CsB2, CsC, CsC2, CsD2, CtB, CtC, CtD, CvC, CvD.	Good to poor	
Gloucester	GcA, GcB, GcC, GcD, GsB, GsC, GsD, GvC, GvD.	Good to poor	
Hollis	HoC, HoD, HsC, HsE	Poor	
Holyoke	HtC, HtD, HyC, HzE	Poor	
Narragansett	NaA, NaB, NaB2, NaC, NaC2, NaD, NgB, NgC, NgD, NkC, NmD.	Good to poor	
Sunderland	SuC, SuE	Poor	
Sutton	SvA, SvB, SwA, SwB, SxC	Fair to poor	Slight
Wapping	WeA, WeB, WfA, WfB	Fair to poor	Slight
Watchaug	WgA, WgB, WhA, WhB	Fair to poor	Slight
Very firm, compact substrata:			
Birchwood	BhA, BhB	Poor	Slight
Broadbrook	BrA, BrB, BrB2, BrC, BrC2, BrD, BsA, BsB, BsC, BsD.	Fair to poor	
Ludlow	LoA, LoB, LsB, LwC	Poor	Slight
Paxton	PbB, PbC, PbD2, PdB, PdC, PdD, PeC, PeD	Fair to poor	
Paxton, reddish substratum phases	PaB, PaC, PaD, PcB, PcC, PcD	Fair to poor	
Poquonock	PpB, PpC, PuA, PuB, PuC	Fair to poor	
Rainbow	RaA, RaB, RbA, RbB	Poor	Slight
Wethersfield	WkA, WkB, WkB2, WkC, WkC2, WkD, WkD3, WmB, WmC, WmD, WnC, WnD.	Fair to poor	
Woodbridge	WxA, WxB, WzA, WzB, WzbC	Poor	Slight
Woodbridge, reddish substratum phases	WyA, WyB, WzaB	Poor	Slight
Loose to compact substrata:			
Leicester	LcA, LeA, LdA	Very poor	Moderate
Menlo	MoA, MpA	Very poor	Severe
Ridgebury	RdA	Very poor	Moderate
Whitman	WpA	Very poor	Severe
Wilbraham	WrA, WsA, WtA	Very poor	Moderate
Water- or wind-deposited terrace soils over sand or sand and gravel:			
Agawam	AfA, AfB, AfC, AgA, AgB, AgC, AkA	Excellent	
Branford	BoA, BoB	Excellent	
Ellington	EfA	Fair	Slight
Enfield	EsA, EsA2, EsB, EsB2, EsC, EsC2, EwA	Excellent	
Hartford	HdA, HdB, HfA, HfB, HfC	Excellent	
Hinckley	HkA, HkC, HnC	Excellent	
Manchester	McA, McC, MgA, MgC, MhC	Excellent	
Merrimac	MrA, MrB, MrC, MsA, MyA, MyB, MyC	Excellent	
Ninigret	NnA, NnB, NsA, NsB	Fair	Slight
Penwood	PnA, PnB, PnC	Excellent	
Scarboro	SeA	Very poor	
Sudbury	SsA	Fair	Slight
Tisbury	TsA, TsB	Fair	Slight
Walpole	WcA, WdA	Fair	Slight
Windsor	WuA, WuB, WuC, WvA, WvB, WvC	Excellent	
Glaciolacustrine terrace soils:			
Sand over silt and clay:			
Elmwood	EmA, EnA, EnB, EoA, EoB	Poor	Slight
Melrose	MmA, MmB, MnA, MnB	Fair	
Swanton	SyA, SzA	Very poor	Moderate
Whately	WoA	Very poor	Severe
Deep silt and clay:			
Belgrade	BaA, BaB, BbA, BbB	Fair	Slight
Berlin	BcA, BcB, BcC	Poor	Slight
Biddeford	BfA	Very poor	Severe
Biddeford, reddish variant	BgA	Very poor	Severe
Buxton	BxA, BxB, BxC	Poor	Slight
Scantic	ScA	Very poor	Moderate
Scantic, reddish variant	SdA	Very poor	Moderate
Wallington, reddish variant	WbA	Very poor	Moderate

See footnotes at end of table.

applicable to urban development

or that a different characteristic of the soil limits or causes difficulty in urban development]

Suitability of infiltration rate for septic tanks	Flooding	Excavation difficulty	Slope [1]
Poor [2]		May be stony to very stony [3]	Less than 15 percent.
		May be stony to very stony [3]	More than 15 percent.
		May be stony to very stony [3]	More than 15 percent.
		May be stony to very stony [3]	More than 15 percent.
		May be stony to very stony [3]	More than 15 percent.
		Bedrock [4]; some soils are stony to very stony [3]	More than 15 percent.
		Bedrock [4]; some soils are stony to very stony [3]	More than 15 percent.
		May be stony to very stony [3]	More than 15 percent.
		Bedrock [4]; some soils are stony to very stony [3]	More than 15 percent.
Poor [2]		May be stony to very stony [3]	More than 15 percent.
Poor [2]		May be stony to very stony [3]	More than 15 percent.
Poor [2]		May be stony to very stony [3]	More than 15 percent.
Poor		May be stony to very stony [3]	
Poor		May be stony to very stony [3]	More than 15 percent.
Poor		May be stony to very stony [3]	
Poor		May be stony to very stony [3]	More than 15 percent.
Poor		May be stony to very stony [3]	More than 15 percent.
Poor		May be stony to very stony [3]	More than 15 percent.
Poor		May be stony to very stony [3]	
Poor		May be stony to very stony [3]	More than 15 percent.
Poor		May be stony to very stony [3]	
Poor		May be stony to very stony [3]	
Poor		May be stony to very stony [3]	
Poor		May be stony to very stony [3]	
Poor		May be stony to very stony [3]	
Poor		May be stony to very stony [3]	
	Some soils are subject to overflow		
Poor [2]			
Poor [2]			
	Some soils are subject to overflow		
	Some soils are subject to overflow		
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Poor			

TABLE 8.—*Soil data applicable*

[Additional information is in text. Absence of data in columns indicates the characteristic is not a problem,

Topographic position and soil series	Map symbols	Rating for urban development	Drainage limitations
Alluvial soils:			
Deep sand and silt:			
Alluvial land	Am	Very poor	Slight
Bermudian	BdA, BeA	Very poor	
Bowmansville	BmA	Very poor	Moderate
Hadley	HaA	Very poor	
Limerick	LmA	Very poor	Moderate
Ondawa	OnA	Very poor	
Podunk	PoA	Very poor	Slight
Rowland	RoA	Very poor	Slight
Rumney	RuA	Very poor	Moderate
Saco	SaA, SbA	Very poor	Severe
Suncook	StA	Very poor	
Winooski	WwA	Very poor	Slight
Miscellaneous land types:			
Peats and Mucks	PkA, PmA	Very poor	Severe
Riverwash	Re	Very poor	Severe
Rocky land, Hollis materials	RhC, RhE	Very poor	
Rocky land, Holyoke materials	RkC, RkE	Very poor	
Terrace escarpments	Tc, Te, Tg	Poor	

[1] Generally slopes of less than 15 percent do not interfere with construction.

[2] Seasonal high water table interferes with internal drainage, but infiltration rates may be satisfactory when water tables are low.

TABLE 9.—*Approximate acreage and proportionate extent of the soils*

Soil	Acres	Percent	Soil	Acres	Percent
Acton fine sandy loam, 0 to 3 percent slopes	85	(1)	Broadbrook silt loam, 3 to 8 percent slopes, eroded	729	0.2
Acton fine sandy loam, 3 to 8 percent slopes	225	(1)	Broadbrook silt loam, 8 to 15 percent slopes	1,102	.2
Acton stony fine sandy loam, 3 to 8 percent slopes	512	0.1	Broadbrook silt loam, 8 to 15 percent slopes, eroded	304	.1
Agawam fine sandy loam, 0 to 3 percent slopes	3,970	.8	Broadbrook silt loam, 15 to 25 percent slopes	615	.1
Agawam fine sandy loam, 3 to 8 percent slopes	2,058	.4	Broadbrook stony silt loam, 0 to 3 percent slopes	131	(1)
Agawam fine sandy loam, 8 to 15 percent slopes	310	.1	Broadbrook stony silt loam, 3 to 8 percent slopes	1,231	.3
Agawam very fine sandy loam, 0 to 3 percent slopes	2,257	.5	Broadbrook stony silt loam, 8 to 15 percent slopes	687	.1
Agawam very fine sandy loam, 3 to 8 percent slopes	937	.2	Broadbrook stony silt loam, 15 to 25 percent slopes	269	(1)
Agawam very fine sandy loam, 8 to 15 percent slopes	65	(1)	Brookfield fine sandy loam, 3 to 8 percent slopes	80	(1)
Agawam very fine sandy loam, overflow, 0 to 3 percent slopes	372	.1	Brookfield fine sandy loam, 8 to 15 percent slopes	20	(1)
Alluvial land	1,990	.4	Brookfield stony fine sandy loam, 3 to 8 percent slopes	162	(1)
Belgrade silt loam, 0 to 3 percent slopes	494	.1	Brookfield stony fine sandy loam, 8 to 15 percent slopes	74	(1)
Belgrade silt loam, 3 to 8 percent slopes	237	(1)	Buxton silt loam, 0 to 3 percent slopes	1,391	.3
Belgrade silt loam, reddish variant, 0 to 3 percent slopes	384	.1	Buxton silt loam, 3 to 8 percent slopes	3,604	.7
Belgrade silt loam, reddish variant, 3 to 8 percent slopes	167	(1)	Buxton silt loam, 8 to 15 percent slopes	423	.1
Berlin silt loam, 0 to 3 percent slopes	1,059	.2	Charlton fine sandy loam, 0 to 3 percent slopes	61	(1)
Berlin silt loam, 3 to 8 percent slopes	1,165	.2	Charlton fine sandy loam, 3 to 8 percent slopes	2,337	.5
Berlin silt loam, 8 to 15 percent slopes	26	(1)	Charlton fine sandy loam, 8 to 15 percent slopes	630	.1
Bermudian sandy loam, 0 to 3 percent slopes	129	(1)	Charlton fine sandy loam, 15 to 25 percent slopes	347	.1
Bermudian silt loam, 0 to 3 percent slopes	106	(1)	Charlton stony fine sandy loam, 3 to 8 percent slopes	3,356	.7
Biddeford silt loam, 0 to 3 percent slopes	757	.2	Charlton stony fine sandy loam, 8 to 15 percent slopes	684	.1
Biddeford silt loam, reddish variant, 0 to 3 percent slopes	949	.2	Charlton stony fine sandy loam, 15 to 25 percent slopes	419	.1
Birchwood fine sandy loam, 0 to 3 percent slopes	381	.1	Charlton very stony fine sandy loam, 3 to 15 percent slopes	12,604	2.7
Birchwood fine sandy loam, 3 to 8 percent slopes	227	(1)	Charlton very stony fine sandy loam, 15 to 35		
Bowmansville silt loam, 0 to 3 percent slopes	256	(1)			
Branford silt loam, 0 to 3 percent slopes	2,009	.4			
Branford silt loam, 3 to 8 percent slopes	2,031	.4			
Broadbrook silt loam, 0 to 3 percent slopes	725	.2			
Broadbrook silt loam, 3 to 8 percent slopes	4,738	1.0			

See footnote at end of table.

to urban development—Continued

or that a different characteristic of the soil limits or causes difficulty in urban development]

Suitability of infiltration rate for septic tanks	Flooding	Excavation difficulty	Slope [1]
Poor [2]	Frequent		
	Frequent		
	Frequent		
	Frequent		
	Frequent		
	Frequent		
Poor [2]	Frequent		
Poor	Frequent		
	Frequent		
	Frequent		
	Frequent		
Poor	Frequent		
Poor			
Poor	Frequent		
Poor		Exposed bedrock	More than 15 percent.
Poor		Exposed bedrock	More than 15 percent.
			More than 15 percent.

[3] Some soils in this series have stones on the surface and some do not.

[4] Bedrock is generally less than 2 feet below the surface.

TABLE 9.—*Approximate acreage and proportionate extent of the soils*—Continued

Soil	Acres	Percent	Soil	Acres	Percent
percent slopes	5, 388	1. 2	Gloucester fine sandy loam, 8 to 15 percent slopes	437	0. 1
Cheshire fine sandy loam, 0 to 3 percent slopes	319	. 1	Gloucester fine sandy loam, 15 to 25 percent slopes	79	(1)
Cheshire fine sandy loam, 3 to 8 percent slopes	525	. 1	Gloucester stony fine sandy loam, 3 to 8 percent slopes	1, 889	. 4
Cheshire fine sandy loam, 3 to 8 percent slopes, eroded	603	. 1	Gloucester stony fine sandy loam, 8 to 15 percent slopes	1, 166	. 2
Cheshire fine sandy loam, 8 to 15 percent slopes	770	. 2	Gloucester stony fine sandy loam, 15 to 25 percent slopes	287	(1)
Cheshire fine sandy loam, 8 to 15 percent slopes, eroded	380	. 1	Gloucester and Brookfield very stony fine sandy loams, 3 to 15 percent slopes	6, 984	1. 5
Cheshire fine sandy loam, 15 to 25 percent slopes, eroded	463	. 1	Gloucester and Brookfield very stony fine sandy loams, 15 to 35 percent slopes	5, 613	1. 3
Cheshire stony fine sandy loam, 3 to 8 percent slopes	1, 990	. 4	Hadley silt loam, 0 to 3 percent slopes	3, 109	. 6
Cheshire stony fine sandy loam, 8 to 15 percent slopes	652	. 1	Hartford fine sandy loam, 0 to 3 percent slopes	758	. 1
Cheshire stony fine sandy loam, 15 to 25 percent slopes	127	(1)	Hartford fine sandy loam, 3 to 8 percent slopes	1, 021	. 2
Cheshire very stony fine sandy loam, 3 to 15 percent slopes	234	(1)	Hartford sandy loam, 0 to 3 percent slopes	3, 788	. 8
Cheshire very stony fine sandy loam, 15 to 35 percent slopes	320	. 1	Hartford sandy loam, 3 to 8 percent slopes	2, 954	. 6
Ellington fine sandy loam, 0 to 3 percent slopes	1, 357	. 3	Hartford sandy loam, 8 to 15 percent slopes	203	(1)
Elmwood loamy sand, 0 to 3 percent slopes	63	(1)	Hinckley gravelly sandy loam, 0 to 3 percent slopes	1, 302	. 3
Elmwood sandy loam, 0 to 3 percent slopes	2, 158	. 4	Hinckley gravelly sandy loam, 3 to 15 percent slopes	14, 483	3. 1
Elmwood sandy loam, 3 to 8 percent slopes	1, 842	. 4	Hinckley loamy sand, 3 to 15 percent slopes	2, 986	. 6
Elmwood very fine sandy loam, 0 to 3 percent slopes	2, 532	. 5	Hollis rocky loam, 3 to 15 percent slopes	1, 112	. 2
Elmwood very fine sandy loam, 3 to 8 percent slopes	1, 511	. 3	Hollis rocky loam, 15 to 35 percent slopes	431	. 1
Enfield silt loam, 0 to 3 percent slopes	4, 401	. 9	Hollis very rocky loam, 3 to 15 percent slopes	9, 791	2. 1
Enfield silt loam, 0 to 3 percent slopes, eroded	740	. 1	Hollis very rocky loam, 15 to 35 percent slopes	12, 363	2. 7
Enfield silt loam, 3 to 8 percent slopes	2, 754	. 6	Holyoke rocky silt loam, 3 to 15 percent slopes	1, 192	. 2
Enfield silt loam, 3 to 8 percent slopes, eroded	2, 406	. 5	Holyoke rocky silt loam, 15 to 35 percent slopes	346	. 1
Enfield silt loam, 8 to 15 percent slopes	173	(1)	Holyoke very rocky silt loam, 3 to 15 percent slopes	5, 282	1. 2
Enfield silt loam, 8 to 15 percent slopes, eroded	418	. 1	Holyoke very rocky loam, 15 to 35 percent slopes	5, 076	1. 1
Enfield silt loam, overflow, 0 to 3 percent slopes	320	. 1	Leicester loam, 0 to 3 percent slopes	494	. 1
Gloucester fine sandy loam, 0 to 3 percent slopes	51	(1)	Leicester stony loam, 0 to 3 percent slopes	354	. 1
Gloucester fine sandy loam, 3 to 8 percent slopes	1, 362	. 3	Leicester, Whitman, and Ridgebury very stony soils, 0 to 5 percent slopes	7, 870	1. 7

See footnote at end of table.

TABLE 9.—*Approximate acreage and proportionate extent of the soils*—Continued

Soil	Acres	Percent
Limerick silt loam, 0 to 3 percent slopes	4,773	1.0
Ludlow loam, 0 to 3 percent slopes	1,786	.4
Ludlow loam, 3 to 8 percent slopes	2,404	.5
Ludlow stony loam, 3 to 8 percent slopes	1,313	.3
Ludlow and Watchaug very stony soils, 3 to 15 percent slopes	2,674	.5
Made land	5,437	1.2
Manchester gravelly loam, 0 to 3 percent slopes	207	(1)
Manchester gravelly loam, 3 to 15 percent slopes	4,068	.8
Manchester gravelly sandy loam, 0 to 3 percent slopes	637	.1
Manchester gravelly sandy loam, 3 to 15 percent slopes	9,469	2.1
Manchester loamy sand, 3 to 15 percent slopes	1,062	.2
Melrose sandy loam, 0 to 3 percent slopes	274	(1)
Melrose sandy loam, 3 to 8 percent slopes	655	.1
Melrose very fine sandy loam, 0 to 3 percent slopes	123	(1)
Melrose very fine sandy loam, 3 to 8 percent slopes	381	.1
Menlo silt loam, 0 to 3 percent slopes	518	.1
Menlo stony silt loam, 0 to 3 percent slopes	685	.1
Merrimac fine sandy loam, 0 to 3 percent slopes	3,606	.7
Merrimac fine sandy loam, 3 to 8 percent slopes	1,640	.3
Merrimac fine sandy loam, 8 to 15 percent slopes	68	(1)
Merrimac fine sandy loam, overflow, 0 to 3 percent slopes	984	.2
Merrimac sandy loam, 0 to 3 percent slopes	10,713	2.3
Merrimac sandy loam, 3 to 8 percent slopes	2,289	.5
Merrimac sandy loam, 8 to 15 percent slopes	56	(1)
Narragansett silt loam, 0 to 3 percent slopes	864	.2
Narragansett silt loam, 3 to 8 percent slopes	1,720	.3
Narragansett silt loam, 3 to 8 percent slopes, eroded	1,161	.2
Narragansett silt loam, 8 to 15 percent slopes	486	.1
Narragansett silt loam, 8 to 15 percent slopes, eroded	309	.1
Narragansett silt loam, 15 to 25 percent slopes	228	(1)
Narragansett stony silt loam, 3 to 8 percent slopes	1,221	.2
Narragansett stony silt loam, 8 to 15 percent slopes	427	.1
Narragansett stony silt loam, 15 to 25 percent slopes	400	.1
Narragansett and Broadbrook very stony silt loams, 3 to 15 percent slopes	658	.1
Narragansett and Broadbrook very stony soils, 15 to 35 percent slopes	1,171	.2
Ninigret fine sandy loam, 0 to 3 percent slopes	6,489	1.4
Ninigret fine sandy loam, 3 to 8 percent slopes	88	(1)
Ninigret very fine sandy loam, 0 to 3 percent slopes	2,350	.5
Ninigret very fine sandy loam, 3 to 8 percent slopes	70	(1)
Ondawa sandy loam, 0 to 3 percent slopes	1,795	.4
Paxton fine sandy loam, reddish substratum, 3 to 8 percent slopes	550	.1
Paxton fine sandy loam, reddish substratum, 8 to 15 percent slopes	339	.1
Paxton fine sandy loam, reddish substratum, 15 to 25 percent slopes	62	(1)
Paxton loam, 3 to 8 percent slopes	2,123	.4
Paxton loam, 8 to 15 percent slopes	657	.1
Paxton loam, 15 to 25 percent slopes, eroded	147	(1)
Paxton stony fine sandy loam, reddish substratum, 3 to 8 percent slopes	518	.1
Paxton stony fine sandy loam, reddish substratum, 8 to 15 percent slopes	234	(1)
Paxton stony fine sandy loam, reddish subtum, 15 to 25 percent slopes	205	(1)
Paxton stony loam, 3 to 8 percent slopes	1,637	.3
Paxton stony loam, 8 to 15 percent slopes	281	(1)
Paxton stony loam, 15 to 25 percent slopes	141	(1)
Paxton very stony loam, 3 to 15 percent slopes	3,262	0.7
Paxton very stony loam, 15 to 35 percent slopes	997	.2
Peats and Mucks	3,801	.8
Peats and Mucks, shallow	1,120	.2
Penwood loamy sand, 0 to 3 percent slopes	858	.2
Penwood loamy sand, 3 to 8 percent slopes	1,003	.2
Penwood loamy sand, 8 to 15 percent slopes	199	(1)
Podunk sandy loam, 0 to 3 percent slopes	1,079	.2
Poquonock loamy sand, 3 to 8 percent slopes	209	(1)
Poquonock loamy sand, 8 to 15 percent slopes	108	(1)
Poquonock sandy loam, 0 to 3 percent slopes	380	.1
Poquonock sandy loam, 3 to 8 percent slopes	2,814	.6
Poquonock sandy loam, 8 to 15 percent slopes	434	.1
Rainbow silt loam, 0 to 3 percent slopes	869	.2
Rainbow silt loam, 3 to 8 percent slopes	1,172	.2
Rainbow stony silt loam, 0 to 3 percent slopes	106	(1)
Rainbow stony silt loam, 3 to 8 percent slopes	180	(1)
Ridgebury loam, 0 to 3 percent slopes	171	(1)
Riverwash	677	.1
Rocky land, Hollis materials, 3 to 15 percent slopes	182	(1)
Rocky land, Hollis materials, 15 to 35 percent slopes	2,941	.6
Rocky land, Holyoke materials, 3 to 15 percent slopes	125	(1)
Rocky land, Holyoke materials, 15 to 35 percent slopes	4,733	1.0
Rowland silt loam, 0 to 3 percent slopes	207	(1)
Rumney sandy loam, 0 to 3 percent slopes	1,778	.4
Saco sandy loam, 0 to 3 percent slopes	2,701	.6
Saco silt loam, 0 to 3 percent slopes	7,231	1.5
Scantic silt loam, 0 to 3 percent slopes	5,450	1.1
Scantic silt loam, reddish variant, 0 to 3 percent slopes	1,441	.3
Scarboro loam, 0 to 3 percent slopes	5,532	1.2
Sudbury fine sandy loam, 0 to 3 percent slopes	3,995	.8
Suncook loamy sand, 0 to 3 percent slopes	1,306	.3
Sunderland rocky fine sandy loam, 3 to 15 percent slopes	658	.1
Sunderland rocky fine sandy loam, 15 to 35 percent slopes	316	.1
Sutton loam, 0 to 3 percent slopes	174	(1)
Sutton loam, 3 to 8 percent slopes	431	.1
Sutton stony loam, 0 to 3 percent slopes	84	(1)
Sutton stony loam, 3 to 8 percent slopes	1,011	.2
Sutton and Acton very stony loams, 3 to 15 percent slopes	3,537	.7
Swanton sandy loam, 0 to 3 percent slopes	1,151	.2
Swanton very fine sandy loam, 0 to 3 percent slopes	3,622	.7
Terrace escarpments, clay	356	.1
Terrace escarpments, sand and clay	2,225	.5
Terrace escarpments, sand and gravel	18,216	3.8
Tisbury silt loam, 0 to 3 percent slopes	2,234	.5
Tisbury silt loam, 3 to 8 percent slopes	139	(1)
Wallington silt loam, 0 to 3 percent slopes	467	.1
Wallington silt loam, reddish variant, 0 to 3 percent slopes	447	.1
Walpole loam, 0 to 3 percent slopes	8,283	1.7
Walpole sandy loam, 0 to 3 percent slopes	4,006	.8
Wapping silt loam, 0 to 3 percent slopes	551	.1
Wapping silt loam, 3 to 8 percent slopes	137	(1)
Wapping stony silt loam, 0 to 3 percent slopes	263	(1)
Wapping stony silt loam, 3 to 8 percent slopes	220	(1)
Watchaug loam, 0 to 3 percent slopes	149	(1)
Watchaug loam, 3 to 8 percent slopes	339	.1
Watchaug stony loam, 0 to 3 percent slopes	61	(1)
Watchaug stony loam, 3 to 8 percent slopes	468	.1
Wethersfield loam, 0 to 3 percent slopes	567	.1
Wethersfield loam, 3 to 8 percent slopes	11,006	2.4
Wethersfield loam, 3 to 8 percent slopes, eroded	543	.1
Wethersfield loam, 8 to 15 percent slopes	2,773	.6

See footnote at end of table.

TABLE 9.—*Approximate acreage and proportionate extent of the soils*—Continued

Soil	Acres	Percent	Soil	Acres	Percent
Wethersfield loam, 8 to 15 percent slopes, eroded	681	0. 1	Windsor loamy fine sand, 0 to 3 percent slopes	5, 134	1. 1
Wethersfield loam, 15 to 25 percent slopes	1, 158	. 2	Windsor loamy fine sand, 3 to 8 percent slopes	6, 645	1. 4
Wethersfield loam, 15 to 25 percent slopes, severely eroded	525	. 1	Windsor loamy fine sand, 8 to 15 percent slopes	977	. 2
Wethersfield stony loam, 3 to 8 percent slopes	3, 353	. 7	Winooski silt loam, 0 to 3 percent slopes	3, 215	. 7
Wethersfield stony loam, 8 to 15 percent slopes	1, 541	. 3	Woodbridge loam, 0 to 3 percent slopes	103	(1)
Wethersfield stony loam, 15 to 25 percent slopes	1, 567	. 3	Woodbridge loam, 3 to 8 percent slopes	757	. 1
Wethersfield very stony loam, 3 to 15 percent slopes	3, 874	. 8	Woodbridge loam, reddish substratum, 0 to 3 percent slopes	78	(1)
Wethersfield very stony loam, 15 to 35 percent slopes	1, 631	. 3	Woodbridge loam, reddish substratum, 3 to 8 percent slopes	273	(1)
Whately loam, 0 to 3 percent slopes	990	. 2	Woodbridge stony loam, 0 to 3 percent slopes	113	(1)
Whitman stony loam, 0 to 3 percent slopes	278	(1)	Woodbridge stony loam, 3 to 8 percent slopes	1, 519	. 3
Wilbraham silt loam, 0 to 3 percent slopes	2, 946	. 6	Woodbridge stony loam, reddish substratum, 3 to 8 percent slopes	354	. 1
Wilbraham stony silt loam, 0 to 3 percent slopes	1, 992	. 4	Woodbridge very stony soils, 3 to 15 percent slopes	3, 258	. 7
Wilbraham and Menlo very stony silt loams, 0 to 3 percent slopes	5, 034	1. 0	Mines and pits	1, 698	. 4
Windsor loamy coarse sand, 0 to 3 percent slopes	9, 334	1. 9	Subtotal	451, 161	92. 4
Windsor loamy coarse sand, 3 to 8 percent slopes	2, 776	. 6	Urban land not surveyed	22, 439	4. 7
Windsor loamy coarse sand, 8 to 15 percent slopes	599	. 1	Water	6, 400	1. 3
			Total	480, 000	98. 4

[1] Less than 0.1 percent. Items in this category total 1.6 percent of the county area.

Acton Series

The Acton series consists of moderately well drained upland soils that have developed on loose to friable, coarse-textured glacial till. They occur in small, scattered areas in the Eastern and Western Highlands. The lower subsoil is mottled rust brown and gray at depths of 12 to 18 inches.

The Acton soils are associated with the well drained to somewhat excessively drained Gloucester, the poorly drained Leicester, and the very poorly drained Whitman soils. The Acton soils are coarser textured than the moderately well drained Sutton soils, particularly in the substratum.

Typical profile (Acton fine sandy loam, 0 to 3 percent slopes, in a cultivated field):

A_p 0 to 8 inches, very dark grayish-brown (10YR 3/2) fine sandy loam; weak, coarse, granular structure; very friable.

B_{21} 8 to 16 inches, yellowish-brown (10YR 5/6-5/4) fine sandy loam; breaks into soft, subangular blocky clods when disturbed; very friable.

B_{22g} 16 to 24 inches, yellowish-brown (10YR 5/4) fine sandy loam finely mottled with strong brown (7.5YR 5/8) and light brownish gray (2.5Y 6/2); breaks into very soft, subangular blocky clods when disturbed; very friable.

C_g 24 to 42 inches, gray (10YR 6/1) or light brownish-gray (2.5Y 6/2) gravelly loamy sand or coarse loamy sand mottled with strong brown (7.5YR 5/6) and grayish brown (10YR 5/2); streaks or lenses of gravelly sandy loam in places; loose to firm in place.

The soil was originally stony, but some areas have had the surface stones removed. Stones are in the subsoil, and a few are scattered over the surface in places. The small, angular fragments of rock occupy 5 to 20 percent of the soil, by volume. The surface layer is generally a fine sandy loam, but it ranges from sandy loam to light loam.

In places bordering the Central Lowland the glacial till underlying the Acton soils has a pinkish or reddish tinge because of reddish-brown Triassic rocks in the parent material. Drainage ranges from moderately good to somewhat poor; consequently, the depth to mottling, the intensity of mottling, and the color of subsoil layers is variable in Acton soils.

Acton fine sandy loam, 0 to 3 percent slopes (AcA).—This soil is in small, scattered tracts and is not important agriculturally. Runoff is generally slow. Permeability is rapid, but a seasonal high water table restricts internal drainage.

This soil is used mainly for hay and pasture, but a small acreage is in vegetables, silage corn, and other crops. If properly limed and fertilized, it is fairly well suited to hay and pasture without drainage. Cultivated crops and orchards require soil drainage. Tile or open ditches can be used for drainage. The soil is fairly easy to work, and it responds to fertilization and other management. (Capability unit IIw–1.)

Acton fine sandy loam, 3 to 8 percent slopes (AcB).—This soil has better surface drainage than Acton fine sandy loam, 0 to 3 percent slopes. It is suitable for the same crops.

Erosion is a slight hazard in clean-cultivated fields. Contour cultivation adequately protects most fields, but in places terraces and waterways are needed. The soil needs mainly drainage and fertilization. (Capability unit IIwe–1.)

Acton stony fine sandy loam, 3 to 8 percent slopes (AdB).—Except for stones on the surface and differences in the surface horizon in forested areas, this soil is essentially the same as Acton fine sandy loam, 0 to 3 percent slopes. Included with this soil are small, scattered areas having slopes of 0 to 3 percent.

A large part of Acton stony fine sandy loam, 3 to 8 percent slopes, is in cutover forest. Scattered tracts have been cleared and are used mainly for unimproved pasture. The soil is too stony for row crops, but it can be used for hay, pasture, tree fruits, and small fruits. Sod crops need lime and fertilizer; tree fruits require drainage of the soil. (Capability unit IVws–1.)

Agawam Series

The Agawam series consists of well-drained to somewhat excessively drained, medium to moderately coarse textured soils. They are on stream terraces or in areas where glaciofluvial or glaciolacustrine material has been deposited. They occur on nearly level to undulating parts of the Central Lowland and are most extensive in the towns of South Windsor, East Windsor, and Enfield. The Agawam soils are associated with the Merrimac, Enfield, and Windsor soils. They differ from the Merrimac and Enfield soils in not having a gravelly substratum, and from the Windsor in having a finer texture.

Typical profile (Agawam very fine sandy loam, 0 to 3 percent slopes, in a cultivated field):

- A_p 0 to 8 inches, dark yellowish-brown (10YR 3/4) very fine sandy loam; weak, medium and coarse, granular structure in the upper 4 inches; in tobacco and potato fields, the lower part is generally compacted and breaks into coarse plates; very friable.
- B_{21} 8 to 20 inches, yellowish-brown (10YR 5/6) very fine sandy loam; color fades slightly with depth; breaks into soft, medium and coarse, subangular blocky clods when disturbed; very friable; boundary gradual.
- B_{22} 20 to 26 inches, light yellowish-brown (10YR 6/4) very fine sandy loam; breaks into soft, medium, subangular blocky clods; very friable; boundary gradual.
- B_{23} 26 to 36 inches, light olive-brown (2.5Y 5/4) very fine sandy loam in upper part, grading to fine sandy loam; massive; very friable.
- C 36 to 60 inches, intermingled light-gray (10YR 7/2) and light yellowish-brown (10YR 6/4) fine sand, interbedded with lenses of loamy fine sand.

Textures range from very fine sandy loam to sandy loam. The A_p horizon ranges from very dark grayish brown (10YR 3/2) to dark yellowish brown (10YR 6/4); the B_{21} horizon ranges from dark yellowish brown (10YR 4/4) to strong brown (7.5YR 5/6).

Included with the Agawam soils are small, widely scattered areas in the southern part of the county that have a reddish-brown (5YR 4/4) surface soil and a yellowish-red (5YR 4/6 to 4/8) upper subsoil. In some areas close to the Merrimac and Enfield soils, the Agawam soils have thin layers of sand and gravel at depths of 4 or 5 feet and a few pebbles throughout the profile. Small areas of Ninigret, Merrimac, and Enfield soils are included in mapping units of the Agawam soils.

Agawam fine sandy loam, 0 to 3 percent slopes (AfA).—This soil includes fine sandy loam and sandy loam textures with small areas of loamy fine sand. It also includes small areas that have a reddish profile.

This soil warms early in spring. It is easy to work and very responsive to fertilization. Permeability is generally rapid. The moisture-holding capacity is moderate, and the soil is therefore droughty. Unless they are irrigated, crops are damaged in most seasons because of inadequate moisture.

This soil is more suitable for tobacco, sweet corn, and early vegetables and other special crops than for potatoes, silage corn, hay, and pasture (fig. 3). Most fields of tobacco and potatoes are irrigated. Fertilizers are needed for good yields, but the nutrients are fairly rapidly leached out. The soil can be used intensively if management is good. (Capability unit IIs–1.)

Figure 3.—**Harvesting Broadleaf tobacco on Agawam fine sandy loam.**

Agawam fine sandy loam, 3 to 8 percent slopes (AfB).—This soil is undulating and gently sloping but is otherwise much like Agawam fine sandy loam, 0 to 3 percent slopes. Small, scattered areas are moderately eroded.

This soil is used in essentially the same way as Agawam fine sandy loam, 0 to 3 percent slopes; and except for simple practices to control runoff and erosion, management is the same. (Capability unit IIs–2.)

Agawam fine sandy loam, 8 to 15 percent slopes (AfC).—This soil occurs in small, scattered areas, mainly in narrow strips on terrace breaks. About one-third of the acreage is moderately eroded.

A large part of this soil is in forest or is idle. Small, scattered tracts are used for cultivated crops, hay, and pasture. Intensive erosion control is needed if the soil is used for row crops. (Capability unit IIIe–3.)

Agawam very fine sandy loam, 0 to 3 percent slopes (AgA).—This soil occurs in the towns of Suffield, Enfield, East Windsor, and South Windsor and in scattered areas in other parts of the Central Lowland. It is moderately permeable, has a high moisture-holding capacity, is very easy to work, and is very responsive to fertilizer.

A large part of this soil has been cleared and is now used for crops, hay, and pasture. Tobacco and potatoes are the main crops, but some of the acreage is used for silage corn, sweet corn, market vegetables, nursery stock, hay, and pasture. Fertilizer and lime are needed to pro-

duce high yields of alfalfa and other forage crops. The soil can be used intensively for cultivated crops with little risk of erosion or of other damage if management is good. (Capability unit I–1.)

Agawam very fine sandy loam, 3 to 8 percent slopes (AgB).—Some small, scattered areas of this soil are moderately eroded, as shown by their thin B horizon; others have a reddish profile.

This soil is used for the same crops as Agawam very fine sandy loam, 0 to 3 percent slopes. Simple practices are needed in clean-cultivated fields to control runoff, as even gentle slopes are easily eroded. Fertilization is needed to obtain high yields. Maintenance of tilth and organic matter and control of erosion are necessary. (Capability unit IIe–1.)

Agawam very fine sandy loam, 8 to 15 percent slopes (AgC).—This soil generally occurs in narrow strips along the margins of the terraces. Some of it is moderately eroded.

Part of the acreage is in forest, and the rest is used for hay, pasture, and cultivated crops. The soil is suitable for cultivated crops if erosion is controlled and crops are grown in moderately long rotations. (Capability unit IIIe–1.)

Agawam very fine sandy loam, overflow, 0 to 3 percent slopes (AkA).—This soil has duller colors in the B horizon than Agawam very fine sandy loam, 0 to 3 percent slopes. The color ranges from dark brown (7.5YR 4/4) to olive brown (2.5Y 4/4) in the upper part of the B horizon and fades as depth increases. The soil occurs on the high parts of flood plains along the Connecticut River and in scattered areas along the Farmington River and other large streams. It is associated with the Alluvial soils but has developed profile characteristics of Brown Podzolic soils. The largest area is in the town of Wethersfield. In the surface soil and subsoil, the predominant textures are very fine sandy loam or light silt loam, but some fine sandy loam is included.

This soil has moderately rapid permeability, and it has a high moisture-holding capacity. It responds to fertilization and other good management. It is easily worked and suitable for the general crops of the area.

Nearly all the acreage has been cleared and is used mainly for market vegetables, hay, and pasture. Some acreage is used for tobacco, silage corn, and other crops. Management and fertilization should be the same as for Agawam very fine sandy loam, 0 to 3 percent slopes. (Capability unit I–1.)

Alluvial Land

Alluvial land (0 to 3 percent slopes) (Am).—This land type consists of small, widely separated areas of recent alluvium that vary in texture and drainage. It is made up of soils that occur in such an intricate pattern that it was not feasible to map them separately. These soils are mostly of the Ondawa, Podunk, Rumney, and Saco series. Most areas are cut up by old stream channels; the soils on low ridges are well drained to moderately well drained, and those in low spots are poorly to very poorly drained. The narrow strips of alluvium along streams consist of sandy or sandy and gravelly riverwash. Forested and idle areas make up much of the acreage. Scattered areas are in pasture. Most unimproved pastures furnish fair grazing in dry seasons. (Capability unit IIIw–2.)

Belgrade Series

This series consists of moderately well drained, deep, silty soils that have developed from glaciolacustrine deposits of silt and very fine sand. The surface soil and the upper subsoil are silt loam. They are underlain by silt loam interbedded with very fine sandy loam and fine sandy loam; lenses of silty clay loam occur in places. Mottles indicate that the lower subsoil is saturated part of the time. Belgrade soils occur in small, scattered areas in the Central Lowland. They are closely associated with the Buxton, Scantic, and Wallington soils. They differ from the Buxton soils in being coarser textured and in having more permeable substrata. The Wallington soils are similar in texture but are poorly drained. Belgrade soils differ from the Ninigret soils in having a finer texture.

Typical profile (Belgrade silt loam, 0 to 3 percent slopes, in pasture):

A_p	0 to 8 inches, dark-brown (10YR 3/3) silt loam; moderate, medium and coarse, granular structure; friable to very friable.
B_{21}	8 to 16 inches, dark yellowish-brown (10YR 4/4) silt loam containing some organic stain from the overlying horizon; very weak, coarse, subangular blocky structure; friable; boundary clear.
B_{22g}	16 to 22 inches, dark grayish-brown (10YR 4/2) silt loam mottled with grayish brown (10YR 5/2) and dark yellowish brown (10YR 4/4); very weak, coarse, subangular blocky structure; friable; boundary gradual,
C_{1g}	22 to 36 inches, mottled light brownish-gray (10YR 6/2), dark grayish-brown (10YR 4/2), and yellowish-brown (10YR 5/6) silt loam interbedded with very fine sandy loam or very fine sand; moderate, thick, platy structure or varved; firm to very friable.
C_{2g}	36 to 48 inches, same as C_{1g} horizon except that it is more highly mottled and contains some reddish-brown (5YR 4/4) and strong-brown (7.5YR 5/6) mottles.

The texture of the surface soil is dominantly silt loam, but in places, it is very fine sandy loam. In cultivated areas, the surface soil is very dark grayish brown (10YR 3/2) to brown (10YR 4/3). The B_{21} horizon ranges from dark yellowish brown (10YR 4/4) to brown (10YR 5/3) or yellowish brown (10YR 5/6). Depth to mottling varies because the drainage ranges from moderately good to somewhat poor. Below depths of 2 or 2½ feet, the material is generally silt loam interbedded with very fine sandy loam or very fine sand; thin lenses of silty clay loam occur in places.

The principal inclusions are small areas of the Wallington, Buxton, and Scantic soils.

Belgrade silt loam, 0 to 3 percent slopes (BgA).—This soil warms slowly in spring because of its texture, drainage, and high moisture-holding capacity. It erodes easily on unprotected areas because of the silty texture and low infiltration capacity.

A large part of the acreage has been cleared and is used mainly for hay and pasture. Small acreages are used for outdoor tobacco, silage corn, vegetables, and other crops. This soil is well suited to hay, pasture, and silage corn and to cabbage, cauliflower, and other late vegetables. It is poorly suited to tobacco, early sweet corn, early vegetables, and alfalfa.

Fertilizer is needed to produce high yields. Some crops also need lime. Plant nutrients are not rapidly

leached from this soil. Management is needed to build up and maintain organic matter because the surface soil crusts and hardens when the content of organic matter is low. (Capability unit IIw–3.)

Belgrade silt loam, 3 to 8 percent slopes (BaB).—This soil has the same use and suitability for crops as Belgrade silt loam, 0 to 3 percent slopes. Management should be about the same except that erosion control practices should be more intensively used. Unprotected areas have a fairly high risk of erosion. (Capability unit IIwe–3.)

Belgrade silt loam, reddish variant, 0 to 3 percent slopes (BbA).—This soil differs from typical Belgrade silt loam mainly in color. It is called a variant of the Belgrade series because its small acreage does not justify placing it in a separate series. A profile of this soil in an improved pasture is as follows:

A_p	0 to 8 inches, dark reddish-brown (5YR 3/2) silt loam; moderate, medium and coarse, granular structure; friable.
B_{21}	8 to 18 inches, reddish-brown (5YR 4/4) silt loam; very weak, coarse, subangular blocky structure; friable to very friable.
B_{22g}	18 to 30 inches, reddish-brown (5YR 4/4) silt loam finely mottled with pinkish gray (5YR 6/2) and dark reddish brown (5YR 3/3); friable to very friable.
C_g	30 to 60 inches, mottled yellowish-red (5YR 4/6), light reddish-brown (5YR 6/3), and dark-reddish brown (5YR 3/4) silt loam, very fine sandy loam, and loamy fine sand; interbedded with thin lenses of silty clay loam in places.

This soil is associated with the Berlin, Scantic, reddish variant, and Biddeford, reddish variant, soils on glaciolacustrine terraces in the southern part of the Central Lowland. It has coarser textured and more permeable subsurface horizons than the Berlin soils.

The soil warms slowly in spring. Inadequate drainage and a waterlogged subsoil limit the kinds of crops that can be grown. This soil is well suited to sod crops and silage corn, and to cabbage, cauliflower, and other late vegetables. A large percentage of the acreage is cleared, and it is used mainly for hay and pasture. A small acreage is used for silage corn and vegetables.

Management should be the same as for Belgrade silt loam, 0 to 3 percent slopes. (Capability unit IIw–3.)

Belgrade silt loam, reddish variant, 3 to 8 percent slopes (BbB).—The risk of erosion is fairly high on unprotected slopes of this soil. Management and conservation practices should be the same as for Belgrade silt loam, 3 to 8 percent slopes. (Capability unit IIwe–3.)

Berlin Series

The Berlin series consists of moderately well drained, reddish silty soils of the glaciolacustrine terraces. These soils have developed from slightly acid to mildly alkaline, reddish glaciolacustrine silt and clay deposits. They occur mainly in the southern part of the Central Lowland on nearly level to undulating or sloping surfaces. Berlin is the moderately well drained member of the catena that includes poorly drained Scantic, reddish variant, and very poorly drained Biddeford, reddish variant soils. They differ from the Buxton soils in being reddish colored and in having more coarse fragments in the solum. They are finer textured and have a more slowly permeable subsoil and substratum than the reddish variant of the Belgrade series.

Typical profile (Berlin silt loam, 3 to 8 percent slopes, in an idle area):

A_p	0 to 6 inches, dark reddish-brown (5YR 3/2) silt loam; moderate, medium and coarse, granular structure; friable; coarse fragments make up about 5 percent of the volume; very strongly acid.
A_2 or B_{21}	6 to 12 inches, reddish-brown (5YR 4/3) silt loam; strong, medium, platy structure; friable; slightly plastic when wet; coarse fragments make up about 6 percent of the volume; very strongly acid.
B_{22g}	12 to 18 inches, reddish-brown (5YR 4/3) silty clay loam mottled with pinkish gray (5YR 6/2) and light reddish brown (5YR 6/4); common, fine, faint mottles; weak, thick, platy structure; firm; slightly plastic when wet; coarse fragments make up about 5 percent of the volume; medium acid.
B_{23}	18 to 30 inches, reddish-brown (5YR 4/3) silty clay or silty clay loam with light reddish-brown silt films and some dark reddish-brown (5YR 2/2) coatings (manganese dioxide) on breakage faces; moderate, coarse, subangular blocky structure; very firm; slightly acid.
C_1	30 to 48 inches, dark reddish-brown (5YR 3/4) silty clay, or silty clay loam with some dark reddish-brown (5YR 2/2) coatings; moderate, thick, platy structure or distorted varves; very firm; coarse fragments make up 5 percent of the volume; neutral.
C_2	48 inches +, dark reddish-brown (5YR 3/3), well-defined silt and silty clay varves.

In places the subsoil is more reddish than that in the typical profile. The texture in places grades to that of the reddish variant of the Belgrade series, and boundaries between the two soils are indefinite. Drainage generally ranges from moderately good to somewhat poor, but small, scattered areas are well drained. Nearly all areas contain some coarse fragments that make up 3 to 15 percent of the volume of soil in the upper 2 or 3 feet or above well-defined varves. This indicates that the material was reworked by glacial action. In places thin layers of waterworn sand and gravel occur at various depths.

Berlin silt loam, 0 to 3 percent slopes (BcA).—This soil is slowly permeable and moderately well drained. It is difficult to work and dries out slowly in spring. It erodes easily, even on gentle slopes. The soil has a high moisture-holding capacity and retains plant nutrients.

Most of the acreage has been cleared and is used mainly for hay and pasture. Some cultivated crops are grown. Small areas are used for silage corn, vegetables, nursery stock, and other crops. The soil is best suited to grasses and legumes for hay and pasture. It is fairly well suited to silage corn and to cabbage, cauliflower, and other late vegetables. Management is needed to maintain organic matter. When the supply of organic matter is low, the surface bakes and forms a crust. Lime and fertilizer should be applied in amounts determined by soil tests. (Capability unit IIw–3.)

Berlin silt loam, 3 to 8 percent slopes (BcB).—This soil has more rapid runoff than Berlin silt loam, 0 to 3 percent slopes. The risk of erosion is fairly high on unprotected slopes. This soil is used mainly for hay and pasture, but small areas are used for vegetables, nursery stock, silage corn, and other crops. Management should be the same as for Berlin silt loam, 0 to 3 percent slopes, except that cultivated fields need more intensive erosion control. (Capability unit IIwe–3.)

Berlin silt loam, 8 to 15 percent slopes (BcC).—This soil is slowly permeable, and it is eroded in some places. The risk of erosion is high in unprotected areas.

This soil is used mainly for hay and pasture, for which it is best suited. Small areas are used for silage corn, tree fruits, and nursery stock. Because of irregular relief in places, stripcropping and the use of other erosion control practices are not practical. (Capability unit IIIe–4.)

Bermudian Series

This series consists of reddish, medium to moderately coarse textured, well-drained soils. They occur mainly in the southern half of the Central Lowland and occupy flood plains that receive sediments from reddish upland and terrace soils of the Wethersfield, Cheshire, Hartford, and Berlin series. Bermudian soils are seldom flooded during the growing season. They are associated with the moderately well drained Rowland and the poorly drained Bowmansville soils of the same catena. They differ from the Hadley and the Ondawa soils mainly in being reddish colored.

Typical profile (Bermudian silt loam, 0 to 3 percent slopes, in a hayfield):

- A_p 0 to 8 inches, dark reddish-brown (5YR 3/3) silt loam; weak, medium and coarse, granular structure; very friable; strongly acid.
- C_1 8 to 36 inches, yellowish-red (5YR 5/6) silt loam; very weak, medium, subangular blocky structure; very friable; strongly acid; boundary gradual.
- C_2 36 to 50 inches, reddish-brown (5YR 4/4) fine sandy loam; very friable; medium acid; boundary gradual.
- C_3 50 to 60 inches, reddish-brown (5YR 4/4), interbedded loamy fine sand and fine sandy loam; medium acid.

The surface soil ranges in color from dark grayish brown (10YR 4/2) to dark reddish brown (2.5YR 3/4) and the subsurface from reddish brown (5YR 4/4) to dark reddish brown (2.5YR 3/4). Below depths of 24 to 36 inches, the subsoil ranges in texture from coarse sand and gravel to fine sandy loam or very fine sand interbedded with loamy sand or sand.

The principal inclusions are small areas of Rowland silt loam.

Bermudian silt loam, 0 to 3 percent slopes (BeA).—This soil has a high moisture-holding capacity and is easy to work. It responds to good management. The hazard of flooding late in spring and early in fall limits the use of cultivated crops.

A large part of the acreage has been cleared and is used mainly for hay, pasture, and silage corn. Small acreages are used for vegetables and other crops. This soil is well suited to sod crops, silage corn, carrots, cabbage, cauliflower, and other vegetables. If tilth, fertility, and the supply of organic matter are properly maintained, the soil can be farmed intensively. (Capability unit IIw–4.)

Bermudian sandy loam, 0 to 3 percent slopes (BdA).—This soil has a coarser texture and a slightly lower moisture-holding capacity than Bermudian silt loam, 0 to 3 percent slopes. In addition, it dries out earlier in spring.

Because of the flooding hazard late in spring, the soil is used mainly for hay, pasture, and silage corn. It is suitable for general crops grown in the county. Fertilizer and lime are leached more rapidly from this soil than from Bermudian silt loam, 0 to 3 percent slopes. Management requirements are similar for the two soils. (Capability unit IIw–4.)

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Biddeford Series

This series consists of very poorly drained silty soils that have developed in grayish, slightly acid to neutral glaciolacustrine silt and clay. The soils occur in small, scattered areas in the northern part of the Central Lowland. They occupy very wet areas associated with Buxton and Scantic soils.

Typical profile (Biddeford silt loam, 0 to 3 percent slopes, in an idle area):

- A_{11} 0 to 10 inches, very dark gray (N 3/0) silt loam; moderate, coarse, granular structure; friable; slightly plastic when wet; boundary clear.
- A_{12} 10 to 14 inches, dark-gray (10YR 4/1) silty clay loam with fine streaks of dark yellowish brown (10YR 4/4); weak, coarse, subangular blocky structure; friable; plastic when wet; boundary abrupt.
- B_{2g} 14 to 28 inches, mottled dark greenish-gray (5GY 4/1), greenish-gray (5GY 5/1), and dark yellowish-brown (10YR 4/4) silty clay; mottles are common, fine, and distinct; firm, plastic when wet; boundary gradual.
- C_g 28 to 48 inches, mottled olive-gray (5Y 5/2), dark-gray (5Y 4/1), and dark-brown (10YR 3/3) silty clay; mottles are many, medium, and distinct; thinly varved or moderate, medium, platy structure; firm, plastic when wet.

The color of the surface soil is generally black (10YR 2/1) to very dark gray (10YR 3/1). Areas associated with the Belgrade and Wallingford soils are silt loam throughout the profile. In places coarser material has washed in from adjoining areas.

Included in mapping are small, scattered areas underlain by strata of sand and gravel at depths of 2 to 4 feet, and areas with reddish streaks and pockets in the subsoil horizons and in the substrata.

Biddeford silt loam, 0 to 3 percent slopes (BfA).—Runoff and internal drainage are very slow. Water stands on the surface of some areas for long periods in winter and early in spring. The soil is difficult to drain adequately for cultivated crops.

Very poor drainage limits the use of this soil mainly to forests and unimproved pasture. About half of the acreage is in forest; the rest is in unimproved pasture or is idle. Some areas can be used for pasture if drained by open ditches. Unimproved pastures furnish some grazing in dry seasons. They could be improved by the use of fertilizer and lime and by cutting brush and weeds. (Capability unit Vw–2.)

Biddeford silt loam, reddish variant, 0 to 3 percent slopes (BgA).—This very poorly drained soil differs from the grayish Biddeford soils mainly in color. It has developed in old lakebeds from reddish silt and clay deposits. It occurs in the southern part of the Central Lowland.

A typical profile of this soil follows:

- A_0 0 to 1 inch, black (10YR 2/1) silt loam; contains a large amount of organic matter and some partly decomposed litter.
- A_1 1 to 7 inches, black (10YR 2/1) and very dark brown (10YR 2/2), heavy silt loam; coarse clods crushing to moderate, coarse, granular structure; friable; very strongly acid.
- A_{2g} 7 to 11 inches, mottled brown (10YR 5/3), gray (5Y 5/1), and olive-gray (5Y 4/2) silty clay loam; weak, coarse, subangular blocky structure; firm when dry and plastic when wet; very strongly acid.
- B_{2g} 11 to 16 inches, dark reddish-gray (5YR 4/2) silty clay loam or silty clay finely mottled with olive gray (5Y 5/2); weak, coarse, subangular blocky structure; firm when dry and plastic when wet; strongly acid; lower part contains pockets of coarse sand.

C_1 16 to 24 inches, dark reddish-brown (5YR 3/4) silty clay loam or silty clay with a few streaks of olive brown and gray; plastic when wet; strongly acid.

C_2 24 to 42 inches, dark reddish-brown (5YR 3/4) silty clay loam or silty clay; plastic when wet; slightly acid to neutral.

Lenses or thin layers of coarse material ranging from sandy loam to coarse sand and gravel occur in places at various depths. Scattered round and angular fragments of rock occur in the upper horizons. Areas of Biddeford silt loam, reddish variant, 0 to 3 percent slopes, associated with the red variant of Wallington silt loam are somewhat coarser textured than described in the profile.

About half the acreage of this soil is in forest; the rest is in unimproved pasture or is idle. The soil is very poorly drained and, therefore, is best suited to forest and unimproved pastures. Unimproved pastures provide some grazing, especially in dry seasons. They can be improved by open-ditch drainage, by applying fertilizer, and by controlling brush and weeds. (Capability unit Vw–2.)

Birchwood Series

The soils of the Birchwood series consist of moderately well to somewhat poorly drained, moderately coarse textured, water-laid or wind-blown material. The material rests on a fragipan that has developed in glacial till derived from reddish-brown sedimentary Triassic rocks. Depth to the pan layer ranges from 24 to 36 inches. Birchwood soils occur in small, scattered areas in the northern half of the Central Lowland. These soils are associated with the well-drained Poquonock soils, but they differ in drainage. The surface soil and upper subsoil of the Birchwood soils resemble those of Sudbury soils, which are underlain by sand and gravel.

Typical profile (Birchwood fine sandy loam, 0 to 3 percent slopes, in cultivation):

A_p 0 to 10 inches, very dark grayish-brown (10YR 3/2), light fine sandy loam; very weak, coarse, granular structure; very friable.

B_{21} 10 to 16 inches, dark yellowish-brown (10YR 4/4), light fine sandy loam; breaks into very soft, coarse, subangular blocky clods when disturbed; very friable.

B_{22g} 16 to 22 inches, mottled brown (10YR 5/3), yellowish-brown (10YR 5/6), and strong-brown (7.5YR 5/8) sandy loam or loamy sand; very friable.

B_{23g} 22 to 32 inches, dark grayish-brown (10YR 4/2) fine and medium sand mottled with dark yellowish brown (10YR 4/4) and strong brown (7.5YR 5/8); loose.

B_{24gum} 32 to 48 inches, dark reddish-brown (2.5YR 2/4 and 3/4) gravelly loam or silt loam; grayish streaks in upper part; medium, thick, platy structure; very firm and compact.

The texture of the surface soil and upper subsoil is generally light fine sandy loam or sandy loam, but small areas of loamy fine sand are included. In some places the surface soil and subsoil are almost free of coarse fragments, whereas in others they make up as much as 15 percent of the soil volume. Drainage ranges from moderately good to somewhat poor. Therefore, the depth to mottling and color of the subsoil are variable.

Birchwood fine sandy loam, 0 to 3 percent slopes (BhA).—This soil is moderately well to somewhat poorly drained. It is rapidly permeable above the pan layer, but a seasonal high water table restricts internal drainage. The soil is easy to work and responds to good management. It dries out fairly early in spring.

About 60 percent of the acreage has been cleared and is used mainly for hay and pasture. Small, scattered areas are used for tobacco, corn, vegetables, and other crops. Some acreage is idle. If limed and fertilized properly, this soil is fairly well suited to hay and pasture without drainage. Some drainage is desirable for tobacco, orchards, and other special crops. Open ditches or tile can be used for draining the soil.

Management is needed to improve and maintain tilth, fertility, and organic matter. Some crops need applications of lime and fertilizer. (Capability unit IIw–2.)

Birchwood fine sandy loam, 3 to 8 percent slopes (BhB).—This soil is similar to Birchwood fine sandy loam, 0 to 3 percent slopes, except for relief. It is used for the same purposes. However, runoff is more rapid, and the risk of erosion is higher in unprotected areas. Simple practices will generally control runoff. (Capability unit IIwe–2.)

Bowmansville Series

This series consists of poorly drained to somewhat poorly drained, reddish soils on flood plains. These soils are flooded frequently. They are the poorly drained member of the catena that includes the well-drained Bermudian, the moderately well drained Rowland, and the very poorly drained Saco soils. Bowmansville soils differ from the Limerick soils in color and source of sediments and from the Rumney soils in color and texture.

Typical profile (Bowmansville silt loam, 0 to 3 percent slopes, in a brushy pasture):

A_p 0 to 6 inches, dark reddish-gray (5YR 4/2) silt loam; massive; friable.

C_{1g} 6 to 20 inches, mottled reddish-brown (5YR 4/4), pinkish-gray (5YR 6/2), and strong-brown (7.5YR 5/8) silt loam; very friable.

C_{2g} 20 to 30 inches, interbedded sandy loam and loamy sand having the same color as above horizon, but pinkish-gray (5YR 6/2) mottles are more numerous.

30 to 34 inches, coarse sand and gravel.

In most areas the texture of the surface soil is silt loam, but in some it is fine sandy loam. The degree and intensity of mottling vary. Below depths of 24 to 30 inches, the texture is variable, but it is generally moderately coarse to very coarse.

Bowmansville silt loam, 0 to 3 percent slopes (BmA).—This is the only mapping unit in the series. It occupies small, scattered areas in the Central Lowland.

Probably over half the acreage is in forest. The rest is largely in unimproved pasture or is idle. Generally, it is not practical to drain this soil for cultivated crops because of frequent flooding and the lack of suitable drainage outlets. However, partly drained soils are suitable for hay and pasture if they are limed and fertilized properly. Unimproved pastures provide fair grazing in extremely dry weather. They can be improved through the use of fertilizer and by controlling brush and weeds. (Capability unit IIIw–2.)

Branford Series

This series consists of reddish, well-drained soils developed on deltas and smooth to undulating glaciofluvial terraces. These soils are underlain by stratified sand and gravel derived mainly from basalt and reddish-brown, sedimentary sandstone and shale of Triassic age.

They occur in scattered areas in the southern part of the Central Lowland. These soils are associated with the reddish Hartford, Manchester, Wethersfield, and Cheshire soils. Branford soils have similar color but have finer texture than the Hartford soils. They are deeper to sand and gravel than the Manchester soils.

Typical profile (Branford silt loam, 0 to 3 percent slopes, in cultivation):

- A_p 0 to 8 inches, dark reddish-brown (5YR 3/3) silt loam; moderate, coarse, granular structure; very friable; coarse fragments make up 10 to 15 percent of volume.
- B_{21} 8 to 16 inches, reddish-brown (5YR 4/4) silt loam; breaks into coarse, subangular blocky clods that crush easily to weak, coarse, granular structure; very friable; coarse fragments make up 15 percent of volume.
- B_{22} 16 to 22 inches, gravelly silt loam or loam, but otherwise same as the overlying horizon.
- D 22 to 40 inches, reddish-brown (5YR 4/3) sand and gravel derived principally from basalt or traprock, sandstone, and shale.

Coarse fragments on and in the soil make up 5 to 20 percent of the soil volume. The layer of coarse sand and gravel is generally at depths of 22 to 24 inches. The total range in depth to this layer, however, is about 18 to 30 inches. The texture of the surface soil is mainly loam or gritty silt loam, but small areas of sandy loam and fine sandy loam are included.

Small areas of Manchester loam and Ellington loam are the main inclusions in areas of Branford soils.

Branford silt loam, 0 to 3 percent slopes (BoA).—This soil is moderately permeable and has a high moisture-holding capacity. It responds well to fertilizer and management. It dries out fairly early in spring and is easy to work.

A large part of the acreage has been cleared and is used for silage corn, potatoes, vegetable crops, tree fruits, alfalfa, nursery stock, hay, and pasture. This soil is suited to general crops of the area. However, little tobacco is grown, because most of the soil occurs south of the tobacco-growing area. It can be used intensively with little risk of erosion if good management practices are used. Such practices should include proper use of lime and fertilizer. (Capability unit I–1.)

Branford silt loam, 3 to 8 percent slopes (BoB).—This soil is similar to Branford silt loam, 0 to 3 percent slopes, in profile characteristics. It differs in stronger slope, and the risk of erosion is greater in clean-cultivated areas. Simple practices are needed to control runoff. This soil is used for the same crops as Branford silt loam, 0 to 3 percent slopes. (Capability unit IIe–1.)

Broadbrook Series

The Broadbrook series consists of well-drained, medium-textured soils that have developed from a mantle of silt over glacial till. A very firm fragipan is at depths of 2 to 3 feet. The till is mainly from reddish-brown Triassic shale and sandstone containing variable amounts of basalt. The soils occur mainly in the towns of Bloomfield and West Hartford and in scattered areas in other parts of the Central Lowland. They are commonly on smoothly rounded drumlins or drumloidal hills; some areas are on undulating to hilly till plains.

Broadbrook soils have subsurface and subsoil layers similar to those of the Narragansett and Enfield soils, but their underlying material differs. Narragansett soils have developed on very friable to firm, sandy till and the Enfield soils on coarse sand and gravel. The Broadbrook soils are associated with the shallow Holyoke soils, the Wethersfield soils, and the moderately well drained Rainbow soils. The poorly and very poorly drained associates are the Wilbraham and Menlo soils.

Areas of Broadbrook very stony silt loams are mapped as undifferentiated units with the Narragansett very stony soils.

Typical profile (Broadbrook silt loam, 3 to 8 percent slopes, in cultivation):

- A_p 0 to 8 inches, brown to dark-brown (10YR 4/3–3/3) silt loam; weak, medium and coarse, granular structure; very friable; contains a few angular rock fragments.
- B_{21} 8 to 18 inches, dark-brown (7.5YR 4/4) silt loam; very weak, coarse, subangular blocky structure; very friable; small angular fragments of rock make up 2 to 3 percent of the soil volume.
- B_{22} 18 to 22 inches, yellowish-brown (10YR 5/4) silt loam; breaks into very soft, subangular blocky clods; very friable; small, angular fragments of rock make up 3 to 5 percent of the soil volume.
- A'_2 22 to 26 inches, yellowish-brown (10YR 5/4) silt loam streaked with gray (10YR 6/1); very friable; angular rock fragments make up 10 to 15 percent of the soil volume.
- B_{2um} 26 to 48 inches, reddish-brown (5YR 4/4) and dark reddish-brown (5YR 3/4) gravelly loam; moderate, thick, platy structure; very firm and compact.

The principal variations are in the thickness of the mantle of silt overlying the compact horizon and in the quantity of small rock fragments and stones in the surface and subsoil layers. The thickness of the silty mantle is generally 20 to 30 inches but ranges from 10 inches in eroded areas to about 40 inches. Some areas are essentially free of rock fragments and stones. The A'_2 horizon does not occur in all Broadbrook soils. In some places the boundary between the silty mantle and the underlying material is sharp. In other places, these layers are separated by a 4- to 6-inch transitional layer consisting of reddish-brown gravelly sandy loam.

Broadbrook silt loam, 0 to 3 percent slopes (BrA).—This soil is medium textured and moderately permeable above the pan layer. It has a high moisture-holding capacity and dries out rather slowly in spring because the compact horizon restricts internal drainage.

Almost all of the acreage has been cleared and is used for crops, tree fruits, hay, and pasture. This soil is well suited to corn for silage or grain, cabbage, cauliflower, other vegetables, and alfalfa and sod crops for hay and pasture. Alfalfa is subject to heaving during late winter and spring. Outdoor tobacco grows well, but shade-grown tobacco is not well suited because the soil dries out slowly in spring.

This soil responds to fertilizer, and it can be used intensively if management is good. Fertilizer and lime should be applied in amounts determined by soil tests. Crop rotations are needed to prevent erosion and to maintain organic matter and good tilth. (Capability unit I–2.)

Broadbrook silt loam, 3 to 8 percent slopes (BrB).—This soil differs from Broadbrook silt loam, 0 to 3 percent slopes, in slopes; consequently, runoff is more of a problem.

This soil is used for the same crops as Broadbrook silt loam, 0 to 3 percent slopes. The risk of erosion is greater, and the use of erosion control practices and

shorter rotations is desirable. (Capability unit IIe–2.)

Broadbrook silt loam, 3 to 8 percent slopes, eroded (BrB2).—This soil has a thinner solum than Broadbrook silt loam, 3 to 8 percent slopes. Also, it generally contains a higher percentage of small rock fragments. The solum over the compact horizon ranges from about 12 to 20 inches in thickness. In places the surface soil contains less organic matter than the typical soil because the subsoil has been mixed with the surface soil. Erosion is a serious problem because of the compact, slowly permeable horizon.

This soil is less suited to cultivated crops than Broadbrook silt loam, 3 to 8 percent slopes. It is used mainly for silage corn, hay, and pasture. Tobacco, sweet corn, potatoes, tree fruits, and other crops are grown in some areas. Cultivated areas need careful management to maintain soil fertility and prevent erosion. (Capability unit IIe–2.)

Broadbrook silt loam, 8 to 15 percent slopes (BrC).—This soil occurs in small, scattered areas. Runoff is a problem because the soil absorbs water slowly and erodes easily on unprotected slopes.

This soil is used mainly for hay, pasture, and tree fruits. Some acreage is used for silage corn, vegetables, and other crops. If fertilized properly, the soil is well suited to legumes and grasses for hay and pasture, and orchards. If runoff is controlled, cultivated crops can be grown in fairly long rotations. (Capability unit IIIe–2.)

Broadbrook silt loam, 8 to 15 percent slopes, eroded (BrC2).—This soil is similar in profile characteristics to Broadbrook silt loam, 3 to 8 percent slopes, eroded. Erosion control is more of a problem because of the steeper slopes. The soil occurs in small, scattered bodies. Erosion is a serious problem because the compact, slowly permeable horizon is near the surface.

This soil is used mainly for hay, pasture, and tree fruits. Small areas are used for tobacco, silage corn, vegetables, and other crops. Clean-cultivated crops can be grown in moderately long crop rotations if intensive practices are used to control erosion. Management is needed to improve and maintain organic matter and prevent additional loss of soil. (Capability unit IIIe–2.)

Broadbrook silt loam, 15 to 25 percent slopes (BrD).—This soil occurs in small, narrow strips. About one-third of the area is moderately to severely eroded.

This soil is suited to hay, pasture, and tree fruits. It is not suited to clean-cultivated crops unless long crop rotations and intensive erosion control practices are used. Areas in hay and pasture should be limed and fertilized in amounts determined by soil tests. Reseeding should be in strips. (Capability unit IVe–2.)

Broadbrook stony silt loam, 0 to 3 percent slopes (BsA).—The profile in stony areas is similar to that in nonstony areas except in undisturbed forests. In forests the surface layer (A_{00}) is 2 inches of raw litter. This is underlain by 1 to 1½ inches of partly decomposed and well decomposed litter (A_0). Under this and over the B horizon is the dark-colored mineral horizon (A_1) ranging from ½ to 1½ inches in thickness.

This soil is mostly in cutover forests, but scattered areas have been cleared and are used for hay, pasture, and tree fruits. Stones limit the use of the soil for row crops, but most areas can be worked for small grains, hay, improved pasture, and tree fruits. Unimproved pastures can be improved by the use of fertilizer and the control of brush and weeds. (Capability unit IVes–2.)

Broadbrook stony silt loam, 3 to 8 percent slopes (BsB).—This soil is similar to Broadbrook stony silt loam, 0 to 3 percent slopes, except in relief. The risk of erosion is greater if clean-cultivated crops are grown.

A large part of the acreage is in cutover forests, but scattered areas have been cleared and are used for pasture, hay, and tree fruits, or they are idle. Stones limit the use of this soil for row crops, but most areas can be worked for hay, improved pasture, small grains, and tree fruits. (Capability unit IVes–2.)

Broadbrook stony silt loam, 8 to 15 percent slopes (BsC).—This soil is similar to Broadbrook stony silt loam, 0 to 3 percent slopes, and Broadbrook stony silt loam, 3 to 8 percent slopes, except for relief.

Most of the soil is in cutover forests. Small, scattered areas have been cleared and are used for pasture and orchards. Stones limit the use of this soil for row crops, but hay, pasture, and tree fruits can be grown. If used for clean-cultivated crops, intensive erosion control should be practiced to control runoff. (Capability unit IVes–2.)

Broadbrook stony silt loam, 15 to 25 percent slopes (BsD).—This strongly sloping soil is mainly in forests, but small areas have been cleared and are used for unimproved pasture, or they are idle. It is best suited to forest and pasture because of stoniness and the risk of erosion. Some areas are suited to improved pasture and tree fruits. (Capability unit VIes–2.)

Brookfield Series

This series consists of well-drained, yellowish-red to strong-brown soils that have developed on moderately coarse to coarse, unstratified glacial drift. This drift is derived mainly from a brown mica schist that weathers to a yellowish-red or strong-brown material. Brookfield soils occur in scattered areas in the towns of Marlboro and Glastonbury. They are associated with the Charlton, Gloucester, and other soils. They differ from the Charlton soils in color and texture and from the Gloucester soils in color and parent materials.

The Brookfield very stony fine sandy loams are mapped with the Gloucester soils as an undifferentiated mapping unit.

Typical profile (Brookfield stony fine sandy loam, 3 to 8 percent slopes, in a forest):

- A_{00} 3 to 2 inches, raw leaf litter.
- A_0 2 inches to 1 inch, partly decomposed leaf litter.
- A_1 1 to ½ inch, dark grayish-brown (10YR 4/2) fine sandy loam; weak, medium granular structure; very friable.
- B_{21} ½ to 3 inches, dark reddish-brown (5YR 3/3) fine sandy loam; breaks into soft, medium, subangular blocky clods when disturbed; very friable; coarse fragments make up 10 percent of soil mass.
- B_{22} 3 to 14 inches, reddish-brown (5YR 4/4) fine sandy loam; breaks into soft, coarse, subangular blocky clods when disturbed; very friable; coarse fragments make up 10 percent of soil mass.
- B_{23} 14 to 22 inches, strong-brown (7.5YR 5/8) fine sandy loam; breaks into soft, coarse, subangular blocky clods; very friable.

C 22 to 48 inches, light olive-brown (2.5Y 5/4) and brownish-yellow (10YR 6/8), highly micaceous fine sandy loam and loamy sand; generally very friable or loose with lenses of firm material.

The principal variation is in the color of the upper B horizon, which ranges from strong brown (7.5YR 5/8) to reddish brown (5YR 4/4) or yellowish red (5YR 4/6). Brookfield soils grade toward the Gloucester and Charlton soils, and in places the boundary between them is indistinct.

Brookfield fine sandy loam, 3 to 8 percent slopes (BtB).—The profile of this soil in cultivated fields is similar to that of Brookfield stony fine sandy loam, 3 to 8 percent slopes, except that the A_p horizon is dark-brown (10YR 3/3) fine sandy loam. The moisture-holding capacity is moderate. This well-drained to somewhat excessively drained soil is rapidly permeable. It is easy to work and responds to fertilization and other management practices.

This soil is used mainly for hay and pasture, but small areas are used for silage corn, vegetables, and other crops. It dries out early in spring and is suitable for sweet corn and early vegetables. It is only fair for hay and pasture. Fertilizer and lime are needed for good yields, but they are rapidly leached. Lack of moisture, however, limits crop production in most years, unless the soil is irrigated. (Capability unit IIs–2.)

Brookfield fine sandy loam, 8 to 15 percent slopes (BtC).—The control of runoff is more of a problem on this soil than on Brookfield stony fine sandy loam, 3 to 8 precent slopes. This soil is used mainly for hay and pasture, or it is idle. Drought and low fertility limit the yields of crops. (Capability unit IIIe–3.)

Brookfield stony fine sandy loam, 3 to 8 percent slopes (BvB).—Most of this soil is in forest, but scattered areas have been cleared and are used for pasture or are left idle. Row crops are difficult to grow because of the stones. Most areas can be used for hay, improved pasture, and tree fruits. (Capability unit IVes–1.)

Brookfield stony fine sandy loam, 8 to 15 percent slopes (BvC).—Most of this soil is in forest. Stones make it difficult to work for row crops, but most areas can be used for hay and improved pasture. (Capability unit IVes–1.)

Buxton Series

This series consists of moderately well drained, silty soils that have developed on grayish or dark-brown to reddish-brown, glacial-lake silt and clay. These soils have a very strongly to strongly acid surface soil and subsoil to a depth of 2 to 3 feet. Below this depth, the material is generally slightly acid to mildly alkaline. Buxton soils occur mainly in the town of Bloomfield and in towns bordering the Connecticut River north of Hartford in the northern part of the Central Lowland. These soils are closely associated with the poorly drained Scantic and very poorly drained Biddeford soils of the same catena. They are finer textured and more slowly permeable in the subsoil layers and in the substrata than the Belgrade soils. They differ from the reddish Berlin soils in color. In addition, they generally have a lower percentage of coarse rock fragments in the surface soil and subsoil.

Typical profile (Buxton silt loam, 0 to 3 percent slopes, in a pasture):

A_p 0 to 6 inches, dark grayish-brown (10YR 4/2) silt loam; weak, medium, granular structure; friable, slightly plastic when wet; very strongly acid.

B_{21} 6 to 14 inches, dark yellowish-brown (10YR 4/4) silt loam in upper part, grading to silty clay loam; moderate, medium and coarse, subangular blocky structure; friable, slightly plastic when wet; very strongly acid.

B_{22g} 14 to 28 inches, mottled light brownish-gray (10YR 6/2), olive-brown (2.5Y 4/4), and grayish-brown (2.5Y 5/2) silty clay loam; many, fine, and faint mottles; weak, medium, subangular blocky structure; friable, plastic when wet; strongly acid.

C 28 to 60 inches, dark reddish-gray (5YR 4/2), varved silty clay and yellowish-brown (10YR 5/4) silt, with bands of silty clay 4 to 6 millimeters wide and bands of silt 1 to 2 millimeters wide; slightly acid to neutral.

Mottles occur at varying depths, but generally at less than 20 inches. The boundary between the gray and the red glaciolacustrine silts and clays in the valley of the Connecticut River is somewhere near the southern part of the towns of Hartford and West Hartford. Therefore, parent material of the Buxton, Scantic, Belgrade, and Wallington soils in the towns of Hartford, West Hartford, Windsor, Bloomfield, and East Granby shows some evidence of reddish sediment, especially in the underlying varved silt and clay.

Included with the Buxton soils are small, scattered areas that are underlain by sand and gravel or by glacial till at depths of 2 to 3 feet. In these areas, gravel and fragments of rocks are on and in the soil. In addition to these areas, the main inclusions are small areas of Scantic, Belgrade, and Elmwood soils.

Buxton silt loam, 0 to 3 percent slopes (BxA).—This soil is moderately well drained and slowly permeable. It is difficult to work and dries very slowly in spring. It erodes easily, even on gentle slopes, because of the silty texture and a low infiltration capacity. It has a high moisture-holding capacity and retains plant nutrients.

A large part of the acreage has been cleared and is used mainly for hay and pasture. Small areas are used for silage corn, vegetables, and other crops. Scattered areas are idle. The soil is better suited to grasses and legumes for hay and pasture than to cultivated crops. It is not suited to tobacco, alfalfa, and tree fruits.

Fertilizer and lime should be applied in amounts determined by soil tests. Crop rotations are needed to build up and maintain the supply of organic matter. When the supply of organic matter is low, the surface bakes and forms a crust. (Capability unit IIw–3.)

Buxton silt loam, 3 to 8 percent slopes (BxB).—This soil readily erodes if unprotected. Some areas are moderately eroded.

The soil is used mainly for hay and pasture. Small areas are used for silage corn, vegetables, and other crops. Management is the same as for Buxton silt loam, 0 to 3 percent slopes, but more intensive practices are needed to control erosion in cultivated fields. (Capability unit IIwe–3.)

Buxton silt loam, 8 to 15 percent slopes (BxC).—This soil is slowly permeable, and the risk of erosion is high unless management is good. Some eroded areas are mapped with this soil.

Hay and pasture are the main uses and are suited to this soil. Small areas are used for silage corn and other

crops; some acreage is idle. Stripcropping and other erosion control practices cannot be applied in many areas because of the irregular relief. (Capability unit IIIe–4.)

Charlton Series

This series consists of very friable, well drained, gently sloping to hilly soils. They have developed on firm to friable, moderately coarse textured glacial till. The till is derived mainly from schistose rocks, but it contains various amounts of gneiss, granite, and other rocks. The Charlton soils occur in small to fairly large areas in the Eastern and Western Highlands. They are associated with the shallow Hollis, the moderately well drained Sutton, the poorly drained Leicester, and the very poorly drained Whitman soils of the same catena. Charlton soils have a somewhat finer texture than the Gloucester soils, particularly in the substratum. They do not have the very firm and compact fragipan that occurs in the Paxton soils at a depth of about 2 feet.

Typical profile (Charlton fine sandy loam, 0 to 3 percent slopes, in cultivation):

- A_p 0 to 8 inches, dark-brown (10YR 3/3) fine sandy loam; very weak, coarse, granular structure; very friable; coarse fragments make up about 15 percent of soil volume.
- B_{21} 8 to 18 inches, brown (7.5YR 4/4) fine sandy loam; breaks into very soft, subangular blocky clods when disturbed; very friable; coarse fragments make up 15 percent of soil volume.
- B_{22} 18 to 24 inches, yellowish-brown (10YR 5/4–5/6) gravelly fine sandy loam; very friable; coarse fragments make up 25 percent of soil volume.
- C 24 to 40 inches, grayish-brown (2.5Y 5/2) and light olive-brown (2.5Y 5/4) gravelly sandy loam; firm and thick platy layers are interbedded with very friable material.

All areas of Charlton soils were originally stony or very stony. Surface soil and subsoil textures are dominantly fine sandy loam, but there are some areas of light loam or silt loam that may contain some windblown material. Small to medium-sized, coarse, angular fragments of rock make up 10 to 25 percent of the surface soil and subsoil.

These scattered areas are associated with the reddish substratum phases of the Paxton series. The subsoil layers generally are dark-brown (7.5YR 4/4) fine sandy loam or light loam but have yellowish-red pockets in places. The underlying material is reddish-gray (5YR 5/2) to reddish-brown (5YR 4/4) gravelly sandy loam to gravelly loamy sand.

Included with the Charlton soils in the southwestern part of the town of Glastonbury are scattered areas of soils that show the influence of reddish-brown Triassic rocks characteristic of the Central Lowland.

Charlton fine sandy loam, 0 to 3 percent slopes (CaA).—This soil is well drained, very friable, and moderately to rapidly permeable. It retains plant nutrients and has a high moisture-holding capacity. It is fairly easy to work and responds to fertilizer and other management.

This is one of the most desirable soils in the highlands for general crops. It is used mainly for alfalfa, corn for grain and silage, and hay and pasture for dairy cattle. Some of the acreage is used for apple and peach orchards, sweet corn, potatoes, vegetables, and other crops. Fertilizer is needed for high yields; some crops also need lime. This soil can be used for crops that need intensive cultivation if management includes crop rotations that help maintain organic matter and good tilth. (Capability unit I–1.)

Charlton fine sandy loam, 3 to 8 percent slopes (CaB).—Runoff is more rapid from this soil than from Charlton fine sandy loam, 0 to 3 percent slopes. Unprotected slopes are subject to some erosion.

This soil is used for the same crops as Charlton fine sandy loam, 0 to 3 percent slopes. Simple practices are needed to control erosion if the soil is used for clean-cultivated crops. Good management includes proper use of fertilizers, use of suitable crop rotations, and control of erosion. (Capability unit IIe–1.)

Charlton fine sandy loam, 8 to 15 percent slopes (CaC).—Some areas of this sloping soil are moderately eroded.

This soil is suited to and used mainly for hay, pasture, alfalfa, and apple and peach orchards. Small, scattered areas are used for sweet corn, silage corn, vegetables, and other crops. Management should include the use of fertilizer and lime and practices to control erosion. Clean-cultivated fields require the use of intensive practices to control runoff and save moisture. Crop rotations are needed to maintain good tilth and organic matter. (Capability IIIe–1.)

Charlton fine sandy loam, 15 to 25 percent slopes (CaD).—This soil has rapid runoff, and some areas are eroded. A few, scattered areas have slopes greater than 25 percent.

Because of strong slopes and the risk of erosion, this soil is not suited to cultivation unless crops are grown in long rotations and runoff is controlled. The soil is used mainly for hay, pasture, and apple and peach orchards. Some areas are idle. (Capability unit IVe–1.)

Charlton stony fine sandy loam, 3 to 8 percent slopes (ChB).—A large percentage of this soil is in forests. Some of the acreage is used for hay, pasture, and tree fruits. Some areas are idle. Because of stones, this soil is difficult to work for row crops, but most areas can be used for hay, improved pasture, small grains, and tree fruits. If limed and fertilized, the soil is well suited to sod crops for hay and pasture. (Capability unit IVes–1.)

Charlton stony fine sandy loam, 8 to 15 percent slopes (ChC).—This soil has moderate to rapid runoff. The risk of erosion on unprotected slopes is greater than on Charlton stony fine sandy loam, 3 to 8 percent slopes.

Use and suitability for crops are the same as for Charlton stony fine sandy loam, 3 to 8 percent slopes. (Capability unit IVes–1.)

Charlton stony fine sandy loam, 15 to 25 percent slopes (ChD).—Most of this soil is in forest, but scattered areas are in unimproved pasture, or they are idle. Because of stones, the soil is best suited to these uses. Some areas, however, can be used for improved pasture and tree fruits. (Capability unit VIes–1.)

Charlton very stony fine sandy loam, 3 to 15 percent slopes (CrC).—This soil is largely in forest. Scattered areas have been cleared and are used for pasture, or they are idle. This soil is best suited to forest and pasture. Stoniness prevents its use for cultivated crops. Pastures can be improved by the use of fertilizer and the control of brush. (Capability unit VIs–1.)

Charlton very stony fine sandy loam, 15 to 35 percent slopes (CrD).—This soil is largely in forest, a use to which

it is best suited. Small, scattered areas have been cleared and are used for unimproved pasture, or they are idle. (Capability unit VIIs–1.)

Cheshire Series

The Cheshire series consists of reddish, well-drained soils that have developed on glacial till. The till was derived mainly from reddish-brown Triassic sandstone and conglomerate that contained basalt and other rocks in various amounts. It ranges from gravelly sandy loam to gravelly loamy sand and is firm to very friable. Cheshire soils occur mainly in the southwestern and northeastern corners of the Central Lowland on gently sloping or undulating to hilly till plains. These soils are closely associated with the well drained Wethersfield, moderately well drained Watchaug, poorly drained Wilbraham, and the very poorly drained Menlo soils. The Cheshire soils are similar to Wethersfield soils in color; they have coarser texture, however, and differ in consistence of the underlying material.

Typical profile (Cheshire fine sandy loam, 3 to 8 percent slopes, in cultivation):

- A_p 0 to 8 inches, dark reddish-brown (5YR 3/3) fine sandy loam; weak, medium to coarse, granular structure; very friable; coarse fragments make up 8 percent of soil volume.
- B_{21} 8 to 18 inches, yellowish-red (5YR 4/6) fine sandy loam; very weak, coarse, subangular blocky structure; very friable; coarse fragments make up 8 percent of soil volume.
- B_{22} 18 to 24 inches, yellowish-red (5YR 4/6) sandy loam or coarse sandy loam; very weak, coarse, subangular blocky structure; coarse fragments make up 10 to 15 percent of soil volume.
- C 24 to 48 inches, dark reddish-brown (5YR 3/3) and reddish-brown (5YR 4/3), interbedded, gravelly loamy coarse sand and gravelly coarse sandy loam till; firm to very friable in places.

The texture is predominantly fine sandy loam, but it ranges from sandy loam to light loam or silt loam. Coarse, angular fragments of rock generally make up from 10 to 20 percent of the volume of the surface soil and subsoil, but in some places the percentage is greater. In the northeastern corner of the county, the Cheshire soils are associated with the Narragansett, and many areas are transitional between the typical Narragansett silt loam and the Cheshire fine sandy loam. Consequently, the boundary between these soils is not distinct in many places, and small areas of Narragansett soils are included with the Cheshire and vice versa. The B horizon in Cheshire soils is generally yellowish red (5YR 4/6–4/8). However, in the towns of Glastonbury, Manchester, South Windsor and East Windsor, some areas having a strong-brown subsoil (7.5YR 5/6–5/8) are included with the Cheshire.

Cheshire fine sandy loam, 0 to 3 percent slopes (CsA).—This soil occurs in small, scattered areas. It is very friable and moderately to rapidly permeable. The soil has a high to moderately high moisture-holding capacity, and it responds well to management. Erosion is not a problem.

This soil is well suited to all crops grown in the county, and it is used for the same purposes as Cheshire fine sandy loam, 3 to 8 percent slopes. (Capability unit I–1.)

Cheshire fine sandy loam, 3 to 8 percent slopes (CsB).—This soil has moderate runoff. It is one of the most desirable upland soils in the Central Lowland for potatoes, tobacco, and other general crops. It is used for grain and silage corn, alfalfa, hay, pasture, tree fruits, sweet corn, vegetables, tobacco, potatoes, and other crops. This soil can be cultivated intensively if erosion is controlled and tilth, fertility, and the supply of organic matter are maintained. Fertilizer is needed for high yields. Some crops also need lime. (Capability unit IIe–1.)

Cheshire fine sandy loam, 3 to 8 percent slopes, eroded (CsB2).—This soil has a thinner solum than Cheshire fine sandy loam, 3 to 8 percent slopes; the C horizon is generally at depths ranging from about 12 to 20 inches. The surface soil generally contains less organic matter because the subsoil has been mixed with the surface soil. Eroded areas generally contain a higher percentage of rock fragments. A few small, severely eroded areas are included with this soil.

This soil is used for the same crops as Cheshire fine sandy loam, 3 to 8 percent slopes, but yields are generally lower because of the lower moisture-holding capacity. Careful management is needed to build up fertility and the supply of organic matter and to prevent further erosion. (Capability unit IIe–1.)

Cheshire fine sandy loam, 8 to 15 percent slopes (CsC).—This soil has more runoff even on protected areas than Cheshire fine sandy loam, 3 to 8 percent slopes.

The soil is used mainly for alfalfa, hay, pasture, and orchards and is suitable for them. Small areas are used for silage corn, tobacco, vegetables, and other cultivated crops. Fertilizer is needed for high yields. If clean-cultivated crops are grown, runoff should be controlled. Hay and pasture should be reseeded in strips. (Capability unit IIIe–1.)

Cheshire fine sandy loam, 8 to 15 percent slopes, eroded (CsC2).—This soil is similar to Cheshire fine sandy loam, 3 to 8 percent slopes, eroded. In addition, the control of erosion is more of a problem. Small, scattered, severely eroded areas are included with this soil.

This soil is used mainly for hay and pasture, or it is idle; however, small areas are used for tobacco, potatoes, and other crops. Because of the shallow solum and risk of erosion, the soil is best suited to continuous sod crops. Management should include the improvement of fertility, increase of organic matter, and control of erosion. (Capability unit IIIe–1.)

Cheshire fine sandy loam, 15 to 25 percent slopes, eroded (CsD2).—This soil occurs in relatively small, narrow strips, a large percentage of which is moderately eroded. Erosion varies from slight to severe.

The soil is suited to hay, pasture, and orchards. It is not suited to cultivation unless crops are grown in long rotations and the soil is protected by erosion control practices.

Hay and pastures should be reseeded in strips and limed and fertilized according to needs determined by soil tests. (Capability unit IVe–1.)

Cheshire stony fine sandy loam, 3 to 8 percent slopes (CtB).—This soil is largely in forest, but scattered areas are used for hay, pasture, tree fruits, and other crops. Some areas are idle. Because of stones, this soil is generally not suited to crops that need intensive cultivation. It can be used for hay, pasture, tree fruits, and small grains. It is well suited to sod crops for hay and pas-

ture if lime and fertilizer are used. (Capability unit IVes–1.)

Cheshire stony fine sandy loam, 8 to 15 percent slopes (CtC).—This soil has moderate to rapid runoff. The risk of erosion on unprotected areas is greater than on Cheshire fine sandy loam, 3 to 8 percent slopes. This soil is used for and is suited to the same purposes as Cheshire stony fine sandy loam, 3 to 8 percent slopes. (Capability unit IVes–1.)

Cheshire stony fine sandy loam, 15 to 25 percent slopes (CtD).—This soil is largely in forest. Scattered areas have been cleared and are used for unimproved pasture, or they are idle. This soil is best suited to forest and pasture because of stoniness. Some areas can be used for improved pasture and tree fruits. (Capability unit VIes–1.)

Cheshire very stony fine sandy loam, 3 to 15 percent slopes (CvC).—This soil is largely in forest, but scattered areas have been cleared and are used for unimproved pasture, or they are idle. It is suited mainly to forest and pasture because of stoniness. Some areas can be worked for improved pasture. Unimproved pastures can be improved by the control of brush and the use of fertilizer. (Capability unit VIs–1.)

Cheshire very stony fine sandy loam, 15 to 35 percent slopes (CvD).—This soil is largely in forest, and it is best suited to this use. Small, scattered areas have been cleared and are used for unimproved pasture, or they are idle. (Capability unit VIIs–1.)

Ellington Series

This series consists of moderately well drained, reddish terrace soils. They have developed on stratified sand and gravel derived mainly from basalt and reddish-brown Triassic rocks. These soils occur in small, scattered areas mainly in the southern part of the Central Lowland. They are closely associated with the Hartford, Branford, and Manchester soils. They differ from the Sudbury soils in color and parent material. Only one soil was mapped in this series.

Typical profile (Ellington fine sandy loam, 0 to 3 percent slopes, in cultivation):

- A_p 0 to 8 inches, dark reddish-brown (5YR 3/3) fine sandy loam or silt loam; breaks into soft, subangular blocky clods that crush to weak, coarse, granular structure; very friable; coarse fragments make up 5 percent of soil volume.
- B_{21} 8 to 20 inches, reddish-brown (5YR 4/4) fine sandy loam; breaks into very soft, subangular blocky clods; very friable; coarse fragments make up 10 percent of soil volume; boundary gradual.
- B_{22g} 20 to 26 inches, reddish-brown (5YR 4/3) sandy loam finely mottled with pinkish gray (5YR 7/2) and gray (5YR 6/1); very friable; coarse fragments make up 10 to 15 percent of soil volume.
- D 26 to 40 inches, reddish-brown (5YR 4/4) coarse sand and gravel streaked with pinkish gray (5YR 6/2); derived largely from Triassic sandstone, shale, and traprock.

In the small acreage of this soil, surface soil textures range from sandy loam to silt loam or loam. Coarse fragments make up 5 to 20 percent of the volume of the surface soil and subsoil. Mottles are at depths ranging from 12 to 20 inches. Areas associated with the Hartford soils are generally fine sandy loam or sandy loam, and those associated with Branford soils are silt loam or loam.

Ellington fine sandy loam, 0 to 3 percent slopes (EfA).—This soil usually occurs in small areas. It is moderately to rapidly permeable. A seasonal high water table interferes with internal drainage, and the soil dries out rather slowly in spring. Moisture is generally adequate for plants during the growing season. A few areas have slopes ranging from 3 to 5 percent.

Without drainage, this soil is suited to corn, hay, pasture, and late vegetables. Partly drained areas are suited to tobacco, potatoes, and early vegetables. Fertilizer is needed for high yields. Good management is essential to maintain organic matter and good tilth. (Capability unit IIw–1.)

Elmwood Series

This series consists of moderately well drained, moderately coarse to medium textured soils on nearly level to gently sloping terraces. These soils occur mainly in the northern part of the Central Lowland. They have developed over glacial-lake silt and clay, which is at depths of 24 to 48 inches. Mottles in these soils occur at depths of 10 to 20 inches.

The Elmwood soils are closely associated with the well-drained Melrose, the poorly drained Swanton, and the very poorly drained Whately soils. They occur in areas with the Buxton, Scantic, and Biddeford soils. They differ from the moderately well drained Ninigret and Sudbury soils in that they are underlain by silt and clay rather than by sand or sand and gravel.

Typical profile (Elmwood sandy loam, 0 to 3 percent slopes, in an idle area):

- A_p 0 to 6 inches, very dark grayish-brown (10YR 3/2) sandy loam or fine sandy loam; very weak, medium, granular structure; very friable.
- B_{21} 6 to 10 inches, dark yellowish-brown (10YR 4/4) sandy loam or fine sandy loam; very soft, subangular blocky clods; very friable; boundary clear.
- B_{22} 10 to 18 inches, brown (10YR 4/3) sandy loam; very soft, medium, subangular blocky clods; very friable; boundary clear.
- B_{23g} 18 to 25 inches, mottled dark grayish-brown (2.5Y 4/2), yellowish-brown (10YR 5/4), and strong-brown (7.5YR 5/8) loamy fine sand, grading to fine sand in lower part; mottles common, medium, and distinct; loose.
- D_{1u} 25 to 28 inches, dark yellowish-brown and dark-brown (7.5YR 4/4 and 10YR 3/3) medium sand; loose.
- D_{2gu} 28 to 36 inches, olive-gray (5Y 5/2), varved silt and silty clay loam or silty clay mottled with olive brown (2.5Y 4/4) and brownish yellow (10YR 6/6).

Textures range from loamy sand to very fine sandy loam. Mottles generally occur at depths of 10 to 20 inches, except in small areas of somewhat poorly drained soils that were mapped as inclusions. In most places the depth to silt and clay is 24 to 30 inches, but it ranges from 20 to 48 inches. Below the depth of 20 to 24 inches, the material is variable, but it is generally loamy sand or in places sand with some gravel.

Small areas of Melrose, Swanton, Ninigret, and Sudbury soils are included with these soils as mapped. Also included are small, scattered areas having reddish-brown (5YR 4/4) to yellowish-red (5YR 4/6) B horizons that are underlain by reddish silt and clay.

Elmwood loamy sand, 0 to 3 percent slopes (EmA).—This soil is loamy sand or sand, and it occurs in small, widely scattered areas. It is underlain by silt and clay at depths of 2 to 4 feet. Mottles generally occur at depths of 20 to 24 inches but may be deeper in places.

This soil is largely in pasture, or it is idle. Pastures have a low grazing capacity unless they are irrigated and heavily fertilized. (Capability unit IIIs–1.)

Elmwood sandy loam, 0 to 3 percent slopes (EnA).—About 25 percent of the acreage of this soil is in forest. The rest is used for cultivated crops, hay, and pasture, or it is idle. The main crops are outdoor tobacco, potatoes, silage corn, hay, and pasture. Some of the tobacco and potatoes are grown on undrained areas. Some areas are used for sweet corn, vegetables, and other crops.

This soil is not well suited to alfalfa and tree fruits. Undrained areas are generally suited to silage corn, hay, pasture, and late vegetables. Tobacco and potatoes are likely to be damaged in very wet seasons. Good management is needed to maintain tilth and improve the supply of organic matter. Fertilizer is required for high yields of crops. Some crops also need lime. (Capability unit IIw–1.)

Elmwood sandy loam, 3 to 8 percent slopes (EnB).—This soil has medium runoff and dries out faster in spring than Elmwood sandy loam, 0 to 3 percent slopes. It is used for the same crops. A few areas with slopes of 8 to 10 percent are included. Runoff from clean-cultivated fields can be controlled by the use of simple practices. (Capability unit IIwe–1.)

Elmwood very fine sandy loam, 0 to 3 percent slopes (EoA).—This soil dries out more slowly in spring than Elmwood sandy loam, 0 to 3 percent slopes, because of finer texture. The surface soil and subsoil are very fine sandy loam or light silt loam, underlain by silt and clay at depths of 2 to 4 feet. The soil is moderately permeable above the silt and clay. It has a high moisture-holding capacity. Crops seldom lack moisture during the growing season.

About 25 percent of the acreage is in forest. Cleared areas are used mainly for hay, pasture, outdoor tobacco, and silage corn. Some areas are used for potatoes, vegetables, sweet corn, and other crops.

Undrained areas are generally well suited to silage corn, late vegetables, and sod crops grown for hay and pasture. Partly drained areas are more suitable for tobacco, potatoes, and early vegetables. Tobacco and potatoes are subject to damage in very wet seasons. Fertilizer is needed for high yields. Some crops also need lime. (Capability unit IIw–1.)

Elmwood very fine sandy loam, 3 to 8 percent slopes (EoB).—Unprotected slopes erode easily on this soil. A few small areas on slopes ranging from 8 to 12 percent are included.

The use, management, and crop suitability of this soil are generally the same as for Elmwood very fine sandy loam, 0 to 3 percent slopes. However, more intensive practices are needed to control runoff and erosion. (Capability unit IIwe–1.)

Enfield Series

This series consists of well-drained, medium-textured soils on terraces. These soils have developed from a silty mantle that is underlain by stratified sand and gravel, generally at a depth of 24 inches, but depths may range from 10 to 30 inches. The surface soil and the subsoil are probably eolian in origin.

Enfield soils occur in the Central Lowland, mainly in the northeastern part. They are commonly associated with the Tisbury, Merrimac, Hartford, Narragansett, and Broadbrook soils. They differ from the Merrimac soils mainly in texture, and from the Hartford in color and texture. They differ from the Narragansett and Broadbrook soils in the character of the underlying material, which in these two soils is glacial till.

Typical profile (Enfield silt loam, 0 to 3 percent slopes, in cultivation):

- A_p 0 to 8 inches, dark-brown (10YR 3/3) silt loam; very weak, fine and medium, granular structure in upper 6 inches; most cultivated areas have a plowsole at a depth of about 6 inches, which has a weak, thick, platy structure; very friable to friable.
- B_{21} 8 to 20 inches, yellowish-brown (10YR 5/6) silt loam; very weak, medium to coarse, subangular blocky structure; very friable; coarse fragments make up 2 percent of soil volume.
- B_{22} 20 to 24 inches, yellowish-brown (10YR 5/4) silt loam; very weak, medium, subangular blocky structure; very friable; coarse fragments make up 3 to 5 percent of soil volume.
- D_u 24 to 36 inches, reddish-brown (5YR 4/3), stratified sand and gravel derived mainly from reddish-brown Triassic sandstone and conglomerate.

The texture is silt loam in most places, but small areas of light loam, very fine sandy loam, and fine sandy loam are included. Coarse fragments of rounded gravel in the surface soil and subsoil make up 1 to 15 percent of the soil volume. The quantity of these fragments generally increases with depth. Shallow soils have a higher percentage of them than the deeper ones. The color of the surface layer is very dark grayish brown (10YR 3/2) to brown (10YR 4/3) and that of the upper subsoil is yellowish brown (10YR 5/4) to strong brown (7.5YR 5/6 or 5/8).

Soils thicker than 24 inches have pockets or streaks of light brownish gray (2.5Y 6/2) just above the sand and gravel. In places the underlying sand and gravel are derived mainly from reddish-brown Triassic rock and traprock containing various proportions of sediment from crystalline rocks. In places, however, these deposits are derived mainly from quartz, granite, gneiss, and schist.

Enfield silt loam, 0 to 3 percent slopes (EsA).—This soil is moderately permeable and has a high moisture-holding capacity (fig. 4). It is easy to work and responds well to management. There is some risk of erosion in unprotected areas, even on gentle slopes.

Nearly all the acreage has been cleared and is used mainly for tobacco and potatoes. Some of the acreage is used for corn for grain and silage, alfalfa, vegetables, nursery stock, and hay and pasture. This soil is suitable for crops that require intensive cultivation. It is well suited to all crops grown in Hartford County, and it is considered one of the most desirable soils for potatoes and for shade-grown and outdoor tobaccos. It is not a fertile soil, but its favorable physical properties make it responsive to fertilizers and other management. Management should consist of practices that maintain fertility, tilth, and the supply of organic matter. (Capability unit I–1.)

Enfield silt loam, 0 to 3 percent slopes, eroded (EsA2).—This soil is shallower and has a higher percentage of coarse fragments in the surface soil and subsoil than Enfield silt loam, 0 to 3 percent slopes. The silty mantle over coarse sand and gravel ranges in thickness from about 8 to 18 inches. In some places, the mantle has been made shallow by erosion; in others, it was probably originally shallow. This soil is somewhat excessively drained,

Figure 4.—**Profile of Enfield silt loam in an idle area.**

and it has a moderate moisture-holding capacity. The soil is easy to work and warms up early in spring. Most areas are used for tobacco, sweet corn, and potatoes, but some are used for alfalfa, silage corn, nursery stock, hay, and pasture. The soil is suited to tobacco and other general crops grown in the county. The lack of moisture in properly fertilized soils reduces the yields of crops in most years unless supplemental irrigation is used. (Capability unit IIs–1.)

Enfield silt loam, 3 to 8 percent slopes (EsB).—Unprotected slopes erode very readily on this soil. Use and management are the same as for Enfield silt loam, 0 to 3 percent slopes. The control of erosion, however, requires more intensive practices. (Capability unit IIe–1.)

Enfield silt loam, 3 to 8 percent slopes, eroded (EsB2).—This soil has irregular slopes. Unprotected slopes erode very easily.

The soil is used mainly for tobacco, potatoes, sweet corn, vegetables, and alfalfa and other legumes and grasses used for hay and pasture. It is fairly well suited to general crops but is somewhat droughty. Crop rotations and management are the same as for Enfield silt loam, 0 to 3 percent slopes. The control of runoff, however, requires more intensive practices. (Capability unit IIs–2.)

Enfield silt loam, 8 to 15 percent slopes (EsC).—This soil occurs in small, scattered areas. Runoff is rapid, and the control of erosion is a management problem.

A large percentage of the soil is in hay, pasture, and forest. Because of the high risk of erosion, this soil is better suited to alfalfa and other legumes and grasses grown for hay and pasture than for cultivated crops. It is suited to clean-cultivated crops if erosion is controlled and crops are grown in moderately long rotations. (Capability unit IIIe–1.)

Enfield silt loam, 8 to 15 percent slopes, eroded (EsC2).—This soil has a very irregular surface. Because of more rapid runoff and the extremely variable thickness of the silty mantle, this soil is more droughty than the eroded Enfield silt loams on more gentle slopes.

This soil is better suited to alfalfa and other legumes and grasses for hay and pasture than for clean-cultivated crops, because of surface irregularities and the risk of erosion. Intensive erosion control practices are needed on slopes used for rotations of clean-cultivated crops. Careful management is needed to prevent further erosion and to improve and maintain fertility and the supply of organic matter. (Capability unit IIIe–3.)

Enfield silt loam, overflow, 0 to 3 percent slopes (EwA).—This soil has a slightly darker A_p horizon and a slightly duller B_2 horizon than Enfield silt loam, 0 to 3 percent slopes. It is associated with the Alluvial soils on the flood plains of the Farmington and Connecticut Rivers and has developed profile characteristics of Brown Podzolic soils.

This soil occurs mainly in the southwestern part of the town of Farmington and west of South Glastonbury in the town of Glastonbury. It occupies the higher parts of flood plains but is subject to occasional flooding. It is moderately permeable and has a high moisture-holding capacity. Crops are damaged occasionally by floods.

The soil is used mainly for hay, silage corn, and pasture, but some acreage is used for tobacco and vegetables. This soil is well suited to general crops grown in the county. Management is the same as for Enfield silt loam, 0 to 3 percent slopes. (Capability unit I–1.)

Gloucester Series

This series consists of well-drained to somewhat excessively drained soils that have developed on coarse-textured glacial till derived mainly from granite rocks. These soils occur in the Eastern and Western Highlands. A large percentage of the acreage is stony or very stony and is in forest.

Gloucester soils are associated with the moderately well drained Acton, the poorly drained Leicester, and the very poorly drained Whitman, all of which are in the same catena. Gloucester soils are somewhat coarser textured than the Charlton soils, particularly in the underlying till. They are similar in texture to the Brookfield soils, but differ in color because the Brookfield soils have developed from schist and gneiss that weather to a strong brown or reddish brown.

Typical profile (Gloucester stony fine sandy loam, 3 to 8 percent slopes, in forest):

A_{00} 4 inches to 1 inch, fresh litter.
A_0 1 to 0 inch, partly decomposed litter.
A_1 0 to 1 inch, very dark grayish-brown (10YR 3/2) fine sandy loam; weak, medium, granular structure; very friable.
B_{21} 1 to 4 inches, dark-brown (7.5YR 4/4) fine sandy loam; breaks into very soft, subangular blocky clods when disturbed; very friable; coarse fragments make up 10 to 15 percent of soil volume.

B_{22} 4 to 24 inches, yellowish-brown (10YR 5/6) fine sandy loam; breaks into very soft, subangular blocky clods; very friable; coarse fragments make up 15 to 20 percent of soil volume.

C 24 to 40 inches, gray (10YR 6/1) and light brownish-gray (10YR 6/2) till of gravelly loamy sand; very friable to loose.

The Gloucester soils were originally stony to very stony, but some areas have had most of the stones removed. Color, texture, and depth to the underlying till are fairly uniform. Some areas having a sandy loam texture are included. In the transition area between the Central Lowland and the Eastern and Western Highlands, areas included with the Gloucester soils show some influence of reddish-brown Triassic rocks in the underlying till. In places this till is reddish-gray (5YR 5/2) to light reddish-brown (5YR 6/3) gravelly loamy sand.

Gloucester fine sandy loam, 0 to 3 percent slopes (GcA).—This soil is similar to Gloucester stony fine sandy loam, 3 to 8 percent slopes, in profile characteristics except that its surface soil is usually dark brown (10YR 4/3) in cultivated fields. It occurs in small, widely separated areas. It is well drained to somewhat excessively drained and has a moderate moisture-holding capacity. The soil dries out rapidly in spring and responds to management.

This soil is used for the same crops as Gloucester fine sandy loam, 3 to 8 percent slopes. Erosion is not a management problem. (Capability unit IIs–1.)

Gloucester fine sandy loam, 3 to 8 percent slopes (GcB).—This soil has medium runoff. It is used mainly for silage corn, hay, and pasture to supply feed for dairy cattle. Small areas are used for vegetables, orchards, and other crops. The soil is fairly well suited to alfalfa, early vegetables, and sweet corn if fertilized properly. It is only fair for hay and pasture because of droughtiness. Careful management is needed to improve and maintain fertility and the supply of organic matter. Runoff is not a major problem, but unprotected soils are subject to erosion. (Capability unit IIs–2.)

Gloucester fine sandy loam, 8 to 15 percent slopes (GcC).—This soil occurs in small, scattered areas. Because runoff is more rapid, it is slightly more droughty than the Gloucester soils on more gentle slopes. A few areas are moderately eroded.

This soil is used mainly for hay and pasture. A few small areas are used for cultivated crops and orchards. Some acreage is idle. The soil is fairly well suited to alfalfa if limed and fertilized properly. Shallow-rooted legumes and grasses are damaged by lack of moisture in most years. (Capability unit IIIe–3.)

Gloucester fine sandy loam, 15 to 25 percent slopes (GcD).—This soil has rapid runoff, and it is somewhat droughty. Unprotected slopes are subject to erosion.

This soil is used mainly for pasture, or it is idle. Some areas are used for hay and cultivated crops. Because of steep slopes, droughtiness, and the risk of erosion, this soil is not suited to cultivation unless erosion is controlled and crops are grown in long rotations. (Capability unit IVe–1.)

Gloucester stony fine sandy loam, 3 to 8 percent slopes (GsB).—This soil is largely in forest. Some areas are used for hay, pasture, orchards, and other crops. Because of stones, this soil is not suited to crops that need intensive cultivation, but it can be used for hay, improved pasture, and orchards. It is somewhat droughty but is fair for sod crops grown for hay and pasture if lime and fertilizer are used. (Capability unit IVes–1.)

Gloucester stony fine sandy loam, 8 to 15 percent slopes (GsC).—This soil has medium runoff. The use and suitability of this soil for crops are the same as for Gloucester stony fine sandy loam, 3 to 8 percent slopes. (Capability unit IVes–1.)

Gloucester stony fine sandy loam, 15 to 25 percent slopes (GsD).—This soil is largely in forest. Some areas have been cleared and are used for unimproved pasture, or they are idle. This soil is best suited to forestry and grazing. Some areas can be improved for pasture. (Capability unit VIes–1.)

Gloucester and Brookfield very stony fine sandy loams, 3 to 15 percent slopes (GvC).—A large percentage of this mapping unit is in forest. Scattered areas have been cleared and are used for pasture or left idle. This mapping unit is not suited to cultivated crops because of stones. It is best suited to forestry and grazing. Most pastures are unimproved, but some areas can be used for improved pastures and orchards. (Capability unit VIs–1.)

Gloucester and Brookfield very stony fine sandy loams, 15 to 35 percent slopes (GvD).—This mapping unit is largely in forest, and it should be managed for forestry and grazing. Scattered areas have been cleared and are used for unimproved pasture or left idle. (Capability unit VIIs–1.)

Hadley Series

This series consists of grayish-brown, well-drained, silty soils on flood plains that are flooded occasionally. They are seldom flooded during the growing season, however. The alluvium is derived mainly from schist, gneiss, and granite with some reddish-brown Triassic sandstone and shale in places.

Hadley soils occur mainly along the Connecticut and Farmington Rivers; some areas are along the smaller streams. They are closely associated with the Winooski, Limerick, and Saco soils of the same catena and with soils of the Ondawa catena. They are finer textured than the Ondawa soils and differ from the Bermudian soils in color. Only one soil was mapped in this series.

Typical profile (Hadley silt loam, 0 to 3 percent slopes, in cultivation):

A_p 0 to 14 inches, very dark grayish-brown (10YR 3/2) silt loam; weak, medium, granular structure in upper 6 inches; very friable; strongly to very strongly acid.

C_1 14 to 24 inches, dark grayish-brown (10YR 4/2) silt loam; breaks into very soft, subangular blocky clods that are very friable; strongly acid.

C_2 24 to 30 inches, very dark-brown (10YR 2/2) silt loam; very friable; strongly acid.

C_3 30 to 48 inches, dark yellowish-brown (10YR 4/4) silt loam or very fine sandy loam; very friable; strongly acid.

C_4 48 to 60 inches, light brownish-gray (2.5Y 6/2) loamy fine sand.

The surface soil ranges in color from very dark brown (10YR 2/2) to olive gray (5Y 4/2). The silt loam texture is generally fairly uniform to a depth of 3 feet or more, but in places loamy sand or sand and gravel occur at depths of 24 to 30 inches. Although silt loam is the dominant texture, areas of very fine sandy loam and fine sandy loam are included. In places faint mottlings are present below a depth of 2 feet. The principal

variations are in the colors of the interbedded horizons and in the depth to coarser textured material. Colors range from very dark brown (10YR 2/2) in the darkest colored horizons to dark yellowish brown (10YR 3/4–4/4). Depths to coarser textured material range from about 2 to 4 feet.

The principal inclusions are small areas of the Winooski, Limerick, and Ondawa soils.

Hadley silt loam, 0 to 3 percent slopes (HoA).—This soil is very friable and easy to work. It is moderately permeable and has a high moisture-holding capacity. It retains applied plant nutrients well. The hazard of flooding early in spring and late in fall limits its use for cultivated crops. Runoff is slow. Land preparation and the planting of tobacco and similar crops may be delayed in spring.

Most of the acreage has been cleared and is used mainly for silage corn, sweet corn, garden vegetables, hay, and pasture. Some areas are used for tobacco, potatoes, and nursery stock. The soil is well suited to all these crops, particularly hay and pasture. Floods can be expected to damage cultivated crops occasionally. If tilth, fertility, and the supply of organic matter are properly maintained, the soil can be farmed intensively. (Capability unit IIw–4.)

Hartford Series

This series consists of reddish, moderately coarse textured soils of terraces that have developed on stratified sand and gravel. The sand and gravel were derived mainly from reddish-brown Triassic sandstone, conglomerate, and shale.

These soils occur mainly in the south-central and southwestern parts of the Central Lowland. Small, scattered areas occur in the north-central part on nearly level to gently undulating terraces.

Hartford soils are associated with the Manchester, Branford, Cheshire, and Wethersfield soils. They differ from the Merrimac soils in color and from the Branford soils in having coarser texture.

Typical profile (Hartford sandy loam, 0 to 3 percent slopes, in cultivation):

- A_p 0 to 8 inches, dark reddish-brown (5YR 3/4) sandy loam; weak, coarse, granular structure; very friable.
- B_{21} 8 to 22 inches, yellowish-red (5YR 4/6) sandy loam, fading slightly with depth; breaks into very soft, subangular blocky clods; very friable.
- B_{22} 22 to 26 inches, reddish-brown (5YR 4/4) loamy coarse sand.
- D 26 to 48 inches, reddish-brown (5YR 4/4) coarse sand and gravel derived principally from sandstone and conglomerate with some basalt, quartz, and gneiss.

Textures range from coarse sandy loam to fine sandy loam. Gravel in the surface soil and subsoil layers makes up 5 to 15 percent of the soil volume. Depth to stratified sand and gravel is generally 22 to 24 inches, but it ranges from 18 to 30 inches. The subsoil is normally yellowish red (5YR 4/6–4/8), but in places it is dark red to red (2.5YR 3/6–4/6).

The principal inclusions are small areas grading in color toward the Merrimac soils, and small areas of Manchester and Ellington soils.

Hartford fine sandy loam, 0 to 3 percent slopes (HdA).—This soil occurs in small, scattered areas. It is moderately to rapidly permeable and has a moderate to high moisture-holding capacity. It is very easy to work.

Hartford fine sandy loam is well suited to tobacco, potatoes, alfalfa, early sweet corn, and vegetables. It is fairly well suited to silage corn, hay, and pasture. If fertility, good tilth, and supply of organic matter are properly maintained, the soil is suited to crops that require intensive cultivation. Control of runoff is not a problem. (Capability unit I–1.)

Hartford fine sandy loam, 3 to 8 percent slopes (HdB).—This soil has medium runoff. Use and suitability are the same as for Hartford fine sandy loam, 0 to 3 percent slopes. Management is also the same except that simple practices are needed to control erosion where row crops are grown in the rotation or cropping system. (Capability unit IIe–1.)

Hartford sandy loam, 0 to 3 percent slopes (HfA).—This soil is somewhat excessively drained, is rapidly permeable, and has a moderate moisture-holding capacity. It is very easy to work, dries out early in spring, and responds to management.

About one-third of the acreage is in forest, or it is idle. Tobacco and sweet corn are the main crops, but some areas are used for alfalfa, silage corn, potatoes, orchards, nursery stock (fig. 5), vegetables, hay, and pasture. The soil is well suited to alfalfa, and, if irrigated, to shade tobacco. The lack of moisture limits the yields of crops in most years unless supplemental irrigation is used. Fertilizer is needed for good crop yields, but applied plant nutrients leach out fairly rapidly. Careful management is needed to maintain good tilth, and the supply of organic matter. Unprotected areas are subject to wind erosion in spring and early in summer. (Capability unit IIs–1.)

Hartford sandy loam, 3 to 8 percent slopes (HfB).—This soil has slow to moderate runoff. Use and suitability are about the same as for Hartford fine sandy loam, 0 to 3 percent slopes. Unprotected areas are subject to some wind and water erosion. Simple practices for the control of runoff are adequate. (Capability unit IIs–2.)

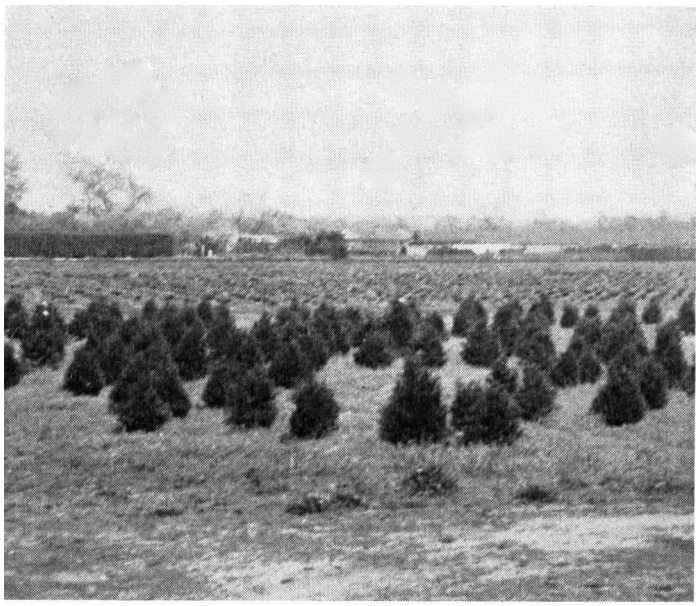

Figure 5.—Nursery stock on Hartford sandy loam.

Hartford sandy loam, 8 to 15 percent slopes (HfC).—This soil generally occurs in narrow strips on the edges of terraces. A large percentage of the soil is in forest, or it is idle. Small areas are used for crops, hay, and pasture. (Capability unit IIIe–3.)

Hinckley Series

This series consists of excessively drained, shallow, gravelly soils that have developed on stratified sand and gravel. The sand and gravel were derived mainly from granitic and schistose rocks but included various quantities of sediment from reddish-brown Triassic rocks in the Central Lowland. Hinckley soils occur on undulating to strongly undulating and pitted surfaces, kames, and eskers in the Eastern and Western Highlands and in the western part of the Central Lowland. They are commonly associated with the Merrimac and Windsor soils and differ from them mainly in depth to sand and gravel. Hinckley soils differ from the Manchester soils in color and parent material.

Typical profile (Hinckley gravelly sandy loam, 3 to 15 percent slopes, in a pasture):

- A_p 0 to 6 inches, dark yellowish-brown (10YR 3/4) gravelly sandy loam; weak, medium, granular structure; very friable; coarse fragments make up 20 percent of soil volume.
- B_{21} 6 to 12 inches, strong-brown (7.5YR 5/6) gravelly sandy loam; breaks into very soft, subangular blocky clods when disturbed; very friable; coarse fragments make up 25 to 30 percent of soil volume.
- D 12 to 36 inches, yellowish-brown (10YR 5/4) coarse sand and gravel, containing a few cobblestones; derived principally from quartz, gneiss, and schist.

The texture ranges from gravelly coarse sandy loam or fine sandy loam to loamy sand. Coarse fragments in the surface layer make up 10 to 30 percent of the soil volume. Depth to sand and gravel ranges from about 6 to 18 inches (fig. 6).

The main inclusions are small areas of the Merrimac and the eroded Enfield soils.

Hinckley gravelly sandy loam, 0 to 3 percent slopes (HkA).—This soil is not quite as droughty as Hinckley gravelly sandy loam, 3 to 15 percent slopes. It is very rapidly permeable and has a moderate to low moisture-holding capacity.

This soil occurs in small, widely separated areas mainly in the Western Highland and the western part of the Central Lowland. A large percentage of the soil is in pasture, forest, or idle areas. Small areas are used for tobacco, vegetables, and other crops. If lime and fertilizer are properly applied, the soil is fairly well suited to alfalfa. It is poorly suited to general crops, hay, and pasture unless it is irrigated. (Capability unit IIIs–2.)

Hinckley gravelly sandy loam, 3 to 15 percent slopes (HkC).—This soil is very rapidly permeable and has a moderate to low moisture-holding capacity. It is droughty.

A large percentage of the acreage is in cutover forests, or it is idle. Small, scattered areas are used for tobacco, sweet corn, silage corn, vegetables, orchards, alfalfa, and other legumes and grasses for hay and pasture. Because of irregular slopes, drought, and the risk of erosion, this soil is poorly suited to general crops, hay, and pasture unless it is irrigated. It is fairly well suited to alfalfa. Heavy and frequent applications of fertilizer are needed for good yields, even if the soil is irrigated. Applied nutrients leach out rapidly. Runoff from some areas is difficult to control because the slopes are too irregular for contour cultivation, terraces, and stripcropping. (Capability unit IIIse–1.)

Figure 6.—Profile of Hinckley gravelly sandy loam in a forested area.

Hinckley loamy sand, 3 to 15 percent slopes (HnC).—This soil is extremely droughty. It absorbs water rapidly. Unprotected areas are subject to some water and wind erosion.

This soil is largely in scrubby forest, or it is idle, but small areas are used for pasture and crops. It is fairly well suited to alfalfa if fertilizer and lime are applied properly. It is poorly suited to general crops, hay, and pasture unless it is irrigated and heavily fertilized. (Capability unit IVs–1.)

Hollis Series

This series consists of moderately coarse to medium textured, shallow soils underlain by crystalline rocks consisting mainly of schist and gneiss mixed with some granite. The soils have developed from a thin layer of glacial till that was derived mainly from schist and gneiss and from residuum of the underlying bedrock. Outcrops of bedrock vary from a few to many. Hollis soils are extensive in the Eastern and Western Highlands, and they occur in association with the Paxton, Charlton, and Gloucester soils. They differ from Holyoke and Sunderland soils in character of the underlying bedrock. They also differ from the Sunderland soils in color.

Typical profile (Hollis rocky loam, 3 to 15 percent slopes, in a forest):

A_{00} 3½ inches to 1 inch, raw leaves and other litter.
A_0 1 to 0 inch, partly decomposed litter.
A_1 0 to 1 inch, very dark grayish-brown (10YR 3/2) loam or silt loam; very weak, medium, granular structure; very friable.
B_{21} 1 to 12 inches, brown (7.5YR 4/4) loam or silt loam; breaks into very soft, subangular blocky clods when disturbed; very friable; coarse fragments make up 10 to 15 percent of soil volume.
D_r 12 inches +, gray, soft mica schist bedrock.

The texture ranges from fine sandy loam to loam or silt loam. Outcrops of rock make up about 5 to 50 percent of the surface. The depth of soil between outcrops varies, but it generally ranges from a few inches to about 24 inches.

Small areas of the Charlton and Sutton soils are mapped as inclusions, especially in forested areas. Other inclusions are small areas of Brimfield fine sandy loam. A few areas of Brimfield soils occur in the western part of the town of Marlboro and are included with the Hollis soils because of small acreage.

Hollis rocky loam, 3 to 15 percent slopes (HoC).—This soil has many loose stones and outcrops of bedrock on the surface. It is moderately permeable and has a moderate to high moisture-holding capacity.

This soil is largely in forest and unimproved pasture, or it is idle. Small, scattered areas are used for improved pasture, hay, and apple and peach orchards. The soil is not generally suited to cultivation because of shallowness. Most areas are suited to forests and unimproved pasture. Where there are fewer bedrock exposures, the soil can be worked for improved pasture, hay, and orchards. (Capability unit VIs–3.)

Hollis rocky loam, 15 to 35 percent slopes (HoD).—This soil is steep, rocky, and stony, and it is largely in forest. A small acreage has been cleared and is used mainly for unimproved pasture, or it is idle. A few small areas are in orchards and improved pasture. The soil should be used mainly for forestry and unimproved pasture. (Capability unit VIIs–3.)

Figure 7.—**Foreground: Branford silt loam. Background: Unimproved pasture on Hollis very rocky loam.**

Hollis very rocky loam, 3 to 15 percent slopes (HsC).—This soil has more exposed bedrock and generally a higher percentage of loose stones and boulders on the surface than Hollis rocky loam, 3 to 15 percent slopes.

It is too rocky for cultivation and should be used for forest, unimproved pasture, or wildlife. Small, scattered areas have been cleared and are used for unimproved pasture (fig. 7), or they are idle. (Capability unit VIIs–3.)

Hollis very rocky loam, 15 to 35 percent slopes (HsE).—This soil is largely in forests and should be managed for this use and for wildlife. (Capability unit VIIs–3.)

Holyoke Series

The Holyoke series consists of medium-textured, shallow, gently sloping to steep soils. These soils have formed over intrusive and extrusive Triassic basalt. Outcrops make up 5 to 50 percent of the soil area. In places the Holyoke soils apparently developed from silty mantles over the residuum of underlying bedrock. In other places, they apparently developed from a thin layer of glacial till derived mainly from basalt but including some reddish-brown Triassic shale and sandstone.

Holyoke soils are associated with the Wethersfield, Ludlow, Broadbrook, and Narragansett soils in the west-

ern and southern parts of the Central Lowland. They differ from the Hollis and Sunderland soils in color and kind of bedrock.

Typical profile (Holyoke rocky silt loam, 3 to 15 percent slopes, in a forest):

- A_{00} 2 inches to 1 inch, undecomposed litter of leaves from hemlock and deciduous trees.
- A_0 1 to 0 inch, partly decomposed litter.
- A_1 0 to 1 inch, black (10YR 2/1) silt loam; moderate, medium, granular structure; very friable.
- B_{21} 1 to 7 inches, dark-brown (7.5YR 4/4) silt loam; breaks into very soft, coarse, subangular blocky clods when disturbed; very friable; coarse fragments make up 5 to 10 percent of soil volume.
- B_{22} 7 to 14 inches, reddish-brown (5YR 4/4) gravelly silt loam; very friable; coarse fragments make up 30 to 40 percent of soil volume.
- D_r 14 inches +, shattered dolerite or basalt (trap) bedrock.

The depth of soil between rock outcrops ranges from a few inches to about 24 inches. The upper subsoil is dark brown (7.5YR 4/4) to reddish brown (5YR 4/4). Angular fragments of rock on and in the soil make up 10 to 60 percent of the soil volume.

Small areas of the Wethersfield, Broadbrook, and Narragansett soils, particularly in forested areas, are included with this soil.

Holyoke rocky silt loam, 3 to 15 percent slopes (HtC).—This soil is not well suited to cultivated crops because of outcrops of bedrock and loose stones on the surface. The medium-textured soil between rock outcrops is generally shallow, and it ranges from a few inches to about 24 inches in thickness.

This soil is largely in forest and unimproved pasture, or it is idle. Small, scattered areas are used for hay, improved pasture, and orchards. The soil is best suited to forest and pasture, but where outcrops of bedrock are less numerous, it can be used for hay, improved pasture, and orchards with considerable difficulty. (Capability unit VIs–3.)

Holyoke rocky silt loam, 15 to 35 percent slopes (HtD).—Steep slopes, rocks, and stones limit the use of this soil mainly to forests and unimproved pasture. Most of the acreage is in forests and should be managed for this use. Scattered areas have been cleared or partly cleared and are used mainly as unimproved pasture, or they are idle. Pastures furnish forage of low quality. (Capability unit VIIs–3.)

Holyoke very rocky silt loam, 3 to 15 percent slopes (HyC).—This soil has more exposed bedrock and generally more stones and boulders on the surface than Holyoke rocky silt loam, 3 to 15 percent slopes. About 100 acres of Sunderland very rocky fine sandy loam are included in this mapping unit.

Most of the acreage is in trees and should be managed for forestry, wildlife, and unimproved pasture. Scattered areas have been cleared, but they are used mainly for unimproved pasture, or they are idle. (Capability unit VIIs–3.)

Holyoke very rocky loam, 15 to 35 percent slopes (HzE).—A few small areas of Sunderland very rocky fine sandy loam are included with this mapping unit.

Most of the acreage of this very rocky soil is in trees and should be used for forestry, wildlife habitat, and unimproved pasture. (Capability unit VIIs–3.)

Leicester Series

This series consists of poorly drained, level to very gently sloping soils that have developed from very friable to firm glacial till derived mainly from crystalline rocks. These soils occur in small, scattered areas throughout the Eastern and Western Highlands. They are the poorly drained members of the Charlton, Sutton, and Whitman and of the Gloucester, Acton, and Whitman catenas. Leicester soils differ from the Ridgebury soils in being underlain by very friable to firm glacial till instead of by a very compact pan horizon.

A typical profile (Leicester loam, 0 to 3 percent slopes, in a pasture):

- A_p 0 to 7 inches, very dark brown (10YR 2/2) loam or silt loam; weak, medium and coarse, granular structure; friable; coarse fragments make up about 5 percent of soil volume; boundary abrupt.
- A_{2g} 7 to 13 inches, olive-gray (5Y 5/2) fine sandy loam finely mottled with yellowish brown (10YR 5/8); very weak, thick, platy structure; very friable; coarse fragments make up 5 to 8 percent of soil volume; boundary clear.
- B_{21g} 13 to 20 inches, mottled gray (5Y 6/1), dark yellowish-brown (10YR 4/4) and yellowish-brown (10YR 5/8) fine sandy loam; very weak, medium, subangular blocky structure; firm; mottles are common, medium, and distinct; coarse fragments make up 8 to 10 percent of soil volume.
- B_{22g} 20 to 28 inches, mottled olive-gray (5Y 6/1), olive (5Y 5/3), and reddish-brown (5YR 4/4) silt loam with streaks and pockets of gravelly sandy loam; weak, thick, platy structure; firm with a weak pan; coarse fragments make up 2 to 5 percent of soil volume.
- C_g 28 to 40 inches, dark grayish-brown (2.5Y 4/2) gravelly sandy loam mottled with strong brown (7.5YR 5/8); massive; friable.

The color of the surface soil ranges from black (10YR 2/1) to very dark grayish brown (10YR 3/2). Textures in the sola range from fine sandy loam or sandy loam to loam or silt loam. The substrata are gravelly sandy loam to gravelly loamy sand in texture and firm to very friable in consistence. Drainage ranges from poor to somewhat poor.

Leicester loam, 0 to 3 percent slopes (LcA).—This soil occurs in small, scattered areas. Most of the acreage is undrained and is used mainly for pasture, or it is idle. If drained, the soil is well suited to legumes and grasses for hay and pasture and fairly well suited to silage corn. It can be drained readily by use of open ditches or tile. Drainage and fertilization are the principal needs. (Capability unit IIIw–1.)

Leicester stony loam, 0 to 3 percent slopes (LeA).—Because of stones and poor drainage, most areas of this soil are suitable only for forest and pasture. The cleared areas are used mainly for unimproved pasture, or they are idle. Unimproved native pastures furnish only fair grazing during the dry parts of summer. They can be improved by fertilization, partial drainage, and brush control. (Capability unit VIws–1.)

Leicester, Whitman, and Ridgebury very stony soils, 0 to 5 percent slopes (LdA).—These soils are generally nearly level or very gently sloping. Some areas slope as much as 6 percent. The mapping unit includes the poorly drained Leicester and Ridgebury and very poorly drained Whitman soils.

Because of stoniness and wetness, these soils are used mainly for forestry, wildlife, and unimproved pasture.

Scattered areas have been cleared or partly cleared and are used for pasture, or they are idle. Native grasses and legumes furnish fair grazing during dry periods. Some pastures can be improved by applying fertilizers and controlling brush. (Capability unit VIIs–4.)

Limerick Series

This series consists of the poorly drained silty soils of the flood plains that have developed from sediment derived mainly from schist and gneiss. Limerick soils are associated with the well-drained Hadley, the moderately well drained Winooski, and the very poorly drained Saco silt loams. They differ from the Rumney soils in having a finer texture and from the Bowmansville soils in color and source of sediment.

Typical profile (Limerick silt loam, 0 to 3 percent slopes, in a hayfield):

A_p 0 to 8 inches, very dark grayish-brown (10YR 3/2) silt loam with fine mottles of dark reddish brown (5YR 3/4); breaks to coarse, subangular blocky clods with very weak, thick, platy structure; friable; strongly acid.

C_{1g} 8 to 24 inches, mottled grayish-brown (2.5Y 5/2) and dark yellowish-brown (10YR 3/4) silt loam; mottles are common, fine, and distinct; breaks into soft, subangular blocky clods; very friable; strongly acid.

C_{2g} 24 to 60 inches, mottled light brownish-gray (10YR 6/2), grayish-brown (2.5Y 5/2), and strong-brown (7.5YR 5/8) fine sandy loam interbedded with silt loam or very fine sandy loam; strongly to medium acid.

The color of the surface soil ranges from very dark grayish brown (10YR 3/2) to very dark brown (10YR 2/2). The subsurface horizons vary in color and intensity of mottling. Below depths of 24 to 30 inches, the material ranges from silt loam to loamy sand or sand with layers of coarse sand and gravel in places.

Small areas of the Winooski, Saco, and Rumney soils are included.

Limerick silt loam, 0 to 3 percent slopes (LmA).—This soil occurs in some of the lowest parts of the flood plains. It is poorly drained and too wet for most crops except hay and pasture.

A small area of this soil is in forest, but most of it has been cleared and is used for hay and pasture, or it is idle. Small, narrow strips that occur in areas of Hadley and Winooski soils are used for corn, vegetables, and other crops. Unimproved native pastures grow forage of low quality, but they furnish fair grazing in dry periods during the summer and late in the fall. Partly drained areas are suited to legumes and grasses for hay and pasture. Because of frequent floods and the lack of suitable outlets, drainage is generally not practical for crops that require intensive cultivation. (Capability unit IIIw–2.)

Ludlow Series

This series consists of moderately well drained, medium-textured, reddish soils that have developed on a very firm and compact fragipan. The fragipan has developed in glacial till derived mainly from reddish-brown Triassic sedimentary rocks and intrusive gray Triassic igneous rocks. These soils occur in scattered areas throughout the Central Lowland on nearly level crests of hills or on slightly concave lower slopes that receive seepage and runoff from higher areas.

Ludlow soils are closely associated with the well-drained Wethersfield soils, the poorly drained Wilbraham, and the very poorly drained Menlo soils. They differ from the moderately well drained Watchaug soils in having a finer texture and a compact pan layer.

Typical profile (Ludlow loam, 3 to 8 percent slopes, in a pasture):

A_p 0 to 6 inches, dark reddish-brown (5YR 3/2) loam or silt loam; moderate, medium and coarse, granular structure; friable; coarse fragments make up 10 percent of soil volume.

B_{21} 6 to 16 inches, dark-red (2.5YR 3/6) loam or silt loam; very weak, coarse, subangular blocky structure; friable; coarse fragments make up 10 to 15 percent of soil volume.

B_{22g} 16 to 22 inches, dark-red (2.5YR 3/6) loam or silt loam mottled with weak red (2.5YR 5/2) and strong brown (7.5YR 5/8); mottles are common, fine, and faint; very weak, coarse, subangular blocky structure; friable; coarse fragments make up 10 to 15 percent of soil volume.

A'_2 22 to 24 inches, mottled olive-gray (5Y 5/2) and light brownish-gray (10YR 6/2) sandy loam or loam; friable.

B'_{2m} 24 to 40 inches, dark reddish-brown (2.5YR 3/4) gravelly loam with a few grayish streaks; very firm and compact; moderate, thick, platy structure; silt films are on some breakage faces and rock fragments.

All areas of this soil were originally stony, but some areas have had most of the stones removed. The texture ranges from loam to silt loam. The B horizon ranges from dark reddish brown (2.5YR 3/4) or dark red (2.5YR 3/6) to yellowish red (5YR 4/6–4/8). Small to medium, angular fragments of rock in the surface soil and subsoil make up from about 5 to 20 percent of the soil volume.

Ludlow loam, 0 to 3 percent slopes (LoA).—This soil dries out rather slowly in spring because it is moderately well drained and has a high moisture-holding capacity. It is moderately permeable above the compact pan layer. A seasonal perched water table on the pan restricts internal drainage.

A large percentage of this soil has been cleared and is used mainly for hay and pasture. Some areas are used for silage corn, vegetables, tobacco, and other crops. Without drainage, the soil is suited to hay and pasture and fairly well suited to silage corn and late vegetables. Unless partly drained, however, it is poorly suited to tobacco, orchards, and alfalfa. Fertilizer is needed for high yields. Lime is also needed for legumes. Some places need diversion terraces to divert seepage and runoff from higher land. (Capability unit IIw–2.)

Ludlow loam, 3 to 8 percent slopes (LoB).—Surface drainage is better on this soil than on Ludlow loam, 0 to 3 percent slopes. A few small areas having slopes of 8 to 12 percent are included.

This soil is used mainly for hay and pasture, but small areas are used for silage corn, vegetables, alfalfa, orchards, and tobacco. It is suited to hay and pasture and fairly well suited to silage corn and late vegetables. It is poorly suited to tobacco, alfalfa, and orchards unless adequately drained. Fields in clean-cultivated crops need simple practices to control erosion. Fertilizer and lime should be applied to legumes and grasses used for hay and pasture and to cultivated crops. Amounts should be determined by soil tests. (Capability unit IIwe–2.)

Ludlow stony loam, 3 to 8 percent slopes (LsB).—This moderately stony soil includes a few small areas on slopes of less than 3 percent and a few areas on slopes that range from 8 to 12 percent.

A large percentage of the soil is in cutover forest. Cleared areas are used mainly for hay and pasture, but small areas are in crops and orchards. Because of stones, this soil is not suitable for row crops that require the use of modern machinery. However, most areas can be used for hay, improved pasture, and orchards. This soil is generally suited to hay and pasture without drainage. It should be drained for orchards. Fertilizer and lime should be applied to legumes and grasses for hay and pasture. (Capability unit IVws–2.)

Ludlow and Watchaug very stony soils, 3 to 15 percent slopes (LwC).—This undifferentiated unit consists mainly of Ludlow soils and small areas of Watchaug soils. A few small areas are on slopes of 0 to 3 percent.

The mapping unit is largely in forest. It should be used for forests and for unimproved pasture. Small areas have been cleared and are used for unimproved pasture, or they are idle. Stones prevent the use of this unit for cultivated crops. (Capability unit VIs–2.)

Made Land

Made land (Ma).—Made land occurs where the surface soil and subsoil have been stripped, and where earth, trash, or both, are used as fill material. It also occurs where sand and gravel have been removed and the unwanted material was left in ridges or mounds. Made land also includes areas where the soil profiles have been disturbed through leveling or other means.

Manchester Series

This series consists of excessively to somewhat excessively drained, reddish, shallow, gravelly soils. In some places, these soils are naturally shallow; in other places, shallowness is the result of erosion.

Manchester soils have developed in some areas on stratified sand and gravel derived from reddish-brown Triassic sandstone and conglomerate, and in other areas from basalt, Triassic sandstone, and shale. They occur mainly in the central and southern parts of the Central Lowland on undulating to strongly undulating or sloping, pitted surfaces.

Manchester soils are closely associated with the Hartford, Branford, and Penwood soils, but they are shallower to coarse sand and gravel and have gravelly surface soil and subsoil. They differ from the Hinckley soils in color and source of parent material.

Typical profile (Manchester gravelly sandy loam, 3 to 15 percent slopes, in forest):

- A_0 1 to 0 inch, partly decomposed litter.
- A_1 0 to ½ inch, dark reddish-brown (5YR 3/4) sandy loam; weak, medium, granular structure; very friable.
- B_2 ½ to 12 inches, yellowish-red (5YR 4/6) gravelly sandy loam; breaks into very soft, subangular blocky clods; very friable.
- D 12 to 48 inches, reddish-brown (5YR 5/4) sand and gravel derived mainly from Triassic sandstone and conglomerate with some basalt or traprock.

The surface textures vary from gravelly loam to loamy sand. Coarse fragments in this layer make up about 10 to 30 percent of the soil volume. Depth to sand and gravel varies, but it ranges from about 6 to 18 inches.

Small areas of Hartford soils are the principal inclusions.

Manchester gravelly loam, 0 to 3 percent slopes (McA).—This soil has a finer texture and a slightly higher moisture-holding capacity than Manchester gravelly sandy loam, 0 to 3 percent slopes. The underlying sand and gravel, which occur at depths ranging from 6 to 18 inches, are derived from a mixture of basalt and reddish-brown Triassic rocks.

The soil occurs mainly in the southern part of the Central Lowland. Part of the acreage is forested, part is idle, and part is used for alfalfa, vegetables, silage corn, nursery stock, hay, and pasture. Although the soil is a little droughty, it is better suited to general crops than Manchester gravelly sandy loam, 0 to 3 percent slopes. It is fairly well suited to alfalfa and early vegetables, but it is poorly suited to silage corn, shallow-rooted legumes, and grasses for hay and pasture. (Capability unit IIIs–2.)

Manchester gravelly loam, 3 to 15 percent slopes (McC).—The surface of this soil is very irregular. About 60 percent of the acreage is forested, idle, or in urban sites. Generally, the steeper slopes are forested or idle. The smoother slopes, having gradients of 3 to 10 percent, have been cleared, and they are used mainly for silage corn, orchards, vegetables, and hay. They are also used for pastures in which mixtures of grass and alfalfa and other legumes are grown.

This soil is fairly well suited to alfalfa and early vegetables. It is generally poorly suited to silage corn and shallow-rooted legumes and grasses. Fertilizer and lime are needed for good yields. The control of runoff and erosion is a problem in clean-cultivated fields on irregular slopes. (Capability unit IIIse–1.)

Manchester gravelly sandy loam, 0 to 3 percent slopes (MgA).—This soil generally has a reddish-brown (5YR 4/3) A_p horizon in cultivated fields. It occurs in small areas. A large percentage of the acreage is in scrubby forest, or it is idle. Small areas are used for tobacco, sweet corn, vegetables, alfalfa, hay, and pasture. This soil is suited to tobacco, early sweet corn, and early vegetables if it is irrigated and heavily fertilized. It is fairly well suited to alfalfa if limed and fertilized heavily. Because of droughtiness, it is poorly suited to general crops, hay, and pasture unless irrigated. (Capability unit IIIs–2.)

Manchester gravelly sandy loam, 3 to 15 percent slopes (MgC).—This soil is very rapidly permeable, and it has a low to moderate moisture-holding capacity. Surfaces are generally very irregular. Scrubby forest or idle areas make up a large part of the acreage. Small areas are used for tobacco, alfalfa, sweet corn, vegetables, orchards, hay, and pasture. Because of droughtiness, low natural fertility, and irregular slopes, this soil is poorly suited to hay and pasture and general crops unless it is irrigated. It is fairly well suited to alfalfa. If irrigated, the soil needs frequent and heavy applications of fertilizer to produce high yields because applied plant nutrients leach out rapidly. Runoff is difficult to control on some areas because the slopes are too irregular

for contour cultivation, terracing, and stripcropping. (Capability unit IIIse–1.)

Manchester loamy sand, 3 to 15 percent slopes (MhC).—Both the surface soil and thin subsoil horizons are loamy sand or gravelly loamy sand. They absorb water rapidly.

The soil is very droughty and is largely in scrubby forest, or it is idle. Small areas are used for crops, hay, and pasture. This soil is poorly suited to corn, shallow-rooted legumes, grasses for hay and pasture, and other general crops. It can be used for alfalfa, early vegetables, early sweet corn, and tobacco if it is fertilized heavily at frequent intervals and irrigated. Unprotected areas are subject to some water and wind erosion. (Capability unit IVs–1.)

Melrose Series

This series consists of well-drained, moderately coarse to medium textured soils. These soils have developed from glaciolacustrine, glaciofluvial, or windblown deposits underlain by glacial-lake deposits of silt and clay at depths ranging from 2½ to 4 feet.

Melrose soils occur in small, scattered, nearly level to sloping areas mainly in the northern part of the Central Lowland. They are commonly associated with the Buxton, Scantic, and Berlin soils. They are a member of the catena that includes the moderately well drained Elmwood, poorly drained Swanton, and very poorly drained Whately soils. Agawam and Merrimac soils have A and B horizons similar to those of the Melrose soils, but they are underlain by coarse-textured materials and have freer internal drainage.

Typical profile (Melrose sandy loam, 3 to 8 percent slopes, in cultivation):

- A_p 0 to 8 inches, dark-brown (10YR 3/3) sandy loam; weak, coarse, granular structure; very friable.
- B_{21} 8 to 12 inches, dark yellowish-brown (10YR 4/4) sandy loam; very weak, coarse, granular structure; very friable.
- B_{22} 12 to 24 inches, brown (10YR 5/3) sandy loam; very weak, coarse, subangular blocky structure; very friable.
- B_{23} 24 to 30 inches, grayish-brown (10YR 5/2) loamy fine sand; very friable to loose.
- D_{1gu} 30 to 36 inches, mottled gray (10YR 5/1), grayish-brown (10YR 5/2), and dark yellowish-brown (10YR 4/4) coarse sand containing some fine gravel; loose.
- D_{2gu} 36 to 48 inches, mottled dark-gray (10YR 4/1), grayish-brown (10YR 5/2), dark yellowish-brown (10YR 4/4), and strong-brown (7.5YR 5/8) silt and very fine sand; thin lenses of silty clay loam; thick, platy structure or weakly varved.

The surface textures range from sandy loam to very fine sandy loam but in some places are loamy sand and loamy fine sand. Below depths of 18 to 24 inches, the texture varies, but it is generally loamy sand or sand that contains some gravel in places. The material just above the silty and clayey strata is nearly always mottled.

The silty and clayey strata generally occur at a depth of about 3 feet, but the range is from about 2½ to 4 feet. These deposits may be silt and very fine sands interbedded with silty clay or very fine sands with lenses of silt, silty clay loam, or silty clay. The color varies but is generally mottled.

The main inclusions are small areas of Elmwood, Agawam, Merrimac, and Windsor soils. In the towns of Rocky Hill, Glastonbury, and Enfield, there are small areas that have reddish-brown (5YR 4/4) B horizons underlain by reddish silt and clay.

Melrose sandy loam, 0 to 3 percent slopes (MmA).—This soil is rapidly permeable and has a moderate moisture-holding capacity above the silt and clay strata. It is somewhat droughty, but internal drainage is not as free as that in the Merrimac and Hartford sandy loams. The soil dries out early in spring, is very easy to work, and responds to good management.

The soil is used mainly for tobacco, potatoes, sweet corn, and vegetables. Some areas are used for silage corn, hay, and pasture. This soil is suitable for many crops, but droughtiness reduces yields in most years. In general, it is better suited to tobacco, early sweet corn, alfalfa, and similar crops than it is to silage corn, shallow-rooted grasses, and legumes. It can be used for intensively cultivated crops if organic matter and good tilth are maintained. (Capability unit IIs–1.)

Melrose sandy loam, 3 to 8 percent slopes (MmB).—Slopes on this soil are gently sloping or undulating. Runoff is medium. A few small areas having slopes of 8 to 12 percent are included with this soil.

This soil is used for the same crops as Melrose sandy loam, 0 to 3 percent slopes. Simple practices are needed to control runoff and erosion; otherwise, management should be the same as for Melrose sandy loam, 0 to 3 percent slopes. (Capability unit IIs–2.)

Melrose very fine sandy loam, 0 to 3 percent slopes (MnA).—This soil differs from Melrose sandy loam, 3 to 8 percent slopes, in texture of the surface soil and upper subsoil. Depths to the underlying deposits of silt and clay range from about 2½ to 4 feet. This soil is moderately permeable and has a high moisture-holding capacity. It has somewhat slower internal drainage than Enfield silt loam and Agawam very fine sandy loam and similar soils. It is easy to work.

Most of this soil has been cleared and is used for tobacco, potatoes, and general crops. It is well suited to hay and pasture and most crops. If properly fertilized, this soil produces good yields. (Capability unit I–1.)

Melrose very fine sandy loam, 3 to 8 percent slopes (MnB).—This soil has medium runoff. It absorbs water slowly, and unprotected areas erode easily, even on gentle slopes. A few small areas having slopes of 8 to 12 percent are included with this soil.

Most of the acreage of this soil has been cleared and is used for hay, pasture, and other general crops. The soil is well suited to outdoor tobacco, potatoes, vegetables, silage corn, hay, and pasture. It needs lime and fertilizer for high yields. Simple practices are adequate to control runoff. (Capability unit IIe–1.)

Menlo Series

This series consists of poorly drained upland soils that have black surface soils and mottled subsoils over compact fragipans. The fragipans have developed on reddish glacial till that is derived mainly from basalt and yellowish-red Triassic rocks. Menlo soils are wet most of the time. Water stands on the surface for long periods in the winter and spring.

Menlo soils occur in small areas throughout the Central Lowland. They are associated with the reddish Wethersfield, Ludlow, Cheshire, and Watchaug soils. They differ from the very poorly drained Whitman soils by having reddish mottles in the subsoil and reddish substrata.

Menlo very stony silt loams are mapped with the Wilbraham soils as an undifferentiated mapping unit.

Typical profile (Menlo stony silt loam, 0 to 3 percent slopes, in a forest):

A_1 0 to 8 inches, black (10YR 2/1) stony and gravelly silt loam with dark reddish-brown (2.5YR 2/4) stains of organic matter or iron; coarse clods crush to weak, coarse, granular structure; friable.

A_{2g} 8 to 13 inches, dark-gray (2.5Y 4/0) stony silt loam mottled with olive brown (2.5Y 4/4) and dark brown (7.5YR 4/4); firm, slightly plastic when wet.

B_{21g} 13 to 18 inches, mottled dark reddish-brown (2.5YR 3/4), reddish-brown (5YR 5/3), and olive-gray (5Y 5/2) stony silt loam or silty clay loam; firm in place, slightly plastic when wet.

B_{22gm} 18 to 30 inches, dark reddish-brown (2.5YR 3/4) gravelly loam finely mottled with olive gray (5Y 5/2); massive; very firm and compact.

The dark-colored surface layer ranges from 6 to 12 inches in thickness. The upper few inches are mucky in places. The subsoil layers vary in degree and intensity of mottlings. The substrata vary in texture from heavy loam or silt loam to sandy loam and from firm to very firm and compact in consistence.

Menlo silt loam, 0 to 3 percent slopes (MoA).—This soil is very poorly drained. It is used mainly for unimproved pasture, or it is idle. Undrained areas are best suited to forest and unimproved pasture. Partly drained areas will produce fair pasture if limed and fertilized. Large areas are rather difficult and expensive to drain because of water from seepage and runoff. (Capability unit Vw–1.)

Menlo stony silt loam, 0 to 3 percent slopes (MpA).—Most of this soil is in forests consisting mainly of red maple, elm, willow, blackgum, gray birch, and alder. Scattered areas have been cleared and are used for unimproved pasture, or they are idle. Partly drained areas produce fair pasture if limed and fertilized. Unimproved pastures on undrained areas can be improved by use of fertilizer and control of brush. (Capability unit VIws–2.)

Merrimac Series

This series consists of well-drained to somewhat excessively drained, moderately coarse textured soils. These soils have developed over coarse sand and gravel, which occur at a depth of about 2 feet. The sand and gravel are derived mainly from crystalline rock which, in the Central Lowland, is mixed with various quantities of reddish-brown Triassic rock. Except in the south-central part, Merrimac soils occur throughout the county on deltas and on nearly level to undulating glaciofluvial terraces. They are fairly extensive in the towns of Windsor, Suffield, Simsbury, and Plainville. Merrimac soils are generally associated with the Agawam, Windsor, and Hinckley soils. They differ from the Agawam soils in depth to sand and gravel. Merrimac soils are somewhat similar to Hartford soils in texture, but Hartford soils are reddish.

Typical profile (Merrimac sandy loam, 0 to 3 percent slopes, in cultivation):

A_p 0 to 10 inches, brown to dark-brown (10YR 4/3) sandy loam; the upper 6 inches has very weak, coarse, granular structure and is very friable; in intensively cultivated areas, the lower 4 or 5 inches (plowsole) breaks into weak, thick, platy fragments when disturbed and generally is fairly firm; coarse fragments make up 2 to 3 percent of the soil volume.

B_{21} 10 to 14 inches, strong-brown (7.5YR 5/6) sandy loam; breaks into very weak, coarse, subangular blocky clods; friable to very friable; coarse fragments make up 2 to 3 percent of the soil volume.

B_{22} 14 to 22 inches, yellowish-brown (10YR 5/6) sandy loam; breaks into very soft, subangular blocky clods; very friable; coarse fragments make up 3 to 4 percent of the soil volume.

B_3 22 to 26 inches, yellowish-brown (10YR 5/6) loamy sand; loose; coarse fragments make up about 5 percent of the soil volume.

D 26 to 48 inches, yellowish-brown (10YR 5/4), light yellowish-brown (10YR 6/4), and light-gray (10YR 7/2) coarse sand mixed with 10 to 20 percent of fine and medium gravel.

The surface soil ranges in color from very dark grayish brown (10YR 3/2) to dark yellowish brown (10YR 4/4) and in texture from fine sandy loam to coarse sandy loam. The depth to sand and gravel is about 24 inches in most places, but it ranges from 18 to 28 inches. Coarse fragments in the surface soil and subsoil make up 3 to 20 percent of the soil volume. The underlying material ranges from coarse sand containing 10 to 15 percent of gravel to principally gravel and cobblestones.

Merrimac fine sandy loam, 0 to 3 percent slopes (MrA).—This soil is moderately to rapidly permeable and has a moderate to high moisture-holding capacity. It is very easy to work.

A large part of the acreage has been cleared (fig. 8) and is used for crops, hay, and pasture. Tobacco is the main crop, but some areas are used for potatoes, silage corn, and other cultivated crops and for hay and pasture. The soil is well suited to tobacco, potatoes, sweet corn, alfalfa, and nursery stock. It is fairly well suited to legumes and grasses for hay and pasture. If the soil is limed and fertilized properly, good crop yields are obtained. This soil can be cultivated intensively with little risk of erosion if tilth and the supply of organic matter are maintained. (Capability unit I–1.)

Merrimac fine sandy loam, 3 to 8 percent slopes (MrB).—This soil has medium runoff. It is used for the same crops as Merrimac fine sandy loam, 0 to 3 percent slopes. Management should be the same except that simple practices are needed to control erosion. (Capability unit IIe–1.)

Merrimac fine sandy loam, 8 to 15 percent slopes (MrC).—This soil occurs in small areas, generally on terrace breaks. Part of the acreage is in forest and some is idle; a small acreage is used for cultivated crops, hay, and pasture. If erosion is controlled adequately, the soil is suited to cultivated crops grown in moderately long rotations. (Capability unit IIIe–1.)

Merrimac fine sandy loam, overflow, 0 to 3 percent slopes (MsA).—This soil differs from Merrimac fine sandy loam, 0 to 3 percent slopes, in having a slightly darker A_p horizon and a slightly duller B horizon. It is associated with the Alluvial soils on flood plains but has developed profile characteristics of the Brown Podzolic

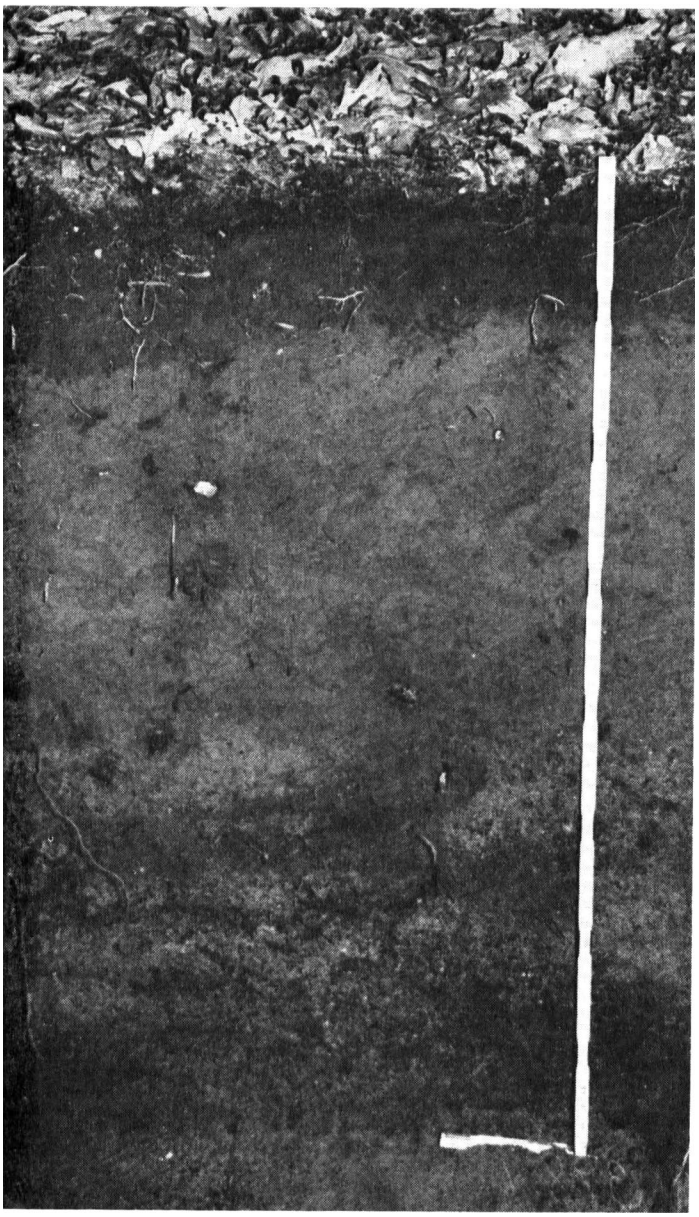

Figure 8.—**Profile of Merrimac fine sandy loam now in forest. The dark horizon under leaf litter is an old plow layer.**

soils. The texture is mainly fine sandy loam, but some is sandy loam in some areas.

This soil occurs mostly along the Farmington River on the higher parts of the flood plains and is subject to occasional but not frequent floods. It is moderately to rapidly permeable, and it has a moderate to high moisture-holding capacity.

This soil is used mainly for grasses and alfalfa and other legumes for hay and pasture. Some areas are used for silage corn, tobacco, potatoes, and other crops. They are well suited to those crops. If the soil is fertilized and limed properly, good yields can be obtained. Floods are not a serious hazard, but they occasionally damage crops. (Capability unit I–1.)

Merrimac sandy loam, 0 to 3 percent slopes (MyA).—This soil occurs in parts of the Central Lowland and in scattered areas in the Eastern and Western Highlands. It is very friable and rapidly permeable and has a moderate moisture-holding capacity.

About 25 percent of the acreage is in forest, some is idle, and some is in urban development. This soil is used to a considerable extent for shade-grown tobacco (fig. 9) in the towns of Windsor, Suffield, Bloomfield, and Simsbury. It is also used for outdoor tobacco, sweet corn, tomatoes, cabbage, alfalfa, potatoes, orchards, nursery stock, hay, and pasture.

The soil is easy to work and can be tilled early in spring. It is somewhat droughty, and, in most seasons, crops are damaged through lack of moisture unless they are irrigated. The soil is well suited to alfalfa without irrigation, but it is poorly suited to shallow-rooted legumes, grasses, and silage corn. In years of adequate rainfall, the yields of most crops are good if the soil is properly fertilized. Liberal fertilization is necessary for high yields, even if moisture is supplied through irrigation. Plant nutrients leach out rapidly. Careful management is needed to maintain tilth and organic matter. Runoff is not a problem, but unprotected areas are subject to wind erosion in spring. (Capability unit IIs–1.)

Merrimac sandy loam, 3 to 8 percent slopes (MyB).—This soil occurs in small, scattered areas. Use and suitability are the same as for Merrimac sandy loam, 0 to 3 percent slopes. This soil absorbs water readily, but unprotected slopes are subject to some water and wind erosion. Simple measures will control runoff. (Capability unit IIs–2.)

Merrimac sandy loam, 8 to 15 percent slopes (MyC).—This soil generally occurs in narrow strips on terrace breaks. A large part of the acreage is in forest, or it is idle, but small areas are used for crops. The same crops can be grown on this soil as on Merrimac sandy loam, 3 to 8 percent slopes, if longer rotations and intensive

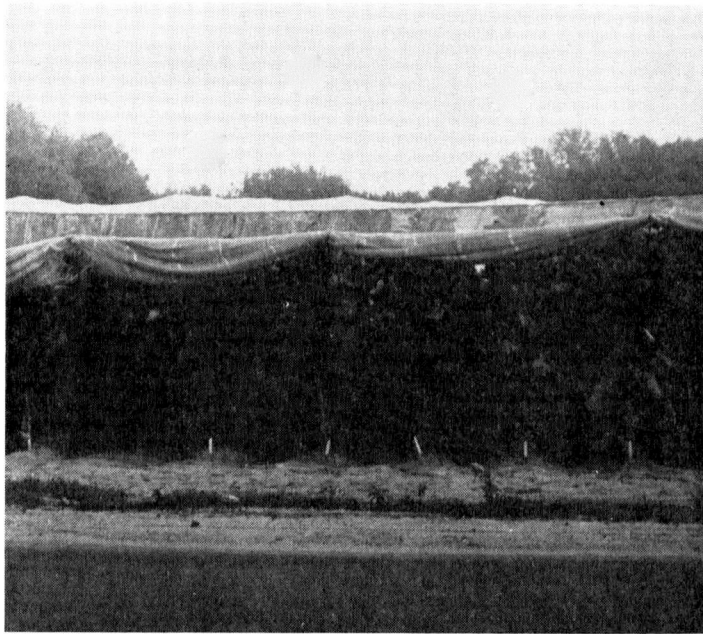

Figure 9.—**Shade-grown tobacco on Merrimac sandy loam, 0 to 3 percent slopes.**

practices to control erosion are used. (Capability unit IIIe–3.)

Narragansett Series

The soils of this series are well drained. They consist of a silty mantle over firm to very friable glacial till. The till was derived mainly from reddish-brown Triassic sandstone, conglomerate, and shale mixed in places with basalt and other rocks.

Narragansett soils occur mainly in the northern part of the Central Lowland on gentle to strong slopes. The very stony Narragansett soils are mapped as undifferentiated units with the very stony Broadbrook soils, which are underlain by a very compact horizon. Narragansett soils differ in color from the Cheshire soils and have a finer textured surface soil and subsoil.

Typical profile (Narragansett silt loam, 3 to 8 percent slopes, in cultivation) :

- A_p 0 to 8 inches, dark yellowish-brown (10YR 3/4) silt loam; very weak, coarse, granular structure; very friable; coarse fragments make up about 8 percent of the soil volume.
- B_{21} 8 to 18 inches, strong-brown (7.5YR 5/6) silt loam; breaks into very soft, coarse, subangular clods when disturbed; very friable; coarse fragments make up about 8 percent of the soil volume.
- B_{22} 18 to 26 inches, yellowish-brown (10YR 5/6) silt loam; very friable; coarse fragments make up 15 to 18 percent of the soil volume.
- D_u 26 to 48 inches, yellowish-red (5YR 4/6–5/6) gravelly coarse sandy loam or loamy sand till derived mainly from Triassic sandstone and conglomerate; firm to very friable in place, but the firm material breaks down very easily when disturbed.

Except in eroded areas, the silty mantle is about 18 to 30 inches thick. In some places, however, it is 36 to 40 inches thick. Where this mantle is more than 2 feet thick, it is generally yellowish brown (10YR 5/6) streaked with light olive gray (5Y 6/2). In many places the silty deposits were originally thin; in others they have been eroded. Angular fragments of rock in the surface soil and subsoil make up 5 to 20 percent of the soil volume. As a rule, the percentage of fragments increases with depth. Shallow soils contain more fragments than deep soils.

In the northeastern corner of the county, these soils are closely associated with Cheshire fine sandy loam, and the boundary between these two soils is not distinct. Many areas in this vicinity are transitional between Narragansett silt loam and Cheshire fine sandy loam. The underlying till ranges from firm and weak, thick platy to very friable in place.

Narragansett silt loam, 0 to 3 percent slopes (NaA).—This well-drained, medium-textured soil is moderately permeable, and it has a high moisture-holding capacity. It is fairly easy to work and responds to good management.

Most of the acreage has been cleared. The soil is used mainly for tobacco and potatoes, but some areas are used for silage corn, sweet corn, vegetables, and nursery stock, and for alfalfa and mixed legumes and grasses for hay and pasture. This soil is suited to crops that require intensive cultivation. It is one of the most desirable soils in the county for tobacco, potatoes, and other general crops. Careful management is needed to maintain organic matter and good tilth, and fertilizers are needed to produce high yields. The risk of erosion is not great. The soil absorbs water slowly, however, and under poor management erodes readily. (Capability unit I–1.)

Narragansett silt loam, 3 to 8 percent slopes (NaB).—This soil has medium runoff, and it erodes easily on unprotected slopes.

It is used for and suited to the same purposes as Narragansett silt loam, 0 to 3 percent slopes. Contour cultivation, terraces, and waterways on long slopes are needed to control erosion in fields. Otherwise management should be the same as for Narragansett silt loam, 0 to 3 percent slopes. (Capability unit IIe–1.)

Narragansett silt loam, 3 to 8 percent slopes, eroded (NaB2).—This soil has a shallower solum and is more droughty than Narragansett silt loam, 3 to 8 percent slopes. The thickness of the mantle of silt is generally less than 18 inches, but it ranges from about 10 to 20 inches. In places the A_p horizon contains less organic matter than normal because the subsoil has been mixed with the surface soil. In addition, eroded areas generally contain a higher percentage of small rock fragments than normal.

This soil is used for the same crops as Narragansett silt loam, 3 to 8 percent slopes, but yields are less. When the soil is used for cultivated crops, careful management is needed to improve fertility and the supply of organic matter and to prevent further erosion. (Capability unit IIe–1.)

Narragansett silt loam, 8 to 15 percent slopes (NaC).—Water control on this soil is a more serious problem than on Narragansett silt loam, 3 to 8 percent slopes. Unprotected slopes are subject to severe erosion.

Some areas of this soil are used for silage corn, tobacco, potatoes, and other crops. The soil is suited to about the same crops as Narragansett silt loam, 3 to 8 percent slopes. It is well suited to alfalfa and other close-growing crops. Cultivated crops should be grown in moderately long rotations supported by intensive practices to control erosion. (Capability unit IIIe–1.)

Narragansett silt loam, 8 to 15 percent slopes, eroded (NaC2).—This soil occurs in small areas. The silty mantle ranges in thickness from about 10 to 20 inches.

Part of the acreage is used for tobacco, potatoes, and other crops, and part is used for hay and pasture. Because of droughtiness and the risk of erosion on this soil, close-growing crops are better suited than cultivated crops. Cultivated crops should be grown in moderately long rotations supported by intensive practices to control erosion. Careful management is needed to improve and maintain fertility and the supply of organic matter and to prevent further erosion. (Capability unit IIIe–1.)

Narragansett silt loam, 15 to 25 percent slopes (NaD).—This soil occurs in small areas. About one-third of the acreage is eroded.

This soil is suited to close-growing crops and orchards. Because of the strong slopes and risk of erosion, it is not suited to clean-cultivated crops unless they are grown in long rotations supported by intensive practices to control erosion. Alfalfa, other legumes, and grasses need lime and fertilizer to make a good sod. (Capability unit IVe–1.)

Narragansett stony silt loam, 3 to 8 percent slopes (NgB).—This soil is largely in cutover forest. Scattered areas have been cleared and are used mainly for pasture and hay. Row crops are difficult to grow because of

stones, but hay, improved pasture, small grains, and orchards can be grown. This soil is well suited to hay and pasture, if fertilized and limed. (Capability unit IVes–1.)

Narragansett stony silt loam, 8 to 15 percent slopes (NgC).—This soil has medium to rapid runoff. It is used for and suited to the same purposes as Narragansett stony silt loam, 3 to 8 percent slopes, but the risk of erosion is greater on unprotected slopes. (Capability unit IVes–1.)

Narragansett stony silt loam, 15 to 25 percent slopes (NgD).—This soil is largely in forest. Small areas have been cleared and are in unimproved pasture, or they are idle. This soil is best suited to forestry or pasture because of stoniness. Some areas can be developed for improved pasture and orchards. (Capability unit VIes–1.)

Narragansett and Broadbrook very stony silt loams, 3 to 15 percent slopes (NkC).—This mapping unit is largely in forest. Scattered areas have been cleared and are used for unimproved pasture, or they are idle. Stoniness prevents the use of these soils for cultivated crops. Forestry and unimproved pasture are the most suitable uses for this soil. Some areas can be developed for improved pasture if brush is controlled and fertilizer applied. (Capability unit VIs–1.)

Narragansett and Broadbrook very stony soils, 15 to 35 percent slopes (NmD).—This mapping unit is largely in forest and should be managed for forestry and grazing. Small areas have been cleared and are used for unimproved pasture, or they are idle. (Capability unit VIIs–1.)

Ninigret Series

This series consists of moderately well drained to somewhat poorly drained, moderately coarse to medium textured soils. The sediments from which these soils have developed were derived mainly from crystalline rocks. Some of the sediments, however, were from sedimentary Triassic sandstone and shale. Ninigret soils are associated with the Agawam soils on glaciofluvial or glaciolacustrine and stream terraces. They are the moderately well drained member of the Agawam catena. They differ from the moderately well drained Sudbury soils in being almost free of gravel to a depth of 4 or 5 feet. They differ from the Elmwood soils in underlying material; the Elmwood soils are underlain by silt and clay at depths of 2 to 4 feet.

Typical profile (Ninigret very fine sandy loam, 0 to 3 percent slopes, in a forest):

A_{00} 4 to 2 inches, raw oak leaves and pine needles.
A_0 2 inches to 0 inch, partly decomposed litter.
A_1 0 to 3 inches, very dark grayish-brown (10YR 3/2) very fine sandy loam; massive; very friable.
B_{21} 3 to 16 inches, yellowish-brown (10YR 5/6) very fine sandy loam; breaks into soft, medium, subangular blocky clods when disturbed; very friable; boundary clear.
B_{22g} 16 to 26 inches, yellowish-brown (10YR 5/4) very fine sandy loam mottled with grayish brown (2.5Y 5/2) and strong brown (7.5YR 5/6); breaks into soft, medium, subangular blocky clods; very friable.
B_{23g} 26 to 30 inches, color same as in overlying horizon; texture is sandy loam.
C_{1g} 30 to 56 inches, mottled gray (10YR 6/1), yellowish-brown (10YR 5/8), and strong-brown (7.5YR 5/6) fine sand.
C_{2g} 56 to 60 inches, mottled gray (2.5Y 5/0), dark yellowish-brown (10YR 3/4), and strong-brown (7.5YR 5/8) loamy very fine sand; weak, thick, platy structure; firm.

Textures range from very fine sandy loam to sandy loam. In cultivated fields the color of the surface soil is generally very dark grayish brown (10YR3/2). The upper subsoil ranges from yellowish brown (10YR 5/4) to strong brown (7.5YR 5/6). Depth to mottling varies because drainage ranges from moderately good to somewhat poor. Areas associated with the Enfield and Merrimac soils contain a small amount of gravel and pockets of discontinuous thin strata of sand and gravel in places. Areas associated with Elmwood and Swanton soils contain, in places, thin strata of silt or very fine sand at depths of 3 to 5 feet. A few small areas in the northeastern part of the county have reddish-colored profiles.

The principal inclusions are small areas of the Sudbury, Walpole, Elmwood, and Agawam soils.

Ninigret fine sandy loam, 0 to 3 percent slopes (NnA).—This soil has a light fine sandy loam and sandy loam surface soil and upper subsoil. It is rapidly permeable above the seasonal high water table and has a moderate moisture-holding capacity. Because the texture is coarser, it dries out faster in spring than Ninigret very fine sandy loam, 0 to 3 percent slopes. Small areas of loamy fine sand are included with this soil.

About 25 percent of the acreage is in forest. Cleared areas are used mainly for tobacco (fig. 10), potatoes, hay, and pasture. Some of the acreage is used for silage corn, sweet corn, vegetables, nursery stock, and alfalfa. Without drainage, the soil generally is suited to silage corn, late vegetables, hay, and pasture. Fully drained or partly drained areas are suitable for tobacco, potatoes, and general crops. However, tobacco and potatoes are subject to damage in very wet seasons during the summer. Fertilizers are needed to produce high yields. Applied plant nutrients, however, leach out fairly rapidly. This soil requires management that will maintain the supply of organic matter and good tilth. (Capability unit IIw–1.)

Ninigret fine sandy loam, 3 to 8 percent slopes (NnB).—This soil is used for the same crops as Ninigret fine sandy loam, 0 to 3 percent slopes, and is suited to them. Fields used for clean-cultivated crops need simple practices to control runoff. Otherwise, management should be the same as for Ninigret fine sandy loam, 0 to 3 percent slopes. (Capability unit IIwe–1.)

Ninigret very fine sandy loam, 0 to 3 percent slopes (NsA).—This soil is moderately permeable, but a seasonal high water table interferes with internal drainage. Mottles at depths of 12 to 18 inches indicate that the lower subsoil is waterlogged in wet seasons. The soil is easy to work and fairly easy to drain, and it responds to good management. The A_p horizon in cultivated areas is generally very dark grayish brown (10YR 3/2).

Compared to Agawam very fine sandy loam, 0 to 3 percent slopes, this soil dries out somewhat more slowly in spring. However, crops are damaged less by lack of moisture during the growing season.

About 75 percent of the acreage has been cleared. The soil is used mainly for potatoes, tobacco, hay, and pasture, but some areas are used for silage corn, sweet corn, vegetables, and nursery stock. Except for seepy spots, this soil is generally suited without drainage to silage corn, late vegetables, hay, and pasture. Fully drained or partly drained areas are suited to potatoes, tobacco, and

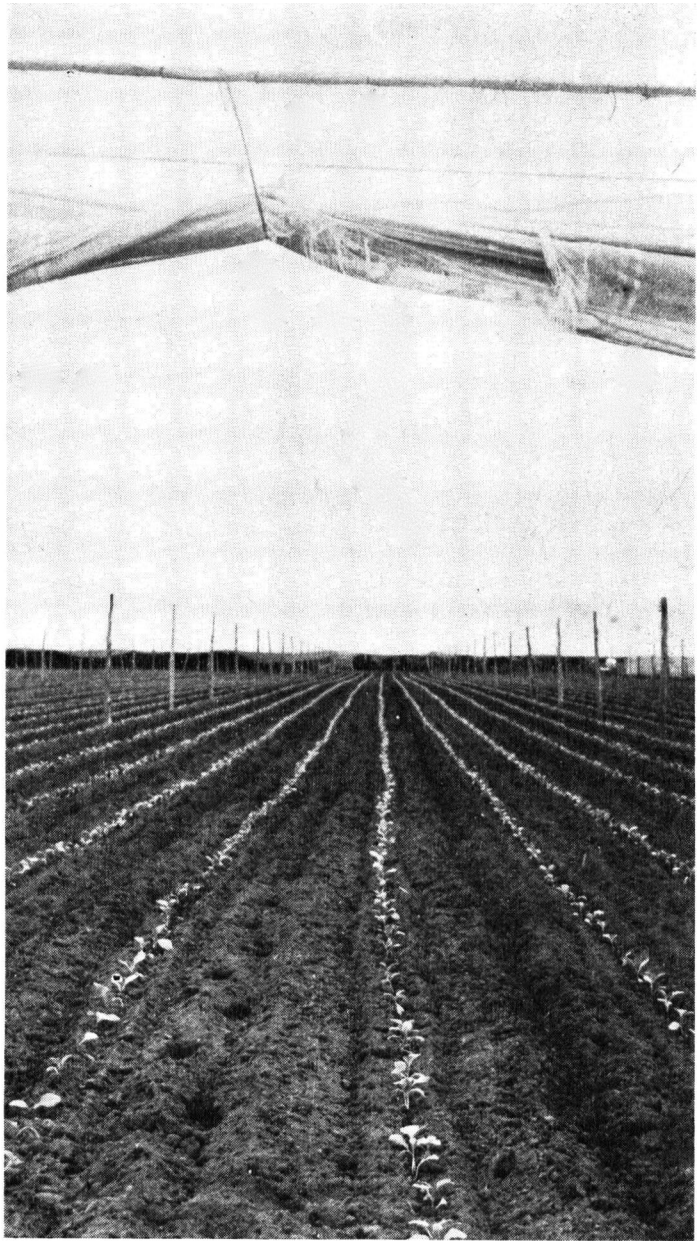

Figure 10.—Young shade-grown tobacco on Ninigret fine sandy loam.

general crops. Preparation of the soil for planting tobacco and potatoes is delayed in spring except in fully drained areas. In wet summer seasons, these crops may be damaged by excess moisture. This soil needs fertilizer, drainage for some crops, and careful management to maintain the supply of organic matter and good tilth. (Capability unit IIw–1.)

Ninigret very fine sandy loam, 3 to 8 percent slopes (NsB).—This soil has better surface drainage than Ninigret very fine sandy loam, 0 to 3 percent slopes. However, it is used for and suited to the same purposes. It occurs in small areas. Simple practices are needed to control erosion in fields used for clean-cultivated crops. (Capability unit IIwe–1.)

Ondawa Series

This series consists of well-drained sandy loam to coarse sandy loam on flood plains. Some areas are flooded about once a year; others are flooded less frequently.

Ondawa soils occur in small areas throughout the county. They are similar to the Hadley soils in color but are coarser textured. They are associated with the Suncook, Podunk, Rumney, and the coarser textured Saco soils. They differ from the Suncook soils in texture.

Typical profile (Ondawa sandy loam, 0 to 3 percent slopes, in a pasture):

- A_p 0 to 10 inches, very dark grayish-brown (10YR 3/2) sandy loam; weak, medium, granular structure in upper 6 inches; very friable.
- C_1 10 to 18 inches, dark yellowish-brown (10YR 3/4) sandy loam with streaks and pockets of very dark grayish brown (10YR 3/2) and very dark brown (10YR 2/2); very weak, coarse, subangular blocky structure; very friable.
- C_2 18 to 22 inches, black (10YR 2/1) and very dark brown (10YR 2/2) sandy loam.
- C_3 22 to 30 inches, dark grayish-brown (10YR 4/2) and brown (10YR 4/3) sandy loam; very friable.
- C_4 30 to 40 inches, grayish-brown (10YR 5/2) loamy sand and loamy fine sand.
- C_5 40 to 48 inches, coarse sand and gravel, mainly quartz, gneiss, and schist but some sandstone and shale.

Texture ranges from fine sandy loam to coarse sandy loam. The color and thickness of the interbedded layers below the surface are extremely variable. Colors range from black (10YR 2/1) to dark yellowish brown (10YR 3/4–4/4). Below depths of 24 to 30 inches, the material is generally sand, loamy sand, or coarse sand and gravel, but in places, sandy loam or fine sandy loam extends to a depth of 4 feet or more. In places, faint mottles occur below 2 feet.

Small areas of Podunk, Rumney, and Suncook soils are mapped as inclusions.

Ondawa sandy loam, 0 to 3 percent slopes (OnA).—This soil is rapidly permeable and has a moderate moisture-holding capacity. Crops are seldom damaged by lack of moisture during the growing season. The soil dries out rapidly in spring and is very easy to work.

Some acreage is used for tobacco, potatoes, alfalfa, and market vegetables, but a large part of the acreage is used for hay and pasture. This soil is suited to general crops of the county. Cultivated crops are damaged occasionally by floods late in spring and fall. All crops need fertilizer and lime for high yields. Plant nutrients leach out fairly rapidly. (Capability unit IIw–4.)

Paxton Series

The soils of this series are well drained and moderately coarse to medium textured. They have developed on glacial till derived mainly from schistose rocks mixed with some granite and gneiss. They have a compact fragipan layer at a depth of about 24 inches. They commonly occur on rounded drumlins or on drumloidal hills in the Eastern and Western Highlands. The Paxton soils are associated with the moderately well drained Woodbridge, the poorly drained Ridgebury, and the very poorly drained Whitman soils. Paxton soils differ from the Charlton soils mainly in character of the underlying material. In the Charlton soils, this material is firm to very friable and more permeable.

The red substratum phases of the Paxton series have developed on glacial till derived from a mixture of red-

dish-brown Triassic rocks and crystalline rocks. The fragipan is at depths of 24 to 30 inches and ranges from reddish brown (5YR 4/3 or 5/3) to yellowish red (5YR 4/6–5/6) in color. The B horizon is somewhat brighter colored than that in the normal Paxton soils, and it ranges from yellowish brown (10YR 5/8) to strong brown (7.5YR 5/6–5/8). The texture of the surface soil and subsoil is sandy loam or loam. These soils occur in the Eastern and Western Highlands near the fault line between the crystalline rocks of the highlands and the reddish-brown Triassic rocks of the Central Lowland. They occur principally in the town of Glastonbury, but scattered areas are also in Manchester, Granby, Simsbury, and Bristol.

Typical profile (Paxton loam, 3 to 8 percent slopes, in cultivation):

A_p	0 to 10 inches, very dark grayish-brown (10YR 3/2) light loam or fine sandy loam; breaks into coarse clods that crush easily to weak, coarse, granular structure; friable; coarse fragments make up 10 to 15 percent of the volume.
B_{21}	10 to 18 inches, dark yellowish-brown (10YR 4/4), light loam or fine sandy loam; very weak, coarse, subangular blocky structure; very friable; coarse fragments make up about 15 percent of the volume; boundary gradual.
B_{22}	18 to 24 inches, olive-brown (2.5Y 4/4), light loam or fine sandy loam; very weak, coarse, subangular blocky structure; very friable; coarse fragments make up 15 to 20 percent of the volume; boundary clear.
B_{23gm}	24 to 40 inches, dark grayish-brown (2.5Y 4/2) gravelly sandy loam mottled with grayish brown (2.5Y 5/2) and olive brown (2.5Y 4/4); moderate, medium to thick, platy structure; firm and compact.

Surface soil and subsoil textures range from loam or silt loam to fine sandy loam. The color of the upper B horizon ranges from brown or dark brown (7.5YR 4/4) to yellowish brown (10YR 5/6–5/8). The compact pan ranges in texture from gravelly sandy loam to gravelly loam. Depth to the pan is generally around 22 to 24 inches, except in eroded areas, but it ranges from 20 to 30 inches. In places faint mottles occur just above the compact horizon, especially in the transitional zone between the Paxton and Woodbridge soils.

Small areas of the Woodbridge, Charlton, and Sutton soils are included. In the southeastern corner of the town of Glastonbury, a few small areas are included in which the compact horizon is light brownish-gray (10YR 6/2) gravelly coarse sandy loam or gravelly loamy sand.

Paxton fine sandy loam, reddish substratum, 3 to 8 percent slopes (PaB).—This soil has a few eroded areas. It is used for and suited to the same purposes as Paxton loam, 3 to 8 percent slopes. In the town of Glastonbury, it is used mainly for apple and peach orchards. (Capability unit IIe–2.)

Paxton fine sandy loam, reddish substratum, 8 to 15 percent slopes (PaC).—This soil occurs in a few small areas. Most of the acreage in the town of Glastonbury is used for apple and peach orchards. Use, suitability, management, and conservation needs are the same as for Paxton loam, 8 to 15 percent slopes. (Capability unit IIIe–2.)

Paxton fine sandy loam, reddish substratum, 15 to 25 percent slopes (PaD).—Use, suitability, management, and conservation needs are the same as for Paxton loam, 15 to 25 percent slopes, eroded. (Capability unit IVe–2.)

Paxton loam, 3 to 8 percent slopes (PbB).—Most of this soil is on gentle slopes, but a few areas are nearly level. The soil is moderately permeable and has a high moisture-holding capacity. It warms slowly in the spring because the pan layer, at a depth of about 2 feet, interferes with internal drainage. However, crops seldom are damaged by lack of moisture during the growing season.

This soil is one of the most desirable for silage corn, alfalfa, pasture, and orchards. It is used mainly for these purposes, but some areas are used for corn, vegetables, and other crops. Alfalfa is subject to heaving in winter, but it produces well if properly limed and fertilized. This soil is suited to crops that require intensive cultivation if management and conservation are practiced. Fertilizer, rotation of crops, and erosion control are needed to maintain the supply of organic matter. (Capability unit IIe–2.)

Paxton loam, 8 to 15 percent slopes (PbC).—Runoff is more of a problem on this soil than on Paxton loam, 3 to 8 percent slopes. Areas on unprotected slopes erode easily.

The soil is used mainly for hay, pasture, and orchards. However, some areas are used for silage corn and other cultivated crops. Cultivated crops should be grown in longer rotations and erosion control should be more intensive than on Paxton loam, 3 to 8 percent slopes. (Capability unit IIIe–2.)

Paxton loam, 15 to 25 percent slopes, eroded (PbD2).—This soil generally occurs in small, narrow strips. Small eroded areas and small areas with slopes of 25 to 35 percent are included in this mapping unit.

This soil is suited to orchards, grasses, and alfalfa and other legumes. Because of the risk of erosion, it is not suited to cultivated crops unless they are grown in long rotations supported by intensive erosion control practices. Forage crops and pastures need lime and fertilizer to produce a good sod. (Capability unit IVe–2.)

Paxton stony fine sandy loam, reddish substratum, 3 to 8 percent slopes (PcB).—Part of this soil is in forest, and part of it has been cleared and is used mainly for hay, pasture, and orchards. Most areas can be developed for hay, orchards, and improved pastures. Stoniness prevents the use of this soil for crops that require intensive cultivation. (Capability unit IVes–2.)

Paxton stony fine sandy loam, reddish substratum, 8 to 15 percent slopes (PcC).—The control of runoff is a greater problem on this soil than on Paxton stony fine sandy loam, reddish substratum, 3 to 8 percent slopes. However, use and suitability are the same. (Capability unit IVes–2.)

Paxton stony fine sandy loam, reddish substratum, 15 to 25 percent slopes (PcD).—This soil is largely in forest. Scattered areas have been cleared and are used for unimproved pasture, or they are idle. The soil is best suited to forest and pasture. (Capability unit VIes–2.)

Paxton stony loam, 3 to 8 percent slopes (PdB).—Most of this soil is in forest. Some areas have been cleared and are used mainly for hay, pasture, and orchards. Most areas can be worked for these crops and for small grains. However, crops that require intensive cultivation are difficult to work with modern machinery. This soil is well suited to improved pasture. (Capability unit IVes–2.)

Paxton stony loam, 8 to 15 percent slopes (PdC).—Control of runoff is more of a problem on this soil than on Paxton stony loam, 3 to 8 percent slopes. The soil can be developed for hay, improved pasture, and orchards.

Because of stones, it is not suited to cultivated crops. (Capability unit IVes–2.)

Paxton stony loam, 15 to 25 percent slopes (PdD).—This soil is largely in forest. Some areas have been cleared and are used for unimproved pasture, or they are idle. Some of the cleared acreage can be developed for unimproved pasture and orchards. The soil is best suited to forest and pasture because of stones and steep slopes. (Capability unit VIes–2.)

Paxton very stony loam, 3 to 15 percent slopes (PeC).—This soil is largely in forest. Some areas have been cleared and are used for unimproved pasture, or they are idle. Stoniness prevents the use of this soil for cultivated crops. However, some areas can be developed for improved pasture. Unimproved pasture can be improved by control of brush and the application of fertilizer. (Capability unit VIs–2.)

Paxton very stony loam, 15 to 35 percent slopes (PeD).—This soil is mainly in forest. Scattered areas have been cleared and are used for unimproved pasture, or they are idle. Because of stones and steepness of slope, this soil is used mainly for forests and grazing. (Capability unit VIIs–2.)

Peats and Mucks

Peats and Mucks (PkA).—This mapping unit consists of organic soil in various stages of decomposition. These soils occupy low, very poorly drained positions, and the water table is at or near the surface most of the time. Accumulations of organic matter range from 1½ feet to more than 20 feet in thickness.

Peats and Mucks occur in small to fairly large bodies throughout the county. Some areas are in cutover forest consisting mainly of red maple, elm, white-cedar, alder, sweet pepperbush, blueberry, and other shrubs and ferns. Open areas consist mainly of sedges and water-loving shrubs. Accumulations of organic matter in these areas are generally coarse and fibrous throughout. (Capability unit VIIIw–1.)

Typical profile (Peats and Mucks in a forest):

0 to 2 inches, raw and partly decomposed leaf litter and twigs.
2 to 12 inches, black (10YR 2/1), fairly well decomposed mucky peat with some visible woody material; well matted with roots.
12 to 36 inches, dark-brown (7.5YR 3/2), fibrous remains of sedges and woody material.
36 to 48 inches, very dark grayish-brown (10YR 3/2), raw fibrous plant remains.

Peats and Mucks, shallow (PmA).—This mapping unit occurs in fairly small, isolated areas or in narrow strips near Peats and Mucks. The thickness of organic matter ranges from about 18 to 36 inches. Most areas have a forest cover similar to that on Peats and Mucks. (Capability unit VIIIw–1.)

Penwood Series

The Penwood soils are excessively drained, droughty, reddish, deep loamy sands and sands. They occur in fairly small areas in the Central Lowland. These soils are similar to the Windsor soils in texture but differ in color. They are coarser textured than the Hartford soils.

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Penwood soils are associated with the Hartford and Manchester soils on terraces where the sediments are derived mainly from reddish-brown Triassic rocks. In places the sediments were deposited or reworked by wind.

Typical profile (Penwood loamy sand, 0 to 3 percent slopes, in a forest):

A_{00} and A_0	½ to 0 inch, raw leaves and partly decomposed material.
A_1	0 to ½ inch, very dark grayish-brown (10YR 3/2) loamy sand with weak, medium, granular structure; very friable.
B_2	½ to 24 inches, yellowish-red (5YR 4/8) loamy sand or sand; very friable to loose; small amount of fine gravel.
C	24 to 48 inches, reddish-brown (5YR 4/3 and 5/3) coarse sand that contains 3 to 5 percent of fine gravel.

The texture ranges from loamy sand to sand. The amount of fine gravel in the solum and substratum varies, but it rarely exceeds 10 percent of the soil volume. Some areas have no coarse fragments.

Penwood loamy sand, 0 to 3 percent slopes (PnA).—This soil is very rapidly permeable and has a low moisture-holding capacity. It is excessively drained and dries out very early in spring. It responds to fertilizer if the moisture supply is adequate.

A large part of the acreage is in scrubby forest, or it is idle. Some areas are used for tobacco, sweet corn, early vegetables, alfalfa, and other crops. Alfalfa grows fairly well. Droughtiness severely limits the use of this soil for crops, hay, and pasture. Practically all areas in tobacco and sweet corn are irrigated. If large quantities of fertilizer are applied frequently, good yields are obtained. Unprotected areas of this soil are subject to some wind erosion late in winter and early in spring. (Capability unit IIIs–1.)

Penwood loamy sand, 3 to 8 percent slopes (PnB).—This soil absorbs water rapidly. Unprotected slopes are subject to some water and wind erosion.

This soil is largely in forest, or it is idle. Use and suitability are essentially the same as for Penwood loamy sand, 0 to 3 percent slopes. (Capability unit IIIs–1.)

Penwood loamy sand, 8 to 15 percent slopes (PnC).—This soil is extremely droughty. The acreage is largely in forest, or it is idle. Small areas are used for early vegetables, sweet corn, tobacco, alfalfa, and other crops. If limed and fertilized properly, alfalfa does fairly well. Cultivated crops need irrigation and heavy applications of fertilizer. Unprotected slopes are subject to wind and water erosion. (Capability unit IVs–1.)

Podunk Series

This series consists of moderately well drained, moderately coarse textured soils on flood plains. Most areas are flooded about once a year, but some are flooded more frequently. Mottles occur at depths of 18 to 20 inches. These soils are similar to the Ondawa soils in texture but differ in drainage. Podunk soils differ from the Winooski soils mainly in texture and from the Rowland soils in texture and color.

Typical profile (Podunk sandy loam, 0 to 3 percent slopes, in a pasture):

A_p	0 to 10 inches, very dark grayish-brown (10YR 3/2) sandy loam; moderate, fine and medium, granular structure in upper 4 inches; very friable.

C_1 10 to 16 inches, dark yellowish-brown (10YR 3/3) sandy loam with streaks of very dark grayish brown (10YR 3/2); very friable.

C_2 16 to 19 inches, very dark brown (10YR 2/1) sandy loam or fine sandy loam; very friable.

C_{3g} 19 to 30 inches, dark grayish-brown (10YR 4/2) sandy loam mottled with dark yellowish brown (10YR 4/4) and light brownish gray (10YR 6/2); lenses of loamy fine sand; very friable.

C_{4g} 30 to 48 inches, mottled grayish-brown (10YR 5/2), dark grayish-brown (10YR 4/2), and dark yellowish-brown (10YR 4/3) loamy fine sand with lenses of gravel.

The texture ranges from coarse sandy loam to fine sandy loam. The principal variations are in the color and thickness of the lower layers, depths to mottling, and the texture of the material below depths of 24 to 30 inches.

Small areas of Ondawa, Rumney, and Winooski soils are the principal inclusions.

Podunk sandy loam, 0 to 3 percent slopes (PoA).—This soil is rapidly permeable, but a seasonal high water table restricts internal drainage. Some areas are flooded frequently and others occasionally.

Part of the acreage is in forest, and part is idle. Cleared areas are used mainly for hay and pasture, but scattered areas are used for vegetables, silage corn, outdoor tobacco, and other crops. The soil is well suited to sod crops for hay and pasture, and it is fairly well suited to silage corn and late vegetables. It is not well suited to alfalfa, but alfalfa can be grown in mixtures with other legumes and grasses. The soil needs lime and fertilizer. It should be drained in places. (Capability unit IIw–5.)

Poquonock Series

This series consists of well-drained soils that have developed in coarse to moderately coarse textured waterlaid or windblown sediment over nonconforming, compact pan horizons. The pan horizons have developed in glacial till that was derived mainly from Triassic sandstone, shale, and basalt. Poquonock soils occur in scattered areas mainly in the towns of Windsor, Bloomfield, Windsor Locks, Suffield, and Enfield. They are associated with the moderately well drained Birchwood soils. They are also associated with the Wethersfield, Broadbrook, Merrimac, and Windsor soils. They differ from the Broadbrook soils in being coarse textured and from the Merrimac and Windsor soils in being underlain by pan horizons.

Typical profile (Poquonock sandy loam, 3 to 8 percent slopes, in cultivation):

A_p 0 to 8 inches, dark yellowish-brown (10YR 3/4) light sandy loam; weak, coarse, granular structure; very friable; coarse fragments make up 10 percent of the soil volume.

B_{21} 8 to 20 inches, strong-brown (7.5YR 5/6) light sandy loam; breaks into soft, medium, subangular blocky clods; very friable; coarse fragments make up 5 percent of the soil volume.

B_{22} 20 to 30 inches, light-brown (7.5YR 6/4) loamy sand; loose; coarse, angular rock fragments 3 to 6 inches in diameter make up 18 to 20 percent of the soil volume.

B_{23um} 30 to 48 inches, reddish-brown (2.5YR 4/4), compact gravelly loam derived mainly from reddish-brown Triassic sandstone and shale; moderate, thick, platy structure; very firm and compact; silt films are on some ped faces and around rock fragments.

The textures range from fine sandy loam to loamy sand. As a rule, the B_{21} horizon is yellowish brown (10YR 5/6) to strong brown (7.5YR 5/8). In places the B_{22} horizon is yellowish red (5YR 4/6) to dark red (2.5YR 3/6) because of mixing with the underlying material. The compact layer (pan) is generally at depths ranging from 24 to 36 inches, but in places it is more than 3 feet deep. Angular fragments of rock in the surface soil and upper subsoil make up 2 to 15 percent of the soil volume. In places thin fragments of sandstone and shale ranging from a few to 10 inches in diameter are numerous just above the compact horizon. A thin, mottled layer is also present just above the compact layer in the deeper soils.

Small areas of Broadbrook and Birchwood soils are mapped as inclusions.

Poquonock loamy sand, 3 to 8 percent slopes (PpB).—This soil is very rapidly permeable above the pan. The pan, however, prevents very rapid internal drainage. The soil is somewhat droughty and very low in fertility. Part of the acreage has slopes of 0 to 3 percent.

Some of the acreage is idle, and some is in forest. Cleared areas are used for tobacco, sweet corn, silage corn, and pasture. Crop yields and the grazing capacity of pastures are low. The soil is fairly well suited to alfalfa. Crops are damaged in most years unless the soil is irrigated. Proper fertilization, droughtiness, and control of erosion are management problems on this soil. (Capability unit IIs–2.)

Poquonock loamy sand, 8 to 15 percent slopes (PpC).—Some of the acreage of this soil is idle, and some is in forest. Small areas are used for tobacco and other cultivated crops. The major problems in management are the proper use of fertilizer, droughtiness, and the control of erosion. (Capability unit IIIe–3.)

Poquonock sandy loam, 0 to 3 percent slopes (PuA).—This soil is moderately coarse textured and rapidly permeable above the pan. The pan prevents rapid internal drainage. Because of coarser texture, this soil dries out faster in spring than Broadbrook silt loam, 0 to 3 percent slopes, and Wethersfield loam, 0 to 3 percent slopes. It is fairly easy to work, and it responds to management.

Most of this soil has been cleared and is used mainly for hay and outdoor tobacco. Some areas are used for silage corn, potatoes, vegetables, pasture, and orchards. This soil is suited to general crops of the county. It is well suited to alfalfa if it is well limed and fertilized. The major needs of this soil are fertilizer and the use of crop rotations and supporting practices that will maintain tilth and the supply of organic matter. (Capability unit I–2.)

Poquonock sandy loam, 3 to 8 percent slopes (PuB).—Erosion control is a moderate problem on this soil. The soil has, however, the same use and suitability as Poquonock sandy loam, 0 to 3 percent slopes. The major needs are fertilizer, the control of runoff, and the use of crop rotations and practices that will maintain tilth and the supply of organic matter. (Capability unit IIe–2.)

Poquonock sandy loam, 8 to 15 percent slopes (PuC).—Control of runoff is a greater problem on this soil than on Poquonock sandy loam, 3 to 8 percent slopes. A few small areas having slopes of 15 to 25 percent are included in this mapping unit.

About half of this soil is forested, idle, and in residential areas. The rest is used mainly for hay and pasture. However, small areas are used for tobacco, silage corn, and orchards. This soil is suited to cultivated crops if they are grown in moderately long rotations supported

by intensive practices to control erosion. (Capability unit IIIe–2.)

Rainbow Series

This series consists of soils that have developed from a silty mantle over glacial till. These soils have a fragipan developed in glacial till at depths of 2 to 3 feet. The till is derived mainly from basalt and reddish-brown Triassic rocks. The subsoil is mottled at depths of 12 to 20 inches.

These soils occur in fairly small areas throughout the Central Lowland. They commonly occupy nearly level or slightly depressed positions on the crests of hills or nearly level and gently sloping positions near the bases of slopes. Areas near the bases of slopes receive runoff and seepage from higher areas. Forested areas consist of white, red, and black oaks, red maple, white ash, birch, white pine, and hemlock.

Rainbow soils are the moderately well drained associates of the Broadbrook soils. They differ from the Wapping soils in the character of the substrata and from the Ludlow soils in color of the subsoil.

Typical profile (Rainbow silt loam, 0 to 3 percent slopes, in a forest):

- A_{00} 3 to 2 inches, surface litter.
- A_0 2 inches to 0 inch, partly decomposed litter.
- A_1 0 to 1 inch, intermingled very dark brown (10YR 2/2) and very dark grayish-brown (10YR 3/2) silt loam; weak, medium, granular structure; very friable.
- B_{21} 1 to 12 inches, yellowish-brown (10YR 5/6) silt loam; breaks into very soft, medium, subangular blocky clods; very friable; coarse fragments make up 3 to 5 percent of the soil volume.
- B_{22} 12 to 18 inches, yellowish-brown (10YR 5/4) silt loam with streaks and pockets of light brownish gray (10YR 6/2); very weak, coarse, subangular blocky structure; very friable; coarse fragments make up 3 to 5 percent of the soil volume.
- B_{23g} 18 to 24 inches, mottled yellowish-brown (10YR 5/4), grayish-brown (2.5Y 5/2), and strong-brown (7.5YR 5/8) silt loam with lenses of fine sandy loam; very weak, coarse, subangular blocky structure; very friable; coarse fragments make up 5 percent of the soil volume.
- B_{24gum} 24 to 32 inches, dark reddish-gray (5YR 4/2) coarse sandy loam mottled with strong brown (7.5YR 5/6); moderate, thick, platy structure; very firm and compact.

The thickness of the silty mantle is generally about 24 inches, but it ranges from 18 to 36 inches. Drainage ranges from moderately good to somewhat poor; so mottles occur at various depths. Angular fragments of coarse rock make up 2 to 15 percent of the soil volume. Some areas are moderately stony on and in the soil.

Rainbow silt loam, 0 to 3 percent slopes (RaA).—This soil is moderately permeable above the pan, but a seasonal perched water table restricts internal drainage. Consequently, it dries out slowly in spring.

Nearly all the acreage has been cleared, and it is used mainly for hay and pasture. Some areas are used for tobacco, potatoes, silage corn, and vegetables. This soil is suited to hay and pasture, and it is fairly well suited without drainage to silage corn, potatoes, and vegetables. It is not suited to orchards and poorly suited to tobacco and alfalfa in most areas unless it is partly drained. In places diversion terraces are needed to divert seepage and runoff from adjoining areas. Cultivated crops and grasses and legumes for hay and pasture should be limed and fertilized in amounts determined by soil tests. (Capability unit IIw–2.)

Rainbow silt loam, 3 to 8 percent slopes (RaB).—This soil has better surface drainage than Rainbow silt loam, 0 to 3 percent slopes. It is used for the same purposes. It erodes easily, even on gentle slopes; consequently, runoff must be controlled on clean-cultivated fields. (Capability unit IIwe–2.)

Rainbow stony silt loam, 0 to 3 percent slopes (RbA).—This soil occurs in small, scattered areas. About half the acreage is in forest, and the rest is used mainly for hay and pasture. Because of stones, this soil is not suitable for cultivated crops that require tillage with modern machinery. However, most areas can be used for hay and improved pasture. Grasses and legumes for hay and pasture need fertilizer and lime. (Capability unit IVws–2.)

Rainbow stony silt loam, 3 to 8 percent slopes (RbB).—Part of this soil is in forest. Cleared areas are used mainly for hay and pasture. If stones are removed and the soil is used intensively for cultivated crops, simple practices are needed to control erosion. (Capability unit IVws–2.)

Ridgebury Series

This series consists of poorly drained, medium-textured soils that have developed in glacial till derived from schist and gneiss. These soils are associated with the Paxton and Woodbridge soils, and they are the poorly drained member of the Paxton, Woodbridge, Ridgebury, and Whitman catena. They differ from the poorly drained Leicester soils in having at depths of 20 to 24 inches a compact fragipan rather than very friable to firm material. They occupy nearly level to very gently sloping wet areas where the water table is at or near the surface in winter and early in spring.

Ridgebury very stony soils are mapped with the Whitman and Leicester soils as an undifferentiated mapping unit.

Typical profile (Ridgebury loam, 0 to 3 percent slopes, in a hayfield):

- A_p 0 to 6 inches, very dark grayish-brown (10YR 3/2) loam or silt loam; moderate, medium and coarse, granular structure; friable; coarse fragments make up about 10 percent of the volume.
- A_{2g} 6 to 9 inches, light olive-gray (5Y 6/2) loam mottled with olive (5Y 5/4) and strong brown (7.5YR 5/6; mottles are few, fine, and distinct; weak, thick, platy structure; friable; coarse fragments make up about 10 percent of the volume; boundary clear.
- B_{21g} 9 to 20 inches, mottled olive-gray (5Y 5/2), light olive-brown (2.5Y 5/4), and olive-brown (2.5Y 4/4) loam; mottles are many, medium, and distinct; weak, coarse, subangular blocky structure; friable; coarse fragments make up 10 to 15 percent of the volume.
- B_{22gm} 20 to 36 inches, olive-gray (5Y 4/2) gravelly sandy loam mottled with olive (5Y 4/4) and light olive brown (2.5Y 5/4); weak, thick, platy structure; very firm and compact; hard when dry.

The color of the surface soil ranges from very dark grayish brown (10YR 3/2) to very dark brown (10YR 2/2). Depth to the very firm and compact horizon ranges from 18 to 26 inches.

Ridgebury loam, 0 to 3 percent slopes (RdA).—This soil occurs in small, widely scattered areas in the Eastern and Western Highlands. Runoff is slow to very slow,

and internal drainage is slow. A few small areas are moderately stony.

This soil is used mainly for hay and pasture because of poor drainage. Some of the acreage is idle. Partly drained areas are suitable for hay and pasture. Fully drained areas are suitable for corn and other crops. The major needs of this soil are drainage, fertilizer, and lime. (Capability unit IIIw–1.)

Riverwash

Riverwash (Re).—This miscellaneous land type consists mainly of sand, gravel, and cobbles. In places stones are in the mixture. Riverwash occurs along streams just above the water, and it is frequently flooded. It is essentially bare of vegetation, but, in places, there are scattered trees. This land type occurs in small areas in the western part of the county, and it has little agricultural value. (Capability unit VIIIs–1.)

Rocky Land

This miscellaneous land type consists of areas that generally have bedrock exposures and steep ledges on more than 50 percent of the surface. It is not suitable for crops or pasture, and it has little value for forestry. It is a habitat for wildlife and, in places, has attractive scenery.

Rocky land, Hollis materials, 3 to 15 percent slopes (RhC).—This unit consists of areas of exposed bedrock that is mainly schist and gneiss, but includes some granite in places. (Capability unit VIIIs–1.)

Rocky land, Hollis materials, 15 to 35 percent slopes (RhE).—This mapping unit is similar to Rocky land, Hollis materials, 3 to 15 percent slopes, except in relief. (Capability unit VIIIs–1.)

Rocky land, Holyoke materials, 3 to 15 percent slopes (RkC).—This unit consists of areas of exposed bedrock that is mainly igneous Triassic intrusive and extrusive basalt. In places some reddish-brown Triassic shale and sandstone are included. (Capability unit VIIIs–1.)

Rocky land, Holyoke materials, 15 to 35 percent slopes (RkE).—This unit is similar to Rocky land, Holyoke materials, 3 to 15 percent slopes, except in relief. (Capability unit VIIIs–1.)

Rowland Series

This series consists of moderately well drained, reddish soils on flood plains. A large part of the sediment from which the soils have developed was washed from reddish-brown Triassic sandstone, conglomerate, and shale. The Rowland soils occur mainly in the southern part of the Central Lowland. They are the moderately well drained member of the catena that includes the well-drained Bermudian and the poorly drained Bowmansville soils. Rowland soils differ from the Winooski soils in color and source of sediment and from the Podunk soils in color, texture, and source of sediment.

Typical profile (Rowland silt loam, 0 to 3 percent slopes, in a cultivated area):

- A_p 0 to 8 inches, dark reddish-brown (5YR 3/4) silt loam; weak, fine and medium, granular structure; very friable.
- C_1 8 to 20 inches, reddish-brown (5YR 4/4) silt loam; very weak, medium, subangular blocky structure; very friable.
- C_{2g} 20 to 30 inches, mottled pinkish-gray (5YR 7/2), light reddish-brown (5YR 6/3), and dark reddish-brown (5YR 3/3) sandy loam with some gravel; very friable
- C_{3g} 30 to 48 inches, mainly sand and fine gravel with some silt; variable in color; saturated.

The texture of the surface soil and upper subsoil ranges from silt loam to fine sandy loam. The color of surface soil and subsoil and the depth to mottling vary. As a rule, below depths of 24 to 36 inches, the material is moderately coarse to very coarsely textured. In places the boundary between Rowland soils and Podunk soils is not definite. Drainage ranges from moderately good to somewhat poor.

Rowland silt loam, 0 to 3 percent slopes (RoA).—This soil is moderately permeable, but a seasonal high water table restricts drainage. Most areas are flooded for a short time each spring. Some areas are flooded occasionally in summer and fall.

This soil is used mainly for hay and pasture, and it is well suited to these crops. It is fairly well suited to silage corn and late vegetables. The soil needs lime and fertilizer and, in places, drainage. (Capability unit IIw–5.)

Rumney Series

The series consists of poorly drained, moderately coarse textured soils on flood plains. Most areas are flooded frequently. These soils have developed from sediment derived mainly from coarse-textured crystalline rocks, such as gneiss and granite. They are associated with the well drained Ondawa and the moderately well drained Podunk soils and with the very poorly drained Saco sandy loam. They differ from the Limerick soils in having a coarser texture and from the Bowmansville soils in color and texture.

Typical profile (Rumney sandy loam, 0 to 3 percent slopes, in unimproved pasture):

- A_p 0 to 6 inches, very dark grayish-brown (10YR 3/2) sandy loam or fine sandy loam with a few mottles of dark reddish brown (5YR 3/4); weak, coarse, granular structure; very friable.
- C_{1g} 6 to 30 inches, dark grayish-brown (10YR 4/2) sandy loam mottled with light brownish gray (10YR 6/2) and reddish brown (5YR 4/3); interbedded with loamy sand in the lower part; mottles are common, fine, and distinct; very friable.
- C_{2g} 30 to 40 inches, dark-brown (7.5YR 3/2) fine sandy loam finely mottled with dark reddish brown (5YR 3/3); very friable.
- C_{3g} 40 to 60 inches, mottled dark grayish-brown (10YR 4/2) and strong-brown (7.5YR 5/8) loamy fine sand.

This unit includes sandy loam and fine sandy loam textures, probably in about equal proportions. The material below 24 to 30 inches is generally loamy sand, or in places, sand with gravel. Finer textured layers are also present in places.

Rumney sandy loam, 0 to 3 percent slopes (RuA).—Most of this soil is in forest, or it is idle. Some areas are used for pasture and hay. A few small areas in fields that consist mainly of well drained or moderately well drained soils are used for cultivated crops. Undrained areas are only fair for pasture. Partly drained areas are suited to hay, pasture, and silage corn. Frequent

flooding and the lack of suitable outlets generally make it impractical to drain this soil adequately for cultivated crops. The soil needs lime and fertilizer to produce good yields. (Capability unit IIIw–2.)

Saco Series

The Saco series consists of frequently flooded, very poorly drained soils on flood plains. The surface soil is very dark gray to black silt loam to loamy sand. The subsurface is mottled mainly with gray. Water stands on the surface of most areas for long periods in winter and spring. Saco soils have developed from a wide variety of sediment, including some from reddish-brown Triassic rocks. They generally occur in slight depressions that border terrace escarpments or uplands, in old oxbows and narrow flood plains.

Typical profile (Saco silt loam, 0 to 3 percent slopes, in an idle area):

A_p 0 to 8 inches, very dark brown (10YR 2/2) silt loam well matted with fine roots; moderate, coarse, granular structure; slightly sticky when wet; strongly acid.

C_{1g} 8 to 18 inches, grayish-brown (10YR 5/2) silt loam mottled with very dark brown (10YR 2/2); friable; slightly sticky when wet; strongly acid.

C_{2g} 18 to 22 inches, gray (5Y 5/1) silt loam finely mottled with pale brown (10 YR 6/3); friable.

C_{3g} 22 to 40 inches, mottled dark-gray (10 YR 4/1), light-gray (2.5Y 7/2), and pale-brown (10 YR 6/3) light silt loam or very fine sandy loam; very friable.

The color of the surface soil ranges from black (10YR 2/1) to very dark grayish brown (10YR 3/2). The material below 2 feet ranges in texture from silt loam to coarse sand and gravel. In places thin, peaty layers occur below the surface.

Included are small areas having a shallow, mucky surface layer.

Saco sandy loam, 0 to 3 percent slopes (SaA).—This soil has about the same use and suitability as Saco silt loam, 0 to 3 percent slopes. (Capability unit VIw–1.)

Saco silt loam, 0 to 3 percent slopes (SbA).—This soil is used mainly for forest, unimproved pasture, and wildlife because it is very poorly drained and frequently flooded. Unimproved pastures furnish some grazing in dry seasons. Drainage is generally not practical because of frequent flooding and the lack of suitable outlets. (Capability unit VIw–1.)

Scantic Series

The Scantic series consists of poorly drained to somewhat poorly drained, silty soils. They have developed on grayish to dark-brown or reddish-brown glaciolacustrine silt and clay, mainly in the northern part of the Central Lowland. The surface soil and subsoil to depths of 24 to 30 inches are very strongly to medium acid, and the underlying material is slightly acid to mildly alkaline. Soils of the Scantic series are the poorly drained members of the catena that includes the moderately well drained Buxton and the very poorly drained Biddeford soils. Scantic soils are associated with the Wallington soils and differ from them in having a finer texture and more slowly permeable subsoil and substrata.

Typical profile (Scantic silt loam, 0 to 3 percent slopes, in a forest):

A_{00} 2½ inches to 1 inch, undecomposed leaf litter and twigs.

A_0 1 to 0 inch, partly decomposed to well decomposed forest litter.

A_1 0 to 4 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, fine to coarse, granular structure; very friable; very strongly acid.

A_{2g} 4 to 9 inches, olive-gray (5Y 5/2) silt loam or silty clay loam finely mottled with light yellowish brown (10YR 6/4) and dark yellowish brown (10YR 4/4); weak, thick, platy structure in place, but breaks into coarse, subangular blocky clods when disturbed; silt films numerous; firm, slightly plastic when wet; medium acid.

B_{2g} 9 to 24 inches, mottled dark-gray (5Y 4/1), olive-gray (5Y 5/2), and dark-brown (10YR 3/3) silty clay loam or silty clay; mottles are many, fine, and distinct; weak, thick, platy structure in place, but breaks into coarse, subangular blocky clods when disturbed; silt films numerous; very firm, plastic when wet; medium acid.

C 24 to 48 inches, dark-brown (10YR 3/3) silty clay loam streaked with olive gray (5Y 5/2) and light yellowish brown (10YR 6/4); weakly varved; very firm, slightly plastic when wet; slightly acid to mildly alkaline.

The texture of the A_{2g} and the B_{2g} horizons ranges from silt loam to silty clay loam or silty clay. In the transitional area between the grayish silts and clays in northern Hartford County and the reddish silts and clays in southern Hartford County, the boundary between the Scantic and the reddish variant of the Scantic soils is not well defined. Consequently, areas in the towns of Hartford, West Hartford, Bloomfield, Windsor, and East Granby having yellowish-red (5YR 4/6) streaks or pockets in the lower B horizon are included with the Scantic soils. In addition, some of the finer textured material of the underlying varved sediment is yellowish red (5YR 4/6 or 4/8). Drainage ranges from somewhat poor to poor.

The main inclusions are small areas of the Buxton, Wallington, and Biddeford soils.

Scantic silt loam, 0 to 3 percent slopes (ScA).—Runoff is slow to very slow, and internal drainage is very slow.

About 25 percent of the acreage of this soil is in forest consisting mainly of red maple, pin oak, gray birch, and elm. The cleared acreage is used mainly for hay and pasture; some of the acreage is idle. Small areas are used for silage corn and vegetables. The soil is more suitable for hay and pasture than for cultivated crops because drainage is very difficult. It is fair for water-tolerant legumes and grasses grown for hay and pasture if lime and fertilizer are applied in adequate quantities. Unimproved pastures produce low-grade forage. Leveling and bedding are the most practical ways to drain the soil; tile drains and open ditches are not satisfactory. In places open ditches can be used to prevent ponding. (Capability unit IVw–1.)

Scantic silt loam, reddish variant, 0 to 3 percent slopes (SdA).—This soil has developed in reddish deposits of glaciolacustrine silt and clay in the southern part of the Central Lowland. It differs from other Scantic soils mainly in color and in having, in places, a higher percentage of gravel and angular fragments of rocks. It is associated with the moderately well drained Berlin soils and the reddish variants of the Biddeford and the Wallington soils. The latter soil is similar in color and drainage to this soil, but it is silt loam or very fine sandy loam throughout the profile.

Typical profile (Scantic silt loam, reddish variant, 0 to 3 percent slopes, in a brushy pasture) :

A_p 0 to 7 inches, dark reddish-brown (5YR 3/2) silt loam; medium, granular structure; friable; small amount of rounded and semirounded gravel; very strongly acid.

A_{2g} 7 to 10 inches, mottled olive-gray (5Y 4/2) and brown (10YR 5/3) silt loam; moderate, thin, platy structure; friable; a few rounded and semirounded pebbles; very strongly acid.

B_{21g} 10 to 38 inches, dark reddish-brown (5YR 3/3) silty clay loam mottled with olive gray (5Y 5/2) and dark brown (7.5YR 4/4); weak, coarse, subangular blocky structure; firm, plastic when wet; few rounded and semirounded pebbles; strongly acid.

D_u 38 to 46 inches, dark grayish-brown (2.5Y 4/2) gravelly fine sandy loam or sandy loam; firm in place but very friable when disturbed; strongly acid.

C 46 to 60 inches, dark reddish-brown (2.5YR 3/4) silty clay loam with lenses of silt loam; firm, plastic when wet; neutral to slightly alkaline.

The B_2^g and C horizons range in texture from silty clay to silty clay loam. Coarse fragments make up as much as 5 to 10 percent of the soil volume in some places; in others coarse fragments are absent. Thin layers of gravelly stream deposits, similar to those in the D_u horizon, are common. They normally occur below depths of 30 inches.

The principal inclusions are small areas of Berlin and the reddish variant of Biddeford soils.

Poor drainage limits the crops that can be grown on this soil. Runoff is slow to very slow, and internal drainage is very slow. The soil is very difficult to drain because of the slowly permeable, moderately fine textured B and C horizons.

Some of the acreage is in forest consisting mainly of red maple, elm, alder, willow, and gray birch. Cleared areas are used mainly for pasture, or they are idle. Much of the pasture is unimproved and produces a poor grade of forage. Some acreage is used for hay. Undrained areas are fair for water-tolerant legumes and grasses for hay and pasture if the soil is limed and fertilized properly.

The soil is very difficult to drain adequately with tile or open ditches. Open ditches are fairly satisfactory in low places. Leveling and bedding are the most practical ways of draining this soil. (Capability unit IVw–1.)

Scarboro Series

This series consists of very poorly drained soils that have developed on glaciofluvial, glaciolacustrine, and stream terraces underlain by deposits of coarse-textured material. Scarboro soils have developed from sediment derived from igneous and metamorphic crystalline rocks and sedimentary Triassic rocks. They occur on nearly level, wet areas in association with the Merrimac, Agawam, Hartford, Enfield, Sudbury, and Walpole soils. The Scarboro soils differ from the Whately soils, which are underlain by silt and clay.

Typical profile (Scarboro loam, 0 to 3 percent slopes, in a brushy pasture) :

A_1 0 to 8 inches, black to very dark brown (10YR 2/1–2/2) loam or very fine sandy loam; weak, medium, granular structure when moderately dry; very friable.

B_{21g} 8 to 22 inches, light brownish-gray (2.5Y 6/2) fine sandy loam with a few fine mottles of yellowish brown (10YR 5/6); very friable.

C_g 22 to 36 inches, gray (10YR 6/1) coarse sand with some gravel; mottles of pale brown (10YR 6/3) and yellowish brown (10YR 5/6).

The texture of the surface soil ranges from loamy sand to loam or silt loam. Because of the high proportion of organic matter, the surface layers generally feel loamy regardless of texture. Subsoil layers also vary in texture. In places the underlying material is coarse sand and gravel; in others it is loamy sand with lenses of sandy loam.

The principal inclusions are small areas of Walpole and Whately soils.

Scarboro loam, 0 to 3 percent slopes (SeA).—This soil occurs throughout the county. A large part of the acreage is in forest consisting of red maple, blackgum, elm, alder, and gray birch. Cleared areas are used largely for unimproved pasture, or they are idle. A few partly drained areas are used for hay. Partly drained areas produce fair pasture if they are limed and fertilized. Undrained areas produce poor pasture. Because of the sandy and gravelly substrata, this soil can be readily drained if suitable outlets are available. (Capability unit Vw–1.)

Sudbury Series

This series consists of moderately well drained, sandy soils of the terraces that have developed on deposits of sand and gravel. In some places, these deposits were derived mainly from crystalline rocks and, in others, from a mixture of crystalline rocks and reddish-brown Triassic sedimentary rocks. Sudbury soils occur in small areas throughout the county except in the south-central part. They are closely associated with the well drained Merrimac, the poorly drained Walpole, and the very poorly drained Scarboro soils of the same catena. They differ from the Tisbury soils in being coarser textured, and from the Ninigret soils in having sandy, gravelly substrata. They differ from the moderately well drained Ellington soils mainly in color.

Typical profile (Sudbury fine sandy loam, 0 to 3 percent slopes, in a forest) :

A_0 1½ to 0 inch, partly decomposed litter.

A_1 0 to 1 inch, very dark grayish-brown (10YR 3/2) fine sandy loam; weak, medium, granular structure; very friable.

A_p 1 to 6 inches, dark-brown (10YR 4/3) fine sandy loam; very weak, fine, granular structure; very friable; coarse fragments make up 2 percent of the soil volume.

B_{21} 6 to 14 inches, yellowish-brown (10YR 5/4) fine sandy loam; breaks into very soft, medium, subangular blocky clods; very friable; coarse fragments make up 2 percent of the volume.

B_{22g} 14 to 26 inches, yellowish-brown (10YR 5/4) fine sandy loam or sandy loam mottled with light brownish gray (10YR 6/2) and strong brown (7.5YR 5/8); very friable; coarse fragments make up 5 percent of the soil volume.

D_g 26 to 40 inches, mottled coarse sand and gravel derived mainly from gneiss and schist and some reddish-brown sandstone; slightly cemented in places.

The main variations are in texture, depth to mottling, and the percentage of coarse fragments in the surface soil and subsoil. Textures are fine sandy loam, sandy loam, and coarse sandy loam. Drainage ranges from moderately good to somewhat poor. Consequently, depth to mottling ranges from near the surface to about 20 inches below the surface. Coarse fragments of rounded gravel on and in the soil make up 2 to 20 percent of the soil volume.

The main inclusions are small areas of the Merrimac, Walpole, Ninigret, and Tisbury soils.

Sudbury fine sandy loam, 0 to 3 percent slopes (SsA).—This soil is rapidly permeable, but a seasonal high water table interferes with internal drainage. Mottles at depths of 10 to 18 inches indicate that the lower subsoil is waterlogged in wet seasons. The soil is fairly easy to drain, because it is underlain by sand and gravel. A few areas having slopes of 3 to 6 percent are included with this soil.

About 60 percent of the acreage has been cleared and is used mainly for hay and pasture. Some acreage is used for tobacco, potatoes, vegetables, silage corn, and other crops. Undrained areas are generally suited to hay, pasture, silage corn, and late vegetables. Drained or partly drained areas are fairly well suited to tobacco, potatoes, and other crops. Even if the soil is drained, tobacco and potatoes are subject to damage in very wet growing seasons. The soil needs fertilizer, drainage for some crops, and management that will maintain tilth and the supply of organic matter. (Capability unit IIw–1.)

Suncook Series

This series consists of excessively drained, coarse-textured soils on flood plains. The profile generally consists of interbedded layers of loamy sand, sand, and coarse sand and gravel that vary in thickness and color. The Suncook soils generally occur in narrow strips bordering drainageways and in fairly small areas along the major streams and some of the smaller streams of the county. They are associated with the soils of the Ondawa and Hadley catenas.

Typical profile (Suncook loamy sand, 0 to 3 percent slopes, in a pasture):

- A_p 0 to 6 inches, very dark grayish-brown (10YR 3/2) loamy sand; very weak, coarse, granular structure; very friable to loose.
- C_1 6 to 16 inches, dark grayish-brown (10YR 4/2) and brown (10YR 5/3) coarse sand containing some fine gravel; loose.
- C_2 16 to 22 inches, dark-brown (10YR 3/3) loamy fine sand with streaks of coarse sand; loose.
- C_3 22 to 32 inches, pale-brown (10YR 6/3) medium and coarse sand; loose.
- C_4 32 to 42 inches, dark grayish-brown (10YR 4/2) fine and medium sand.
- C_5 42 to 48 inches, dark grayish-brown (10YR 4/2) coarse sand and gravel with faint mottles.

Textures are generally sand, loamy sand, or sand and gravel. In places there are thin layers of fine sandy loam or very fine sandy loam. In some places, little or no coarse fragments occur; in others, the material below depths of 12 to 18 inches is mainly coarse sand and gravel. Depth to the water table varies, but it is generally greater along small streams than along the larger ones. Mottles occur in places below depths of 2 or 3 feet.

Suncook loamy sand, 0 to 3 percent slopes (StA).—This soil occurs in small, scattered areas on flood plains. It is excessively drained and extremely droughty. Part of the acreage is in forest, part is in pasture, and part is idle. The use and suitability of this soil are about the same as for Windsor loamy fine sand, 0 to 3 percent slopes, and Penwood loamy sand, 0 to 3 percent slopes. (Capability unit IIIs–1.)

Sunderland Series

This series consists of reddish soils over reddish-brown Triassic sandstone, shale, and conglomerate. These soils are shallow to bedrock. Exposures of bedrock are few to numerous and occupy from 10 to 50 percent of the soil surface. The depth of the soil between the exposed bedrock ranges from a few inches to about 24 inches. Sunderland soils are closely associated with the Wethersfield and Cheshire soils in the Central Lowland. They differ from the shallow-to-bedrock Hollis and Holyoke soils in color and lithology of the bedrock.

Typical profile (Sunderland rocky fine sandy loam, 15 to 35 percent slopes, in a brushy pasture):

- A_p 0 to 4 inches, dark reddish-brown (5YR 3/3) gravelly fine sandy loam; weak, moderate, granular structure; very friable.
- B_{21} 4 to 14 inches, dark reddish-brown (2.5YR 3/4) gravelly fine sandy loam; massive; very friable.
- D_r 14 inches +, shattered Triassic sandstone and shale over hard bedrock.

Outcrops of bedrock may cover as much as 50 percent of the surface. The depth of the soil between the outcrops is extremely variable. The color of the B horizon ranges from dark reddish brown (2.5YR 3/4) to yellowish red (5YR 4/6).

Sunderland rocky fine sandy loam, 3 to 15 percent slopes (SuC).—The soil between bedrock exposures is generally shallow. It ranges in depth from a few inches to about 24 inches.

This soil is largely in forest and unimproved pasture, or it is idle. A small acreage, where bedrock exposures are less numerous, is used for hay, unimproved pasture, and nursery stock. This soil is not suited to cultivated crops because of the exposed bedrock and the loose stones on the surface. Most areas are best suited to forest and unimproved pasture. (Capability unit VIs–3.)

Sunderland rocky fine sandy loam, 15 to 35 percent slopes (SuE).—This soil is largely in forest and should be managed for this use. Scattered areas have been cleared or partly cleared and are used for unimproved pasture, or they are idle. Pastures furnish forage of low quality. Because of steep slopes, rockiness, and stoniness, this soil is suitable mainly for forests and unimproved pasture. (Capability unit VIIs–3.)

Sutton Series

These soils are the moderately well drained associates of the Charlton soils. They differ from the Charlton soils mainly in having mottles at depths of 12 to 20 inches. They differ from the Woodbridge soils in that the latter are underlain by a very firm and compact pan at a depth of about 2 feet. The Sutton and Acton soils are similar in drainage, but the Acton have developed in coarse-textured material. Sutton soils occur in small tracts throughout the Eastern and Western Highlands.

Typical profile (Sutton loam, 3 to 8 percent slopes, in a pasture):

- A_p 0 to 6 inches, very dark grayish-brown (10YR 3/2) loam or fine sandy loam; weak, medium, granular structure; friable; coarse fragments make up 10 percent of the soil volume.

B_{21} 6 to 18 inches, yellowish-brown (10YR 5/4) loam or fine sandy loam; breaks into very soft, subangular blocky clods when disturbed; very friable; coarse fragments make up 10 percent of the soil volume.

B_{22g} 18 to 24 inches, yellowish-brown (10YR 5/4) fine sandy loam mottled with grayish brown (2.5Y 5/2) and strong brown (7.5YR 5/6); very friable; coarse fragments make up 15 to 20 percent of the soil volume.

C_g 24 to 40 inches, mottled light brownish-gray (2.5Y 6/2) and light olive-brown (2.5Y 5/4) gravelly sandy loam till; firm in spots and very friable in others.

Textures range from light loam or silt loam to fine sandy loam. Depth to mottling ranges from about 8 to 22 inches. The quantity of coarse fragments in the surface soil and subsoil ranges from about 10 to 25 percent of the soil volume. The underlying material in places bordering the Central Lowland is reddish gray (5YR 5/2) because of the influence of reddish-brown Triassic rocks. Drainage ranges from moderately good to somewhat poor.

Sutton loam, 0 to 3 percent slopes (SvA).—This soil is moderately well drained and moderately permeable, but a seasonal high water table restricts internal drainage. The soil dries out slowly in spring but more rapidly than Woodbridge loam, 0 to 3 percent slopes—a comparable soil with a pan.

A large part of the acreage has been cleared and is used mainly for hay, pasture, and silage corn in support of dairying. Some areas are used for corn for grain, vegetables, alfalfa, orchards, small fruit, and other crops. Undrained areas are generally well suited to legumes and grasses, late vegetables, and small fruits and fairly well suited to silage corn. The soil should be drained for alfalfa, orchards, and early vegetables. Diversion terraces are needed in places to divert seepage and runoff. The major needs of this soil are fertilizer, drainage in places, and the use of rotations that will maintain tilth and the supply of organic matter. (Capability unit IIw–1.)

Sutton loam, 3 to 8 percent slopes (SvB).—This soil has freer surface drainage than Sutton loam, 0 to 3 percent slopes. A few small areas are included that have 8 to 12 percent slopes.

The soil is used mainly for silage corn, hay, and pasture for dairy cattle. Small acreages are used for orchards, vegetables, corn for grain, and other crops. Management should be the same as for Sutton loam, 0 to 3 percent slopes, except that clean-cultivated fields need simple practices to control erosion. (Capability unit IIwe–1.)

Sutton stony loam, 0 to 3 percent slopes (SwA).—Most of this soil is in cutover forest, but some acreage has been cleared and is used mainly for hay and pasture. Stoniness makes this soil unsuitable for row crops, but most areas can be used for improved pasture, hay, small grains, orchards, and small fruits. If used for orchards, the soil should be drained; small fruits, legumes, and grasses, however, can be grown on undrained areas. (Capability unit IVws–1.)

Sutton stony loam, 3 to 8 percent slopes (SwB).—This soil has moderate surface drainage. A few areas with slopes ranging from 8 to 12 percent are included. The use and suitability of this soil are about the same as for Sutton stony loam, 0 to 3 percent slopes. Unprotected slopes require simple practices to control erosion. (Capability unit IVws–1.)

Sutton and Acton very stony loams, 3 to 15 percent slopes (SxC).—This mapping unit is largely in forest. It should be managed for forest and for grazing. Scattered areas have been cleared and are used mainly for unimproved pasture, or they are idle. Some areas have been developed for improved pasture. Because of stones, this mapping unit is not suited to cultivated crops. (Capability unit VIs–1.)

Swanton Series

This series consists of poorly drained soils that have developed from moderately coarse to medium textured, water-laid or windblown sediments over glaciolacustrine silt and clay. Swanton soils occur in low, wet areas mainly in the northern part of the Central Lowland. Scattered areas are in the southern part. These soils are associated with the well drained Melrose, the moderately well drained Elmwood, and the very poorly drained Whately soils of the same catena. Swanton soils differ from the Walpole soils in being underlain by silt and clay instead of by sandy, gravelly material. Forested areas consist mainly of red maple, gray birch, elm, white ash, alder, and white and red oaks.

Typical profile (Swanton sandy loam, 0 to 3 percent slopes, in a forest):

A_0 1½ inches to 0 inch, partly decomposed litter.

A_{11} 0 to 1 inch, very dark brown (10YR 2/2) sandy loam or fine sandy loam; weak, fine, granular structure; very friable.

A_{12} 1 to 4 inches, dark-gray (10YR 4/1) sandy loam; breaks into very soft, subangular blocky clods; very friable.

B_{21g} 4 to 18 inches, mottled light brownish-gray (10YR 6/2) and yellowish-brown (10YR 5/8) sandy loam; very weak, medium, subangular blocky structure; very friable.

B_{22g} 18 to 28 inches, mottled light-gray (2.5Y 7/2), dark-brown (10YR 4/3), and strong-brown (7.5YR 5/8), interbedded coarse sandy loam and loamy sand; very friable.

D_u 28 to 48 inches, light-gray (2.5Y 7/0) and dark yellowish-brown (10YR 4/4) silty clay with lenses of silt loam or very fine sandy loam; medium, thick, platy structure; plastic when wet.

Textures range from sandy loam to very fine sandy loam. The B_2 horizons vary in color and texture, and in places they contain reddish mottles. Depth to the glaciolacustrine material generally ranges from 24 to 36 inches but may range from 20 to 40 inches in places. This material is generally grayish, but in places it is reddish yellow or yellowish red. In some areas the B_{22g} horizon has some gravel.

Small areas of Whately, Elmwood, and Walpole soils are included.

Swanton sandy loam, 0 to 3 percent slopes (SyA).—This soil has slow to very slow runoff. Internal drainage is slow because of a high water table. Some areas that have a fine sandy loam texture are included.

About half of the acreage is in forest, or it is idle. Undrained areas are used mainly for hay and pasture, and they are best suited to these uses. Scattered, drained or partly drained areas are used for silage corn, tobacco, potatoes, vegetables, and other crops. Good drainage is needed to produce the best yields of tobacco and potatoes. Partly drained areas are suitable for legumes and grasses for hay and for silage corn. Alfalfa and orchards are not suited to this soil. Drainage and fertilization are the principal needs. The soil can be

drained by the use of open ditches or tile. Grazing should be controlled on pastures to prevent puddling the soil and cutting up the sod. (Capability unit IIIw–1.)

Swanton very fine sandy loam, 0 to 3 percent slopes (SzA).—The surface soil and subsoil are very fine sandy loam or light silt loam. Because of the finer texture, this soil dries out somewhat more slowly in spring than Swanton sandy loam, 0 to 3 percent slopes. It is not as well suited to tobacco, potatoes, and similar crops, even if drained.

Use and suitability are essentially the same as for Swanton sandy loam, 0 to 3 percent slopes. Capability unit IIIw–1.)

Terrace Escarpments

Terrace escarpments, clay (Tc).—This land type consists of steep slopes on glaciolacustrine terraces made up of silty and clayey material. It occurs on terrace breaks, along drainageways, and in highly dissected areas. The slopes are generally short, ranging from about 100 feet to several hundred feet wide. Runoff is very rapid, and some areas are eroded. This unit consists of soils in the Buxton, Scantic, Berlin, and Belgrade series.

This land type is used mainly for pasture, but some acreage is idle and some is in forest. Because of the steepness of slopes and risk of erosion, this land type is best suited to pasture and hay. Suitable legumes and grasses can be grown if the soil is limed and fertilized. Alfalfa is not suited to this soil. Pastures and hayfields should be seeded in strips about 100 feet wide that run across the slope. (Capability unit VIe–1.)

Terrace escarpments, sand and clay (Te).—This land type consists of steep slopes on terrace breaks, along drainageways, and in highly dissected areas. Surface textures range from very fine sandy loam to loamy sand and sand. The underlying silty and clayey material is at depths ranging from about 2 to 8 feet. Slopes are generally short, but they are 100 feet to several hundred feet wide. This unit consists of soils in the Melrose, Elmwood, Windsor, Agawam, and Merrimac series.

This land type is largely in forests or it is idle. Some of the acreage, however, is used for unimproved pasture. It is best suited to forestry or pasture because of steep slopes, droughtiness, and the risk of erosion. Pastures need lime and fertilizer. (Capability unit VIe–1.)

Terrace escarpments, sand and gravel (Tg).—This land type consists of sandy or sandy and gravelly materials on slopes of more than 15 percent. It occurs on terrace breaks, along drainageways, in highly dissected areas, and on kames and eskers. The slopes are generally short, and they are 100 feet to several hundred feet wide. This unit consists mainly of soils in the Hinckley, Merrimac, Windsor, Agawam, Hartford, Manchester, and Branford series. Surface textures generally range from gravelly sandy loam or sandy loam to loamy sand and sand.

This land type is mainly in forest, and it is suited best for this purpose because of steep slopes and droughtiness. Most of the cleared acreage is idle, but some is used for pasture. This unit is poorly suited to hay and pasture even if fertilized heavily. (Capability unit VIe–1.)

Tisbury Series

This series consists of moderately well drained, medium-textured soils of the terraces that have developed from a silty mantle overlying coarse sand and gravel. Tisbury soils occur in small areas throughout most of the county. They are the moderately well drained members of the Enfield catena. Tisbury soils are associated with the Merrimac, Sudbury, Ninigret, and Walpole soils. They are finer textured than the Sudbury soil. They differ from the finer textured Ninigret soils in having gravelly substrata.

Typical profile (Tisbury silt loam, 0 to 3 percent slopes, in cultivation):

- A_p 0 to 8 inches, dark-brown (10YR 3/3) silt loam with weak, medium to coarse, granular structure; very friable; coarse fragments make up 3 to 5 percent of the soil volume.
- B_{21} 8 to 15 inches, yellowish-brown (10YR 5/6) silt loam; very weak, medium and coarse, subangular blocky structure; very friable; coarse fragments make up 3 to 5 percent of the soil volume.
- B_{22g} 15 to 22 inches, yellowish-brown (10YR 5/4) silt loam mottled with grayish brown (2.5Y 5/2) and strong brown (7.5YR 5/8); mottles are common, fine to medium, and distinct; very weak, coarse, subangular blocky structure; very friable; coarse fragments make up 6 to 10 percent of the soil volume.
- D_{u1} 22 to 28 inches, mottled brown (7.5YR 5/2) and strong-brown (7.5YR 5/8) coarse sand; firm.
- D_{u2} 28 to 44 inches, intermingled reddish-brown (5YR 4/4) and dark reddish-brown (5YR 4/3) coarse sand and gravel derived from a mixture of Triassic and crystalline rocks.

In cultivated fields the color of the surface soil ranges from very dark grayish brown (10YR 3/2) to dark brown (10YR 3/3) and that of the upper subsoil from yellowish brown (10YR 5/6) to light olive brown (2.5Y 5/4). The quantity of coarse fragments in the surface soil and subsoil ranges from 2 to 15 percent of the soil volume. Depth to the sandy gravelly layer ranges from about 20 to 30 inches. Drainage ranges from moderately good to somewhat poor. Consequently, depths to mottling, intensity of mottling, and the color of subsoil vary.

Tisbury silt loam, 0 to 3 percent slopes (TsA).—This soil is moderately permeable and has a high moisture-holding capacity. A seasonal high water table restricts internal drainage. The lower subsoil is waterlogged in wet seasons. This soil dries out somewhat slowly in spring compared with Enfield silt loam, 0 to 3 percent slopes. It is fairly easy to drain, is easy to work, and responds to good management.

About 80 percent of the acreage has been cleared and is used mainly for silage corn, late vegetables, hay, and pasture. Some acreage is used for tobacco, potatoes, and other crops in the northern part of the Central Lowland. Without drainage, the soil is suited to silage corn, late vegetables, hay, and pasture. Drainage is needed for tobacco and potatoes. Land preparation and planting are delayed in spring, but crops are seldom damaged by lack of moisture in the growing season. The major needs of this soil are drainage for some crops, fertilizer, and crop rotations that will maintain good tilth and the supply of organic matter. (Capability unit IIw–1.)

Tisbury silt loam, 3 to 8 percent slopes (TsB).—This soil has better surface drainage than Tisbury silt loam, 0 to 3 percent slopes. Unprotected slopes erode easily because the silty texture absorbs water slowly.

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This soil has the same use and suitability as Tisbury silt loam, 0 to 3 percent slopes. Management should be the same except that simple practices are needed to control runoff on cultivated areas. (Capability unit IIwe–1.)

Wallington Series

This series consists of poorly drained to somewhat poorly drained soils that have developed in glaciolacustrine silt and very fine sand. Wallington soils are very strongly to strongly acid to depths of 2 or 3 feet, but grade to slightly acid to neutral below this depth. They occur in small, scattered areas in the northern part of the Central Lowland. They are similar to the Belgrade soils in texture but not in drainage. Wallington soils are associated with the Buxton, Scantic, and Biddeford soils. They differ from the Scantic soils in texture and in having more permeable B and C horizons.

Typical profile (Wallington silt loam, 0 to 3 percent slopes, in a forest):

A_{00}	3 to 1½ inches, undecomposed leaves and other debris.
A_0	1½ inches to 0 inch, partly decomposed and well decomposed litter.
A_1	0 to 6 inches, very dark gray (10YR 3/1) silt loam; moderate, coarse, granular structure in upper part and weak, thick, platy structure in lower part; friable; very strongly acid.
A_1–A_{2g}	6 to 8 inches, very dark gray (10YR 3/1) and olive-gray (5Y 5/2) silt loam; weak, thick, platy structure; friable.
A_{2g}	8 to 12 inches, olive-gray (5Y 4/2 and 5/2) silt loam finely mottled with light olive brown (2.5Y 5/4) and brownish yellow (10YR 6/8); mottles few, fine, and distinct; weak, thick, platy structure; friable; slightly plastic when wet; very strongly acid.
B_{2g}	12 to 26 inches, mottled olive-gray (5Y 4/2), light olive-gray (5Y 6/2), and dark yellowish-brown (10YR 4/4) silt loam; mottles are many, medium, and distinct; friable; slightly plastic when wet; medium to slightly acid.
C_{1g}	26 to 48 inches, mottled olive-gray (5Y 5/2), brown (10YR 5/3), and gray (2.5Y 5/0), thinly varved silt and very fine sand; very friable; medium to slightly acid.
C_{2g}	48 to 54 inches, same as overlying horizon with thin lenses of dark-brown (10YR 3/3) silty clay loam; slightly acid.
C_{3g}	54 to 60 inches, similar to C_{1g} horizon except slightly acid to neutral.

The main variation is in drainage, which ranges from poor to somewhat poor. The texture of the material below depths of 2 or 3 feet also varies. In most places it is stratified or weakly varved silt loam and very fine sandy loam or very fine sand containing thin lenses of silty clay loam. Thin layers of coarse-textured material, however, are not uncommon.

The main mapping inclusions are small areas of the Belgrade, Scantic, and Biddeford soils.

Wallington silt loam, 0 to 3 percent slopes (WoA).—This soil has slow to very slow runoff and moderate to slow internal drainage.

Forested areas consist mainly of red maple, elm, gray birch, pin oak, swamp chestnut oak, and high-bush blueberry. Cleared areas are used mainly for hay and pasture. Small areas are partly drained and used for corn, outdoor tobacco, and vegetables. Because of poor drainage, this soil is not suited to alfalfa and tree fruits. Undrained areas are fair for grasses and legumes for hay and pasture if proper amounts of lime and fertilizer are applied. This soil is not as difficult to drain as Scantic loam. However, tiles or open ditches should be closely spaced for adequate drainage. (Capability unit IIIw–1.)

Wallington silt loam, reddish variant, 0 to 3 percent slopes (WbA).—This soil is similar in texture to Wallington silt loam, 0 to 3 percent slopes, but it has developed from reddish sediment and, in places, has coarse fragments in the profiles. In pastures, the surface layer is dark reddish-brown (5YR 3/2) silt loam about 6 inches thick. This is underlain by silt loam mottled with reddish brown, gray, olive gray, and brown. Below the depth of 3 feet, the material is generally interbedded silt, very fine sand, and loamy fine sand with thin layers of sand and gravel in places.

This soil is associated with the Berlin and the reddish variants of the Scantic and Biddeford soils in the southern part of the Central Lowland. Part of the acreage is in forest. The cleared part is used mainly for hay and pasture, or it is idle. Undrained and partly drained areas are fairly well suited to grasses and legumes but not to cultivated crops. (Capability unit IIIw–1.)

Walpole Series

This series consists of moderately coarse to medium textured, poorly drained soils that have developed from sandy or sandy and gravelly terrace deposits. The underlying sediment in the Central Lowland is derived from a wide variety of rocks. Walpole soils occur in scattered areas throughout the county. They are associated with the Merrimac, Agawam, Enfield, Hartford, and Branford soils. They differ from Swanton soils in that the latter are underlain by deposits of silt and clay.

Typical profile (Walpole sandy loam, 0 to 3 percent slopes, in a forest):

A_0	2 inches to 0 inch, partly decomposed litter.
A_1	0 to 7 inches, black (10YR 2/1) sandy loam; very weak, medium, granular structure; very friable; coarse fragments make up 2 to 3 percent of the soil volume.
A_{2g}	7 to 10 inches, mottled very dark grayish-brown (10YR 3/2) and dark yellowish-brown (10YR 4/4) sandy loam; very friable.
B_{21g}	10 to 22 inches, mottled light-gray (5Y 6/1), brown (10YR 4/3), and very dark brown (10YR 2/2) sandy loam, slightly firm in place but very friable when disturbed; coarse fragments make up 3 to 8 percent of the soil volume.
C_g	22 to 48 inches, mottled light-gray (5Y 6/1), brown (10YR 5/3), and yellowish-brown (10YR 5/8) gravelly loamy sand with pockets of gravelly sandy loam.

Textures range from sandy loam to loam or silt loam. In cultivated areas, the surface soil is normally very dark brown (10YR 2/2). The quantity of coarse fragments in the surface soil and subsoil ranges from 0 to 20 percent of the soil volume. In places the underlying material is principally sand and gravel; in others it is sand and loamy sand.

Small areas of the Scarboro, Sudbury, Ninigret, and Swanton soils are mapped as inclusions.

Walpole loam, 0 to 3 percent slopes (WcA).—This soil includes loam, very fine sandy loam, and silt loam textures.

Use, suitability, and management are essentially the same as for Walpole sandy loam, 0 to 3 percent slopes. Because of the finer texture, this soil dries out somewhat

more slowly in spring. If drained, it is not quite so well suited to cultivated crops. (Capability unit IIIw–1.)

Walpole sandy loam, 0 to 3 percent slopes (WdA).—This soil has slow to very slow runoff, and because of a seasonal high water table, it has slow internal drainage. Included with this soil are areas having fine sandy loam and coarse sandy loam textures.

About 50 to 60 percent of the acreage is in forest, and some is idle. A large percentage of the cleared area is used for pasture and hay. Small areas are drained or partly drained and are used for silage corn, sweet corn, tobacco, potatoes, vegetables, and other crops. Undrained areas are best suited to sod crops. Partly drained areas are suited to silage corn and late vegetables. Well-drained areas are fairly well suited to tobacco and potatoes. The soil is not suited to alfalfa and tree fruits. The major needs of this soil are drainage, fertilizer, and lime. The soil is relatively easy to drain because of the sandy, gravelly substrata. (Capability unit IIIw–1.)

Wapping Series

This series consists of moderately well drained soils that have developed from silty mantles over firm to very friable glacial till. This till is derived mainly from reddish-brown Triassic sandstone and conglomerate but with some basalt and other rocks in places. Wapping soils occur in association with the Narragansett, Cheshire, Watchaug, and Wilbraham soils. They differ from the Watchaug soils in color and in having a finer texture and from the Rainbow soils in character of the underlying material.

Typical profile (Wapping silt loam, 0 to 3 percent slopes, in cultivation):

- A_p 0 to 10 inches, very dark grayish-brown (10YR 3/2) silt loam; upper 6 inches weak, coarse, granular structure over a moderate, thick, platy plowsole; friable to very friable; small, angular fragments of rock make up about 10 percent of soil volume.
- B_{21} 10 to 16 inches, brown (7.5YR 4/4) silt loam; soft, subangular blocky clods crush easily to weak, coarse, granular structure; very friable; coarse fragments make up about 5 percent of the soil volume; boundary clear.
- B_{22} 16 to 20 inches, brown (10YR 5/3) silt loam mottled or streaked with yellowish brown (10YR 5/6); very weak, subangular blocky structure; very friable; coarse fragments make up about 3 percent of the soil volume; boundary clear.
- B_{23g} 20 to 28 inches, mottled light-gray (10YR 7/2), pale-brown (10YR 6/3), and yellowish-brown (10YR 5/8) silt loam; common, fine, and distinct mottles; weak, thick, platy structure; very friable.
- D_u 28 to 48 inches, yellowish-red (5YR 4/6) gravelly sandy loam interbedded with loamy sand; lenses and pockets of firm material interbedded with very friable to loose material.

The thickness of the silty mantle generally ranges from 24 to 30 inches, but in places it is as much as 40 inches thick. Coarse fragments in the A and B horizons make up 2 to 15 percent of the soil volume. In some cultivated areas, small, angular fragments of rock are more common on the surface of the soil than in the A or B horizons. The underlying till varies from firm and weak, thick platy to very friable. Drainage varies from moderately good to somewhat poor. Consequently, depth to mottles varies.

Wapping silt loam, 0 to 3 percent slopes (WeA)—This soil is medium textured and moderately permeable, but a seasonal high water table interferes with internal drainage. Runoff is generally slow. The soil dries out somewhat slowly in spring.

This soil is almost all cleared. Some acreage is used for tobacco, potatoes, silage corn, and other crops. Undrained areas are well suited to silage corn, late vegetables, small fruits, and legumes and grasses. Partly drained areas are suited to potatoes, outdoor tobacco, and alfalfa. The major needs of this soil are fertilizer, drainage in places, and crop rotations that will maintain tilth and the supply of organic matter. Ditches for diverting runoff are desirable in places. (Capability unit IIw–1.)

Wapping silt loam, 3 to 8 percent slopes (WeB).—This soil has a moderate runoff problem but is otherwise similar to Wapping silt loam, 0 to 3 percent slopes. It absorbs water slowly, and it erodes easily, even on gentle slopes.

Use and suitability are the same as for Wapping silt loam, 0 to 3 percent slopes. Management is also about the same, but simple practices to control erosion are needed for clean-cultivated crops. (Capability unit IIwe–1.)

Wapping stony silt loam, 0 to 3 percent slopes (WfA).—This soil is partly cleared and partly in forest. Cleared areas are used for pasture and hay. The soil can be used for hay, improved pasture, and small fruits, but it is difficult to work for crops that require intensive cultivation. It should be drained for orchards, but it is generally suited to hay and pasture without drainage. (Capability unit IVws–1.)

Wapping stony silt loam, 3 to 8 percent slopes (WfB)—This soil has freer surface drainage than Wapping stony silt loam, 0 to 3 percent slopes. Part of the acreage is in forest and part is used for hay and pasture. (Capability unit IVws–1.)

Watchaug Series

This series consists of reddish, moderately well drained soils that have developed from glacial till. This till is derived mainly from reddish-brown Triassic sandstone and conglomerate but with some basalt and other rocks in places. The underlying till ranges from gravelly sandy loam to gravelly loamy sand, and it is firm to very friable. Watchaug soils are closely associated with the Cheshire, Wethersfield, Ludlow, Wilbraham, Menlo, Narragansett, and Wapping soils. They differ from the moderately well drained Wapping soils in color and in having a coarser textured solum. They are similar to the Ludlow soils in color, but the latter have finer textured surface soil and subsoil and a very firm, compact horizon at a depth of about 2 feet.

Watchaug very stony soils, 3 to 15 percent slopes, are mapped in this county with the Ludlow soils as an undifferentiated mapping unit.

Typical profile (Watchaug loam, 0 to 3 percent slopes, in improved pasture):

- A_p 0 to 6 inches, very dark grayish-brown (10YR 3/2) fine sandy loam or loam; coarse, subangular blocky clods crush easily to weak, coarse, granular structure; very friable; coarse fragments make up about 5 percent of the soil volume; boundary abrupt.
- B_{21} 6 to 12 inches, yellowish-red (5YR 4/6) fine sandy loam or loam; weak, thick, platy structure; friable; coarse fragments make up about 5 percent of the soil volume; boundary clear.

B_{22g} 12 to 22 inches, mottled dark reddish-gray (5YR 4/2), reddish-gray (5YR 5/2), and strong-brown (7.5YR 5/8) fine sandy loam with lenses of sandy loam; mottles are common, fine, and faint; very weak, coarse, subangular blocky structure; very friable; coarse fragments make up about 10 percent of the soil volume.

C 22 to 36 inches, gravelly sandy loam or coarse sandy loam that is dark red (2.5YR 3/6) intermingled with yellowish red (5YR 4/6) and contains streaks of reddish gray (5YR 5/2); firm in place but crushes very easily when disturbed.

The texture ranges from loam to fine sandy loam or sandy loam. The texture on most areas is near the boundary of loam and sandy loam. Mottles occur at depths of 10 to 20 inches.

Watchaug loam, 0 to 3 percent slopes (WgA).—This soil occurs in small, scattered areas. It is moderately permeable and has slow to medium runoff. A seasonal high water table interferes with internal drainage. The moisture-holding capacity is high.

Most of the acreage has been cleared and is used for hay, pasture, silage corn, tobacco, potatoes, and other crops. Undrained areas are well suited to sod crops, silage corn, and late vegetables. Partly drained areas are suited to potatoes, outdoor tobacco, and alfalfa. The major needs of this soil are drainage in places, fertilization, and crop rotations that will maintain good tilth and the supply of organic matter. Ditches for diverting runoff from high areas are desirable in places. (Capability unit IIw–1.)

Watchaug loam, 3 to 8 percent slopes (WgB).—This soil is similar to Watchaug loam, 0 to 3 percent slopes, except that it has medium runoff. Use, suitability, and management are the same except that simple practices are needed to control erosion in clean-cultivated fields. (Capability unit IIwe–1.)

Watchaug stony loam, 0 to 3 percent slopes (WhA).—This soil is partly in forest and partly in hay and pasture. Because of stones, it is not generally suitable for row crops. It can, however, be used for hay, improved pasture, and small grains. Areas used for orchards should be drained. (Capability unit IVws–1.)

Watchaug stony loam, 3 to 8 percent slopes (WhB).—This soil has more rapid runoff than Watchaug stony loam, 0 to 3 percent slopes. Part of the acreage is in forest, and part is used for hay and pasture. Use and suitability are the same as for Watchaug stony loam, 0 to 3 percent slopes. (Capability unit IVws–1.)

Wethersfield Series

The Wethersfield series consists of reddish, medium-textured, well-drained soils that have a fragipan at a depth of about 2 feet. The fragipan has developed in till that was derived mainly from reddish-brown sedimentary and igneous rocks of Triassic age. These soils are generally on smoothly rounded drumlins or drumloidal hills or on undulating to hilly till plains. They occur throughout the Central Lowland but are mainly in the southern part.

Wethersfield soils are associated with the shallow Sunderland and Holyoke, the moderately well drained Ludlow, the poorly drained Wilbraham, and the very poorly drained Menlo soils. The Wethersfield soils are similar to the Cheshire soils in color but differ from them in texture and in consistence of underlying material. Wethersfield soils are also associated with the Broadbrook soils, which have developed in a silty mantle that is underlain by till.

Typical profile (Wethersfield stony loam, 3 to 8 percent slopes, in a forest):

A_0 1 to 0 inch, partly decomposed litter.

A_1 0 to 1 inch, very dark brown (10YR 2/2) loam; weak, medium, granular structure; very friable; very strongly acid.

A_2 1 to 6 inches, reddish-brown (5YR 4/4) loam or silt loam; very weak, medium, platy structure; very friable; coarse fragments make up 5 percent of the soil volume; very strongly acid.

B_{21} 6 to 18 inches, dark-red (2.5YR 3/6) loam; weak to moderate, medium, subangular blocky structure; friable; coarse fragments make up 8 to 10 percent of soil volume; very strongly acid.

B_{22} 18 to 24 inches, same as the overlying horizon except that the content of angular rock fragments is about 15 percent of soil volume.

B_{23m} 24 to 48 inches, dusky-red (10R 3/4) gravelly loam; moderate, thick, platy structure to massive; manganese dioxide coatings common on breakage faces; silt films are present on some breakage faces and around rock fragments; very firm and compact; only a few roots in cracks penetrate this horizon; medium to strongly acid; material below depth of 6 feet is slightly acid to neutral.

All of this soil was originally stony, but some areas have had most of the stones removed. Surface soil and subsoil textures range from loam to silt loam. Small to medium-size angular fragments of rock on and in this soil make up 5 to 20 percent of the soil volume. The B horizons range in color from reddish brown (5YR 4/3–4/4) to dark red (2.5YR 3/6). In many places the boundaries between the Wethersfield and Broadbrook soils are not well defined. Many areas mapped as Wethersfield soils have developed in material that may contain windblown deposits.

The principal inclusions are small areas of the Ludlow, Cheshire, and Broadbrook soils.

Wethersfield loam, 0 to 3 percent slopes (WkA).—This soil has a high moisture-holding capacity. It is moderately permeable above the pan, but the pan restricts internal drainage. The soil warms rather slowly in spring, but crops seldom seriously lack moisture during the growing season. In cultivated fields the A_p horizon is generally dark reddish brown (5YR 3/3) to reddish brown (5YR 4/3).

This is one of the most desirable upland soils in the Central Lowland for tree fruits and for legumes and grasses for hay and pasture. It is used for these crops and for silage corn. Some of the acreage is used for vegetables, tobacco, sweet corn, nursery stock, and other crops. This soil is poorly suited to tobacco and early vegetables. Alfalfa grows well, but it is subject to some heaving. The soil needs fertilizer, and practices that maintain organic matter and good tilth. Crops should be grown in rotations. Even gentle slopes erode easily if unprotected. (Capability unit I–2.)

Wethersfield loam, 3 to 8 percent slopes (WkB).—This gently sloping soil is fairly extensive, especially in the southern part of the Central Lowland. It absorbs water slowly, and it erodes easily, even on gentle slopes.

It is used mainly for tree fruits, silage corn, alfalfa and other legumes, and pasture grasses. Some of the acreage is used for tobacco, vegetables, sweet corn, nursery stock, and other crops. This soil is well suited to silage corn, tree fruits, alfalfa, and late vegetables, but it is

poorly suited to tobacco and early vegetables. The soil needs fertilizer and supporting practices that maintain organic matter and good tilth. Crops should be grown in rotations; runoff and erosion need control. (Capability unit IIe–2.)

Wethersfield loam, 3 to 8 percent slopes, eroded (WkB2).—This soil is shallower than Wethersfield loam, 3 to 8 percent slopes. Depth to the compact pan is generally about 20 inches or less, but it ranges from about 14 to 20 inches. The A_p horizon generally contains less organic matter than the normal soil, and eroded areas generally contain a higher percentage of rock fragments in the solum.

This soil is used for the same crops as Wethersfield loam, 3 to 8 percent slopes. Yields probably average less because of the lower moisture-holding capacity. Erosion is rather serious on this soil because of the compact, slowly permeable horizon. Careful management and the use of conservation practices are needed to improve and maintain fertility and the supply of organic matter and to prevent further erosion. (Capability unit IIe–2.)

Wethersfield loam, 8 to 15 percent slopes (WkC).—Unprotected slopes are subject to serious erosion on this soil.

The soil is well suited to close-growing crops and orchards. It is suited to silage corn and other cultivated crops, but these crops should be grown in longer rotations and erosion control practices should be more intensive than on Wethersfield loam, 3 to 8 percent slopes. (Capability unit IIIe–2.)

Wethersfield loam, 8 to 15 percent slopes, eroded (WkC2).—This soil has more rapid runoff than Wethersfield loam, 3 to 8 percent slopes, eroded. Consequently, the control of erosion is more of a problem. Included with this unit are a few severely eroded areas.

This soil is used mainly for hay, pasture, and orchards. Because of the shallow solum and risk of erosion, it is best suited to legumes and grasses and to orchards. Areas in cultivated crops need larger quantities of fertilizer and intensive practices to control erosion. (Capability unit IIIe–2.)

Wethersfield loam, 15 to 25 percent slopes (WkD).—This soil generally occurs in fairly small, narrow strips. A few small areas on slopes of 25 to 35 percent are included with it.

The soil is suited to legumes and grasses for hay and pasture and to orchards. Because of the risk of erosion, it is not suited to cultivated crops unless they are grown in long rotations supported by intensive practices to control erosion. Hayfields and pastures should be limed and fertilized to form a good sod. (Capability unit IVe–2.)

Wethersfield loam, 15 to 25 percent slopes, severely eroded (WkD3).—This soil occurs in scattered areas. Small areas on slopes of 25 to 35 percent are included with it. The soil is used mainly for pasture, hay, and orchards, but some of the acreage is idle. It is best suited to close-growing crops and orchards because of shallow solum, droughtiness, and the risk of erosion. (Capability unit IVe–2.)

Wethersfield stony loam, 3 to 8 percent slopes (WmB).—Included with this soil are a few small areas on 0 to 3 percent slopes.

Wethersfield stony loam, 3 to 8 percent slopes, is mainly in forest. Some of the acreage has been cleared and is used for hay, pasture, and orchards, or it is idle. Most areas can be used for hay, improved pasture, small grains, and orchards, but the soil is difficult to work for intensively cultivated crops. (Capability unit IVes–2.)

Wethersfield stony loam, 8 to 15 percent slopes (WmC).—This soil has more runoff than Wethersfield stony loam, 3 to 8 percent slopes. It is mainly in forest, but some acreage is used for hay, pasture, or orchards. (Capability unit IVes–2.)

Wethersfield stony loam, 15 to 25 percent slopes (WmD).—This soil is largely in forest. Some acreage has been cleared and is used for pasture, or it is idle. Some areas can be used for hay and improved pasture. However, the soil is best suited to forestry and grazing because of the stoniness and steepness. (Capability unit VIes–2.)

Wethersfield very stony loam, 3 to 15 percent slopes (WnC).—This soil is largely in forest, but some of it is used for unimproved pasture or is idle. Because of stones, this soil is not suitable for cultivated crops. Some areas, however, are suitable for improved pasture. (Capability unit VIs–2.)

Wethersfield very stony loam, 15 to 35 percent slopes (WnD).—This soil is largely in forest. Some acreage is used for unimproved pasture or is idle. This soil is suited mainly to forestry and grazing because of steepness of slopes and stones. (Capability unit VIIs–2.)

Whately Series

The Whately series consists of very poorly drained, moderately coarse textured to medium textured soils. These soils have developed in water-laid or windblown deposits underlain by glaciolacustrine silt and clay at depths of 2 to 4 feet. They occupy low, wet areas in which the water table is near the surface most of the time. These soils are associated with the well drained Melrose, the moderately well drained Elmwood, and the poorly drained Swanton soils. They differ from the Scarboro soils in being underlain by silt and clay rather than by sandy, gravelly material.

Typical profile (Whately loam, 0 to 3 percent slopes, under forest):

A_0	4 inches to 0 inch, partly decomposed litter.
A_1	0 to 6 inches, black (10YR 2/1) very fine sandy loam or loam high in organic matter; massive, breaks into coarse clods when disturbed.
B_{21g}	6 to 16 inches, gray (5Y 5/1) and olive-gray (5Y 5/2) sandy loam; very friable.
B_{22g}	16 to 28 inches, olive-gray (5Y 5/2) fine sandy loam finely mottled with olive (5Y 4/3); firm in place but very friable when disturbed.
D_u	28 to 60 inches, interbedded or varved, dark reddish-gray (5YR 4/2), light silty clay loam and brown (10YR 5/3) very fine sandy loam.

Surface soil and subsoil textures range from loamy sand to loam or silt loam. The surface soil feels loamy regardless of texture because of the high content of organic matter. The layer of silt and clay occurs at depths ranging from 2 to 4 feet.

Small areas of the Swanton, Walpole, and Scarboro soils are included with this soil as mapped.

Whately loam, 0 to 3 percent slopes (WoA).—This poorly drained soil occurs in small areas. Most of it is in forest. Scattered areas have been cleared and are used mainly for unimproved pasture, or they are idle. Un-

drained areas produce very poor pasture, but partly drained areas produce fair pasture if limed and fertilized. This soil is more difficult to drain than Scarboro soils because of the underlying strata of silt and clay. (Capability unit Vw–1.)

Whitman Series

This series consists of very poorly drained soils on uplands that have developed in glacial till derived mainly from crystalline rocks. This till is variable in texture and consistence. Most of the soils are stony to very stony. Stones have been removed from small, scattered areas. The Whitman soils occur in low, very wet areas in the Eastern and Western Highlands. They are the very poorly drained member of the Gloucester, Charlton, and Paxton catenas.

Whitman very stony soils are mapped with the Leicester and Ridgebury soils as an undifferentiated mapping unit.

Typical profile (Whitman stony loam, 0 to 3 percent slopes, in a forest):

- A_{00} 4½ inches to 2 inches, undecomposed forest litter.
- A_0 2 inches to 0 inch, partly decomposed and well decomposed forest litter.
- A_1 0 to 10 inches, black (10YR 2/1) loam; the upper 6 inches have weak, coarse, granular structure, and the lower 4 inches are massive and mottled with dark-brown (10YR 3/3) iron stains; very friable to friable.
- A_{2g} 10 to 13 inches, dark-gray (10YR 4/1) coarse sandy loam or loamy sand finely mottled with yellowish brown (10YR 5/4); massive; very friable; boundary abrupt.
- B_{21gir} 13 to 17 inches, gray (5Y 5/1) loam mottled with strong brown (7.5YR 5/8); massive; friable; coarse fragments make up 5 percent of the soil volume; boundary clear.
- B_{22g} 17 to 20 inches, gray (2.5Y 5/0) loam or silt loam finely mottled with grayish brown (2.5Y 5/2); friable; coarse fragments make up 5 percent of the soil volume; boundary clear.
- C_{gm} 20 to 36 inches, mottled gray (5Y 5/1), dark grayish-brown (2.5Y 4/2), and yellowish-brown (10YR 5/6) gravelly sandy loam; very firm in place but crushes very easily when disturbed.

The A and B horizons range in texture from coarse sandy loam to loam or silt loam. Some areas have a thin layer of muck or peat on the surface. The underlying till varies in texture from gravelly loamy sand to gravelly loam. It is friable to very firm and compact.

Whitman stony loam, 0 to 3 percent slopes (WpA).—This soil occurs in small, widely scattered areas. Most areas are moderately stony, but the stones have been removed to a large extent from a few small areas. The soil is mainly in forest; however, small areas have been cleared and are used largely for unimproved pasture or they are idle. Partly drained areas produce fair pasture. (Capability unit VIws–2).

Wilbraham Series

This series consists of poorly drained, silty soils that have developed on glacial till. This till was derived mainly from a mixture of reddish-brown Triassic sedimentary and intrusive igneous rocks. These soils have a fragipan at a depth of about 24 inches. They occur in small, low, wet, nearly level areas throughout the Central Lowland. They are associated with the well drained Wethersfield, the moderately well drained Ludlow, the very poorly drained Menlo, and with the Broadbrook, Narragansett, and Cheshire soils. They differ from the poorly drained Ridgebury and Leicester soils in having reddish substrata and reddish mottles in the subsoil horizons.

Typical profile (Wilbraham silt loam, 0 to 3 percent slopes, in a brushy pasture):

- A_1 0 to 6 inches, very dark brown (10YR 2/2) silt loam; weak, medium, granular structure; friable.
- A_{2g} 6 to 11 inches, olive-gray (5Y 5/2) loam mottled with yellowish brown (10YR 5/6) and red (2.5YR 4/6); friable; coarse fragments make up 8 to 10 percent of the soil volume.
- B_{21g} 11 to 22 inches, loam or silt loam; mottled yellowish red (5YR 4/8), strong brown (7.5YR 5/6), and olive gray (5Y 5/2); friable; coarse fragments make up 10 to 15 percent of the soil volume.
- B_{22gm} 22 to 40 inches, yellowish-red (5YR 4/8) gravelly loam mottled with reddish gray (5YR 5/2) and pinkish gray (5YR 4/2); very firm and compact; weak, thick, platy structure to massive.

Small to medium-size angular fragments of rock are common in the surface soil and subsoil. Subsoil layers vary in color and intensity of mottling. Areas of this soil associated with the Broadbrook and Narragansett soils generally have less red mottlings and fewer rock fragments in the subsoil than areas associated with the Wethersfield soils. Areas associated with Cheshire and Narragansett soils have sandy loam substrata in places.

Wilbraham silt loam, 0 to 3 percent slopes (WrA).—This soil occurs in low areas where seepage and runoff collect. It is poorly drained and has slow to very slow runoff.

The soil is used mainly for pasture and hay. A few small areas are drained or partly drained and are used for silage corn, vegetables, and other crops. Some acreage is idle. Undrained areas are best suited to hay and pasture, but drained areas are suited to silage corn, late vegetables, and other crops. The soil can be drained by use of open ditches or tile, but a compact horizon at a depth of 20 to 30 inches makes drainage somewhat difficult. Diversion terraces are needed to divert seepage and runoff from higher areas. The major needs of this soil are drainage and fertilizer. (Capability unit IIIw–1.)

Wilbraham stony silt loam, 0 to 3 percent slopes (WsA).—This soil is mainly in forest. Some acreage has been cleared and is used for pasture, or it is idle. Because of stones and poor drainage, this soil is limited mainly to forestry and unimproved pasture. Some areas are suitable for improved pasture. Unimproved pastures could be improved through the use of fertilizer and the control of brush and weeds. (Capability unit VIws–1.)

Wilbraham and Menlo very stony silt loams, 0 to 3 percent slopes (WtA).—This mapping unit includes poorly drained Wilbraham and very poorly drained Menlo soils. These soils are mainly in forest. Some of the acreage has been cleared or partly cleared and is used for unimproved pasture, or it is idle. Pastures furnish some grazing of native legumes and grasses during dry seasons. Stoniness and wetness limit the use of this soil mainly to forests, unimproved pasture, and wildlife habitat. Unimproved pastures can be improved by controlling brush and weeds. (Capability unit VIIs–4.)

Windsor Series

The Windsor series consists of very droughty sand and loamy sand. Windsor soils have developed on nearly level to sloping and rolling terraces. In many places the soil material shows that it has been deposited or reworked by wind. Well-defined dunes occur in areas of loamy fine sand. Windsor soils are mostly in the six towns in the northeastern corner of the county, but they occur also in scattered tracts in other parts of the Central Lowland. Windsor soils are associated with those of the Agawam and Merrimac catenas. They are similar in texture to Penwood soils, but the latter are yellowish red.

Areas of loamy fine sand and fine sand are essentially free of gravel. Those of loamy coarse sand and coarse sand generally have some fine gravel in the surface soil and subsoil and from 2 to 10 percent of fine gravel in the substratum.

Typical profile (Windsor loamy coarse sand, 0 to 3 percent slopes, in cultivation):

- A_p 0 to 8 inches, dark yellowish-brown (10YR 3/4) loamy coarse sand with a small amount of fine gravel; very friable to loose.
- B_{21} 8 to 20 inches, brown (7.5YR 4/4) loamy coarse sand with a small amount of fine gravel. Color becomes slightly paler with depth.
- B_{22} 20 to 24 inches, yellowish-brown (10YR 5/6) coarse sand with some gravel.
- C 24 to 48 inches, grayish-brown (10YR 5/2) and brown (10YR 5/3) coarse sand with 5 to 6 percent fine gravel.

Typical profile (Windsor loamy fine sand, 0 to 3 percent slopes, in cultivation):

- A_p 0 to 8 inches, dark yellowish-brown (10YR 3/4) loamy fine sand; weak, coarse, granular structure; very friable to loose.
- B_{21} 8 to 18 inches, strong-brown (7.5YR 5/6) loamy fine sand; very friable to loose.
- B_{22} 18 to 24 inches, yellowish-brown (10YR 5/6) fine sand; loose.
- C 24 to 60 inches, intermingled grayish-brown (10YR 5/2) and brown (10YR 5/3) loose fine, medium, and coarse sand.

The principal variation in the loamy fine sands is in texture, which ranges from loamy fine sand to fine sand. The smoother areas are dominantly loamy fine sand, and the steeper ones fine sand.

Windsor loamy coarse sand, 0 to 3 percent slopes (WuA).—This is a droughty soil. About 75 percent of the acreage is forested, idle, or in urban development. Outdoor and shade-grown tobaccos and sweet corn are the main crops. Some acreage is used for alfalfa, early lettuce, and other crops. Most areas in tobacco, sweet corn, and early vegetables are irrigated and produce good yields if heavily fertilized. Careful management is needed to improve and maintain fertility and the supply of organic matter. (Capability unit IIIs–1.)

Windsor loamy coarse sand, 3 to 8 percent slopes (WuB).—This soil absorbs water rapidly, but unprotected areas are subject to some wind and water erosion. Use and suitability are the same as for Windsor loamy coarse sand, 0 to 3 percent slopes. (Capability unit IIIs–1.)

Windsor loamy coarse sand, 8 to 15 percent slopes (WuC).—This soil is extremely droughty. Unprotected slopes are subject to wind and water erosion.

The soil is mainly in forest, or it is idle. Small, scattered areas are used for tobacco, sweet corn, alfalfa, and other crops. Heavy fertilization and irrigation are needed to produce good yields. (Capability unit IVs–1.)

Windsor loamy fine sand, 0 to 3 percent slopes (WvA).—This soil is very rapidly permeable and has a low moisture-holding capacity. It is excessively drained and warms very early in spring. It responds to fertilizer when the moisture supply is adequate.

About 75 percent of the acreage is forested, idle, or in urban development. Tobacco and sweet corn are the main crops, but some acreage is used for early vegetables, corn, alfalfa, pasture, and other crops. Alfalfa grows fairly well. This soil is not well suited to crops, hay, and pasture because of droughtiness. A large part of the tobacco, sweet corn, and early vegetables is irrigated. If fertilizer is applied in large quantities, good yields of crops are obtained. (Capability unit IIIs–1.)

Windsor loamy fine sand, 3 to 8 percent slopes (WvB).—This soil absorbs water rapidly, but unprotected slopes are subject to some water and wind erosion.

A large part of the acreage is forested, idle, or in residential development. Use and suitability are the same as for Windsor loamy fine sand, 0 to 3 percent slopes. (Capability unit IIIs–1.)

Windsor loamy fine sand, 8 to 15 percent slopes (WvC).—This soil is extremely droughty. Unprotected slopes are subject to wind and water erosion.

This soil is largely in scrubby forest, or it is idle. Small areas are used for crops and pasture. Yields are low unless crops are irrigated. (Capability unit IVs–1.)

Winooski Series

This series consists of moderately well drained silty soils of the flood plains. These soils are flooded on the average of about once a year but seldom during the growing season. They are associated with the Hadley soils and have similar texture. However, they occupy slightly lower topographic positions and are mottled at depths of 8 to 20 inches. Winooski soils differ from Podunk soils mainly in having a finer texture.

Typical profile (Winooski silt loam, 0 to 3 percent slopes, in cultivation):

- A_p 0 to 10 inches, very dark grayish-brown (10YR 3/2) silt loam; weak, medium, granular structure in upper few inches; very friable; strongly acid.
- C_1 10 to 16 inches, intermingled dark-brown (10YR 3/3) and dark yellowish-brown (10YR 4/4) silt loam; very weak, medium, subangular blocky structure; very friable; strongly acid.
- C_2 16 to 18 inches, very dark brown (10YR 2/2) silt loam; very friable.
- C_{3g} 18 to 36 inches, mottled grayish-brown (10YR 5/2), dark grayish-brown (10YR 4/2), and dark yellowish-brown (10YR 4/4) silt loam; massive; very friable; strongly acid.
- C_{4g} 36 to 48 inches, interbedded fine sandy loam and very fine sandy loam mottled with various shades of gray, olive gray, olive brown, and brown; very friable; medium acid.

Mottling varies considerably in depth and intensity. In most places it occurs at depths of about 10 to 20 inches. Below a depth of 30 inches, the texture of the material is silt loam, loamy sand, or sand that contains layers of coarse sand and gravel in places.

Small areas of the Hadley, Limerick, and Podunk soils are included.

Winooski silt loam, 0 to 3 percent slopes (WwA).—This soil is medium textured and moderately permeable, but a seasonal high water table interferes with internal drainage. Mottles at depths of 10 to 20 inches indicate that the lower subsoil is waterlogged in wet seasons.

Most of the acreage has been cleared and is used mainly for hay, pasture, and silage corn. Some acreage is used for sweet corn, outdoor tobacco, potatoes, vegetables, and other crops. The soil is well suited to legumes and grasses for hay and pastures. It is not well suited to alfalfa, but this plant can be grown in a mixture with other legumes and grasses. The soil is fairly well suited to silage corn, sweet corn, and vegetables. It is poorly suited to tobacco and potatoes, because it dries out slowly in spring. Fertilization and drainage are needed in places. (Capability unit IIw–5.)

Woodbridge Series

This series consists of moderately well drained soils that have developed from glacial till derived mainly from schistose rocks. The soils have a fragipan at a depth of about 2 feet. They generally occur in small areas throughout the Eastern and Western Highlands on nearly level crests of hills and on slightly concave lower slopes that receive seepage and runoff from higher slopes.

Woodbridge soils are closely associated with the Paxton, the poorly drained Ridgebury, and the very poorly drained Whitman soils of the same catena. They are wetter than the Paxton soils and have mottles in the lower subsoil. They differ from the Ludlow soils in color and parent material and from the Sutton soils in consistence of underlying material.

The reddish substratum phases of the Woodbridge series have developed from glacial till derived from a mixture of crystalline and reddish-brown Triassic rocks. They have a fragipan at depths of 20 to 30 inches, which is generally reddish brown (5YR 4/3–5/3). Other profile characteristics are similar to those of typical Woodbridge soils. The reddish substratum phases occur in the Eastern and Western Highlands near the fault line between the Triassic rocks of the Central Lowland and the crystalline rocks of the highlands in the towns of Glastonbury, Manchester, Granby, Simsbury, and Bristol. They are associated with the reddish substratum phases of the Paxton series.

Typical profile (Woodbridge loam, 0 to 3 percent slopes, in cultivation):

A_p 0 to 8 inches, very dark grayish-brown (10YR 3/2) loam; moderate, coarse, granular structure: friable; coarse fragments make up about 15 percent of the soil volume.

B_{21} 8 to 16 inches, dark yellowish-brown (10YR 4/4) loam; breaks into very soft, subangular blocky clods when disturbed; very friable; coarse fragments make up about 15 percent of the soil volume; boundary gradual.

B_{22g} 16 to 22 inches, olive-brown (2.5Y 4/4) loam mottled with light brownish gray (2.5Y 6/2) and olive gray (5Y 4/2); very friable; coarse fragments make up 15 to 20 percent of the soil volume; boundary clear.

B_{23gm} 22 to 48 inches, mottled grayish-brown (2.5Y 5/2), olive-gray (5Y 4/2), and dark-brown (7.5YR 4/4) gravelly loam or sandy loam; moderate, thick, platy structure; very firm and compact; silt films are on some breakage faces and around rock fragments.

In most areas the texture of the surface soil is light loam or silt loam, but in some it is fine sandy loam. The compact pan is at depths ranging from 20 to 30 inches, and mottling is at depths of 8 to 18 inches. The color of the upper subsoil ranges from light olive brown (2.5Y 5/4) to strong brown (7.5YR 5/6).

Woodbridge loam, 0 to 3 percent slopes (WxA).—This soil is moderately permeable above the pan, which is at depths of 20 to 30 inches. A seasonal perched water table, however, interferes with internal drainage. The soil dries rather slowly in spring and stays wet for several days after heavy rains in summer.

A large part of the acreage has been cleared and is used mainly for hay and pasture. Some acreage is used for vegetables, orchards, small fruits, and corn for grain and silage. The soil is suited to hay, pasture, and small fruits and fairly well suited to silage corn and late vegetables without drainage. It is poorly suited to orchards, alfalfa, and early vegetables unless partly drained. Diversion terraces are needed in places to divert seepage and runoff from higher areas. Legumes and grasses for hay and pasture and cultivated crops need fertilizer and lime for high yields. (Capability unit IIw–2.)

Woodbridge loam, 3 to 8 percent slopes (WxB).—This soil has better surface drainage than Woodbridge loam, 0 to 3 percent slopes. Use and suitability are essentially the same. Clean-cultivated areas need simple practices to control runoff. (Capability unit IIwe–2.)

Woodbridge loam, reddish substratum, 0 to 3 percent slopes (WyA).—This soil occurs in small, widely scattered areas. Use, suitability, and management are the same as for Woodbridge loam, 0 to 3 percent slopes. (Capability unit IIw–2.)

Woodbridge loam, reddish substratum, 3 to 8 percent slopes (WyB).—This soil has better surface drainage than Woodbridge loam, reddish substratum, 0 to 3 percent slopes. It is used mainly for hay and pasture, but small acreages are used for vegetables, orchards, small fruits, and corn for grain and silage. Without drainage, the soil is suitable for hay, pasture, and small fruits and fairly well suited to silage corn and late vegetables. It should be drained for apple and peach orchards. Lime and fertilizer are needed for legumes and grasses grown for hay and pasture. Clean-cultivated fields are subject to erosion unless runoff is controlled. (Capability unit IIwe–2.)

Woodbridge stony loam, 0 to 3 percent slopes (WzA).—Most of the acreage is in cutover forest, but some of it has been cleared. Cleared areas are used mainly for hay and pasture, but small areas are used for cultivated crops and orchards.

Because of stones, this soil is not suitable for cultivated crops that require tillage with modern machinery. However, it can be worked for hay, improved pasture, small grains, and tree fruits or small fruits. Without drainage, this soil is suited to hay and pasture. It should be drained for orchards. Legumes and grasses for hay and pasture need lime and fertilizer. (Capability unit IVws–2.)

Woodbridge stony loam, 3 to 8 percent slopes (WzB).—This soil has better surface drainage than Woodbridge stony loam, 0 to 3 percent slopes. Use and suitability are about the same, but runoff should be controlled on clean-cultivated areas. (Capability unit IVws-2.)

Woodbridge stony loam, reddish substratum, 3 to 8 percent slopes (WzaB).—This unit includes a few small areas on slopes of 0 to 3 percent. Part of the acreage is in forest, and part has been cleared and is used mainly for hay and pasture. Because of stones, this soil is not suited to cultivated crops. However, most areas can be worked for hay, improved pasture, and small fruits. Areas used for orchards need drainage. (Capability unit IVws-2.)

Woodbridge very stony soils, 3 to 15 percent slopes (WzbC).—This mapping unit consists mainly of typical Woodbridge soils intermingled with small areas of Woodbridge stony loam, reddish substratum, 3 to 8 percent slopes. Most of the acreage is in forest, and it should be managed for forest and pasture. Some areas can be worked for improved pasture. If lime and fertilizer are applied, the soil is well suited to pasture. It is too stony for cultivated crops. (Capability unit VIs-2.)

Formation and Classification of Soils

This section deals with the nature of the soils and the broad relationships among them in Hartford County. The factors that influence soil formation are discussed. The major kinds of profiles and their similarities and differences are described. The relationships of the soil series, which are the basic units of soil classification, are then discussed.

Factors of Soil Formation

Soil is formed through the interaction of climate, living organisms, parent materials, topography, and time. The nature of the soil anywhere on the earth depends upon the combination of these five factors. The relative importance of each differs from place to place. In extreme cases, one of these factors may dominate the formation of a soil and fix most of its properties.

The differences among soils in Hartford County can be attributed mainly to parent material and topography. The other factors of soil formation—climate, living organisms, and time—are fairly uniform throughout the county and do not account for important differences among the soils. The kinds of rocks that contributed to glacial drift and the waterborne and windborne material deposited during the glacial recession and in the postglacial period have provided a variety of parent materials from which soils have formed. Differences among soils caused by topography can be attributed mainly to differences in the degree of drainage.

Climate

The climate of Hartford County is a cool, humid, modified oceanic type. Winters are long and moderately cool; summers are short and mild. The average annual precipitation of 42.70 inches is fairly evenly distributed throughout the year. Detailed information on climate is given in the section Additional Facts About Hartford County.

The influence of climate on soil formation are of a physical, chemical, and biological nature. The amount of water percolating through the soil alters its chemical composition over a long period of time. Leaching of soluble chemical constituents produced by weathering depends largely on the amount of rainfall.

Temperature also plays an important role in soil formation. Greater biological activity, hence more rapid destruction of organic material, occurs as the mean annual temperature increases. Mineralization of organic matter in Hartford County progresses at a fairly rapid rate because of a mean annual temperature of 50.1° F.

The action of frost in the ground tends to affect the structural properties of the soil, causing increased seasonal aggregation within the frost table. This affects the percolation rates and the leaching potential of the soil.

Vegetation

On the well drained to moderately well drained soils, the native vegetation of the county was a forest dominated by oak, hickory, and chestnut. Some beech, sugar maple, ash, white pine, hemlock, and other species also occurred. On the very poorly drained soils, red maple, elm, blackgum, and white-cedar were probably the dominant trees. Differences in native vegetation were associated mainly with variations in soil drainage.

The complex of living organisms affecting soil formation has been changed by burning and clearing of the forest, cultivation of the soil, artificial drainage, and other activities of man. Additional information on forests of the county is given in the section Forests.

Parent material

The bedrock formations in Hartford County and surrounding areas are the source of parent material for the soils (*5*, *10*). The county is in the glaciated part of North America. The physiography, drainage, glacial history, and action of the postglacial wind determined how these parent materials were formed and deposited over the county. The depth, texture, color, porosity, permeability, reaction, and other characteristics of the soils are partly the result of characteristics in the parent material.

The bedrock geology of the county (*5*) is explained in figure 11.

A large part of the county is underlain by reddish, fairly soft, sedimentary Triassic rocks. From these rocks protrude sills and dikes of highly resistant Triassic extrusive and intrusive rocks, commonly known as traprock (*9*). The sedimentary Triassic rocks range in texture from coarse-grained conglomerate to siltstone and shale. These formations have furnished much of the parent material for the reddish soils of the Central Lowland. Nearly all soils in the Central Lowland show some influence of reddish-brown Triassic rocks in the C or D horizons, although they have yellowish-brown, brown, or strong-brown colors in the sola. In places in the Eastern and Western Highlands near the border of the Central Lowland, the underlying glacial drift

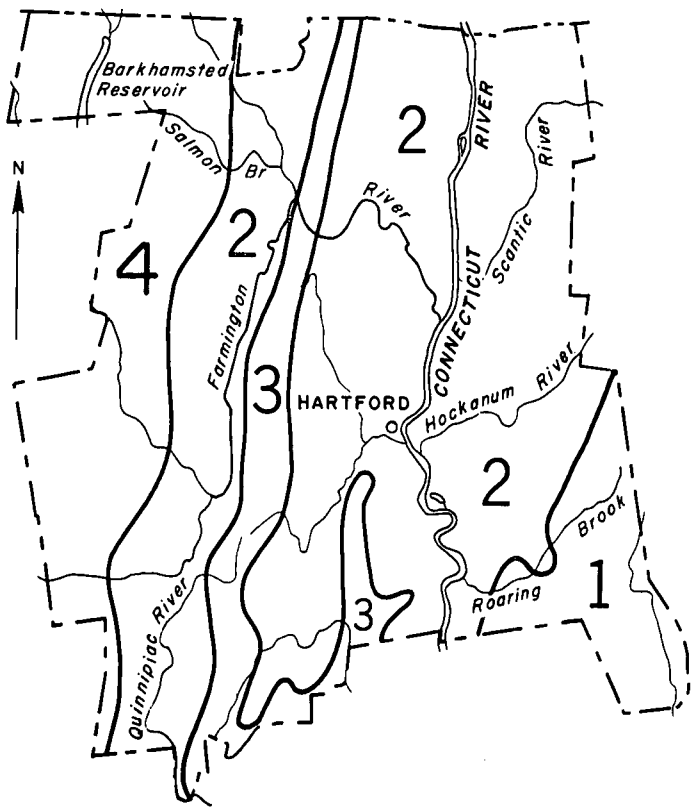

Figure 11.—**Map showing physiography and bedrock geology in Hartford County, Conn.**

(1) ***Eastern Highland:*** **Mainly crystalline gneiss and schist.**
(2) ***Central Lowland:*** **Mainly reddish Triassic sedimentary rocks with small dikes of Triassic intrusive rocks in places.**
(3) ***Central Lowland:*** **Mainly Triassic intrusive and extrusive rocks with some Triassic sedimentary rocks.**
(4) ***Western Highland:*** **Mainly crystalline schist, gneiss, and granite.**

also shows some influence of Triassic rocks. The Triassic rocks are acid in reaction, but the glacial till in places is only slightly acid to mildly alkaline at depths of 8 to 15 feet. The glaciolacustrine deposits of silt and clay are generally slightly acid to mildly alkaline at depths of 4 to 6 feet.

Geologic formations in the Eastern and Western Highlands consist of acid gneiss, schist, and granite. These formations have provided most of the parent material for the soil in these areas, and they have contributed greatly to the parent material of several soils in the Central Lowland.

The broad topographic features of Hartford County now are nearly the same as they were before the invasion by glacial ice from the North (*10*). Ice of the Late Wisconsin stage covered the whole area. Some differences in detail, however, exist between the preglacial surface and that of the present. Ice erosion, acting on this landscape, rounded existing hills and probably deepened, widened, and smoothed the valley floors in places. The present drumlins and kames are the result of glacial action.

As the ice receded, a heterogeneous mantle of stone, rock fragments, sand, silt, and some clay was deposited over the surface of the Eastern and Western Highlands. This material is known as glacial till, and it ranges in thickness from a few inches, except where bedrock is on or very near the surface, to more than 10 feet. The melting ice produced large amounts of water, which carried sand, gravel, silt, and clay and deposited them as stratified material. These stratified deposits are the terraces of assorted gravel, sand, silt, and clay that occur over much of the valley floors and on some of the valley sides. This material is known as stratified drift. Wind activity that occurred contemporaneously with the glacial recession or in postglacial times has modified the glacial surfaces in some areas. Thus the mineral soils in Hartford County have developed from glacial till, water-stratified deposits, or windblown deposits.

On the low-lying hills in the Central Lowland, the glacial till bears a close relationship to the underlying bedrock. The till is reddish and was derived mainly from reddish sedimentary rock mixed with various percentages of basalt or traprock. It ranges in texture from gravelly loamy sand to gravelly loam and shows some evidence of water washing in places. In places, the till is underlain by glaciolacustrine deposits of silt and clay at depths of 10 to 15 feet.

When ice melted in the Connecticut River Valley, the low areas became a temporary glacial lake created by dams of glacial drift and stagnant ice (*9*, *11*). While the lake was in existence, material was deposited as terraces. The Connecticut River, replacing the lake, rapidly eroded the terraces. Thus, in the eastern part of the Central Lowland, the terraces consist of deep sand or loamy sand, stratified sand and gravel, windblown deposits over sand and gravel, and glaciolacustrine silt and clay.

The glaciolacustrine silt and clay in the vicinity of Hartford and north of Hartford are generally grayish. These deposits are essentially free of pebbles and small fragments of rock. In areas south of Hartford, silt and clay deposits are reddish. Rounded pebbles and small fragments of rock are common in the soils developed from these reddish sediments but do not occur in the varves proper. These differences in content of coarse fragments are probably the result of local glacial disturbances. Varved silt and clay underlie many of the sandy and gravelly deposits in the Central Lowland at depths ranging from a few to many feet. As an example, the deposit of silt and clay under the sandy terraces just west of Windsor Center is at depths of 10 to 15 feet. The terraces in the Central Lowland west of Talcott Mountain range consist mainly of stratified sand and gravel. Glaciolacustrine silt and clay deposits have not been observed in this area, but they may be present in places at a depth below 10 feet.

Terrace sediment in the eastern part of the Central Lowland, north and south of Hartford, and in the western part, south of Plainville, originated mainly from Triassic sedimentary rock and basalt or traprock. Sediment north and northwest of Hartford in the eastern part of the Central Lowland and north of Plainville in the western part originated mainly from crystalline

rocks, but some are from Triassic rocks. The area north and northwest of Hartford is a basin that receives deposits from the Connecticut River and its tributaries draining the Eastern and Western Highlands that consist of crystalline rocks. The area north of Plainville in the western part of the Central Lowland receives deposits from the Farmington River and its tributaries draining the Western Highlands.

In the Eastern and Western Highlands, ice carried the debris only short distances, so the mantle of glacial till is closely related to the underlying gneiss, schist, and granite bedrock. The mantle of till varies in texture from gravelly sand or loamy sand to gravelly loam. It ranges from very thin or absent where bedrock is on or near the surface to more than 10 feet thick. The narrow valleys consist of stratified drift derived from gneiss, schist, and granite.

Physiography and drainage

The major physiographic divisions of Hartford County are shown in figure 11.

The Central Lowland occupies a belt in the central part of the county that is as much as 20 miles wide in the north. The Central Lowland has developed on fairly weak, tilted, stratified Triassic rocks from which more resistant Triassic lava flows of basalt, known as traprock, project as ridges (*10*). One of these ridges, known as the Talcott Mountain range, divides the Central Lowland longitudinally into two unequal parts. The part east of the Talcott Mountain range is drained by the Connecticut River and its tributaries. The smaller part west of the range is drained by the Farmington River and its tributaries.

The Central Lowland consists of fairly extensive flood plains along the Connecticut and Farmington Rivers, nearly level to sloping or rolling terraces, low glacial upland hills, and narrow ridges of basalt or traprock. Elevations above sea level range from about 10 feet on the flood plain of the Connecticut River south of Hartford to about 400 feet on the highest hills and drumlins. The highest ridges of basalt or traprock are about 500 to 950 feet above sea level, and the tops are about the same elevations as the adjacent ridgetops in the Eastern and Western Highlands. Most of the terraces in the Central Lowland east of the Talcott Mountain range have elevations less than 200 feet above sea level. West of the Talcott Mountain range, some of the terraces have elevations of as much as 300 to 350 feet above sea level.

The Eastern and Western Highlands rise abruptly from the Central Lowland. They consist mainly of till plains and drumlins or drumloidal hills dissected by narrow valleys of stratified drift. Relief is moderate and is the result of maturely dissected crystalline rocks.

Elevations in the Eastern Highland range from 300 feet above sea level on the lowest valley floors to about 900 feet on the crest of the highest hills. Relief is gently undulating or sloping to hilly. Drainage generally flows to the west-southwest into the Connecticut River; but in the southeastern part, it flows to the southeast into the Salmon River.

Elevations of the Western Highland range from about 350 feet above sea level on the lowest valley floors to about 1,300 feet on some of the highest peaks in the northwestern corner of the county. Relief is gently undulating or sloping to steep. Drainage is generally to the south and southeast into the main branch of the Farmington River.

Time

Geologically, the soil materials of the county are very young. It probably has been between 11,000 and 15,000 years since the area was glaciated, although precise estimates have not been made for this area. Except in color, the soil horizons are generally weakly expressed. Silicate clay accumulation is not generally evident. There is some evidence of leaching of carbonates from the soils that have developed from parent material derived from Triassic rocks and from those that have developed from glaciolacustrine silt and clay. Climate and vegetation have changed within the last 11,000 to 15,000 years. Consequently, there is a strong possibility that the present soils differ somewhat from those that first developed.

Classification of Soils

Table 10 shows the classification of the soil series of Hartford County according to great soil group and drainage. The major kinds of profiles in the county represent six great soil groups. These are Alluvial soils, Brown Podzolic soils, Sols Bruns Acides, Low-Humic Gley soils, Humic Gley soils, and Bog soils. Parent material, topography, drainage, and time have been the dominant factors in the development of soils belonging to all the great soil groups in the county. All poorly and very poorly drained soils are included in the Low-Humic Gley, Humic Gley, and Bog groups because the influence of drainage outweighs effects of the other factors of soil formation, including parent material.

Brown Podzolic soils

Of the six great soil groups in Hartford County, the Brown Podzolic soils (*19*, *20*, *28*) are most nearly zonal, in that they reflect the influence of climate, parent material, and living organisms. In undisturbed forested areas, these soils have a 2- to 6-inch layer of forest litter that is underlain by a very dark grayish-brown A_1 horizon ranging in thickness from ½ inch to about 2½ inches. In a few places the A_1 horizon is underlain by a thin A_2 horizon, or bleicherde, that is barely visible or it may be as much as ½ inch thick. This light-colored horizon most commonly occurs in coarser textured materials. Much of the moisture from precipitation percolates through the organic mat on the surface. Complex sesquioxide-humate compounds are formed when the humic acids leached from the organic mat combine chemically with the aluminum and iron leached from the mineral particles in the A horizon. The sesquioxide compounds coat the mineral particles in the B horizon when the compounds are precipitated or jelled. Typically, the B horizon is strongest in color in the upper part, where most of the complex compounds accumulate because of chemical or microbial activity. The color of the B horizon grades to weaker shades with depth. The B horizons are uniform in texture. They have about the same texture as the A horizons.

TABLE 10.—*The soil series classified according to great soil groups and natural drainage.*

[Great soil group designations are (A), Alluvial soils; (BP), Brown Podzolic soils; (SBA), Sols Bruns Acides; (LHG), Low-Humic Gley soils: (HG), Humic Gley soils; and (B), Bog soils]

Great soil group, parent material, and other characteristics	Excessively drained	Well drained and somewhat excessively drained	Moderately well drained	Poorly drained	Very poorly drained
Alluvial soils and gley associates—AC horizonation:					
Coarse-textured, acid alluvium principally from gneiss and granite.	Suncook (A)				
Moderately coarse textured, acid alluvium from crystalline rocks.		Ondawa (A)	Podunk (A)	Rumney (LHG)	Saco (HG).
Medium-textured, acid alluvium from crystalline rocks.		Hadley (A)	Winooski (A)	Limerick (LHG)	Saco (HG).
Medium-textured, acid alluvium principally from reddish-brown Triassic rocks.		Bermudian (A)	Rowland (A)	Bowmansville (LHG).	
Brown Podzolic soils and gley associates—ABC horizonation:					
Glacial till derived principally from granitic rocks.		Gloucester (BP)	Acton (BP)	Leicester (LHG)	Whitman (HG).
Glacial till containing a high percentage of brown mica schist that weathers to yellowish red or strong brown.		Brookfield (BP)			
Glacial till derived principally from schist and gneiss.		Charlton (BP)	Sutton (BP)	Leicester (LHG)	Whitman (HG).
Glacial till derived principally from schist and gneiss; has a fragipan.		Paxton (BP)	Woodbridge (BP)	Ridgebury (LHG)	Whitman (HG).
Glacial till derived principally from coarse-textured, Triassic sedimentary rocks.		Cheshire (BP)	Watchaug (BP)		
Moderately coarse textured and coarse textured water-laid or windblown sediment containing little or no gravel.		Agawam (BP)	Ninigret (BP)	Walpole (LHG)	Scarboro (HG).
Grayish water-laid and windblown sand containing fine gravel in places.	Windsor (BP)				
Reddish water-laid and windblown sand containing fine gravel in places.	Penwood (BP).				
Grayish interbedded glaciolacustrine deposits of silt, very fine sand, and fine sand.			Belgrade (BP)	Wallington (LHG)	
Reddish interbedded glaciolacustrine deposits of silt, very fine sand, and fine sand.			Belgrade, reddish variant (BP).	Wallington, reddish variant (LHG).	
Grayish glaciolacustrine varved silt and clay.			Buxton (BP)	Scantic (LHG)	Biddeford (HG).
Brown Podzolic soils—AB, Bm, D horizonation:					
Silty mantle over nonconforming fragipan developed in glacial till derived principally from reddish-brown Triassic rocks and basalt.		Broadbrook (BP).	Rainbow (BP)		
Moderately coarse to coarse, water-laid or windblown sediment over nonconforming fragipan developed in glacial till derived principally from reddish-brown Triassic rocks and basalt or traprock.		Poquonock (BP).	Birchwood (BP)		
Brown Podzolic soils and gley associates—AB, D_u horizonation:					
Silty mantle over nonconforming glacial till derived mainly from reddish-brown Triassic rocks.		Narragansett (BP).	Wapping (BP)		
Silty mantle over nonconforming stratified sand and gravel derived principally from Triassic rocks.		Enfield (BP)	Tisbury (BP)		
Medium-textured to coarse-textured water-laid sediment over glaciolacustrine silt and clay.		Melrose (BP)	Elmwood (BP)	Swanton (LHG)	Whately (HG).

TABLE 10.—*The soil series classified according to great soil groups and natural drainage*—Continued

Great soil group, parent material, and other characteristics	Excessively drained	Well drained and somewhat excessively drained	Moderately well drained	Poorly drained	Very poorly drained
Brown Podzolic soils and gley associates—AB, D horizonation:					
Stratified glacial drift derived principally from acid crystalline rocks.		Merrimac (BP)	Sudbury (BP)	Walpole (LHG)	Scarboro (HG).
Stratified glacial drift derived principally from reddish-brown Triassic sedimentary rocks.		Hartford (BP)	Ellington (BP)		
Stratified drift derived from a mixture of Triassic sedimentary rocks and basalt or traprock.		Branford (BP)			
Stratified drift derived mainly from acid crystalline rocks.	Hinckley (BP).				
Stratified drift derived mainly from Triassic sedimentary rocks.	Manchester (BP).				
Brown Podzolic soils—A, B, D_r or A, BC, D_r horizonation:					
Thin mantle of glacial till and residuum from underlying gneiss, schist, and granite.		Hollis (BP)			
Thin mantle of glacial till and residuum from underlying Triassic sedimentary rocks.		Sunderland (BP).			
Thin mantle of glacial till and residuum from underlying basalt or traprock.		Holyoke (BP)			
Sols Bruns Acides and gley associates—A, B, C horizonation:					
Glacial till derived from reddish-brown Triassic sedimentary rocks and basalt or traprock; has a fragipan.		Wethersfield (SBA).	Ludlow (SBA)	Wilbraham (LHG).	Menlo (HG).
Reddish glaciolacustrine varved silt and clay.			Berlin (SBA)	Scantic, reddish variant (LHG).	Biddeford, reddish variant (HG).
Bog (organic) soils:					
Acid plant remains					Peats and Mucks (B).
Acid plant remains					Peats and Mucks, shallow (B).

The Brown Podzolic soils have developed from a variety of materials that consist of (1) acid glacial drift and slightly acid to mildly alkaline glaciolacustrine deposits; (2) silty mantles and moderately coarse to coarse textured water-laid or windblown sediment over nonconforming fragipan horizons; (3) silty mantles over nonconforming D horizons; and (4) moderately coarse to medium textured water-laid deposits over coarse sand and gravel D horizons.

The profile description of Charlton fine sandy loam in the section Descriptions of the Soils is representative of the Brown Podzolic great soil group.

The Gloucester, Brookfield, Charlton, Paxton, and associated moderately well drained soils are the principal Brown Podzolic soils developed on glacial till in the Eastern and Western Highlands.

The moderately coarse textured Gloucester soils have developed on a coarse-textured, granitic till. The Brookfield soils, which are similar to the Gloucester in texture, have developed on a till containing a high percentage of brown mica schist that weathers to a yellowish-red to strong-brown color. The moderately coarse to medium textured Charlton and Paxton soils have developed on moderately coarse to medium textured till derived principally from schistose rocks. The Charlton soils have developed on friable to firm till, and the Paxton soils have a fragipan. The physical, chemical, and mineralogical properties of Paxton fine sandy loam are described by Tamura (*25*).

The Cheshire soils and associated moderately well drained Watchaug soils are reddish upland soils in the Central Lowland. They have developed on friable to firm glacial till derived principally from Triassic sedimentary rocks.

Agawam and Ninigret soils have developed on moderately coarse to coarse textured terrace sediments. The Windsor and Penwood soils have developed from water-laid and windblown loamy sand and sand containing some fine gravel in places. The Belgrade and Buxton soils are moderately well drained and have developed from slightly acid to mildly alkaline glaciolacustrine deposits. The Belgrade soils have developed from interbedded silt, very fine sand, and fine sand. The Buxton soils have developed from varved silts and clays.

Brown Podzolic soils with nonconforming fragipan horizons include the Broadbrook, Poquonock, and associated moderately well drained soils. The Broadbrook soils have developed from silty mantles ranging in thickness from about 18 to 36 inches, over a fragipan that has developed in glacial till. The till was derived principally from reddish-brown Triassic sedimentary rocks and basalt or traprock. The Poquonock soils have developed from moderately coarse to coarse textured water-laid or windblown sediments over fragipan horizons similar to those of the Broadbrook soils.

Brown Podzolic soils that are underlain by nonconforming D horizons are the Narragansett, Enfield, Melrose, and associated moderately well drained soils. Both the Narragansett and the Enfield soils have developed from silty mantles, which are 18 to 36 inches thick. The Narragansett soils in Hartford County are underlain by firm to friable glacial till derived principally from reddish-brown Triassic rocks. In other parts of Connecticut and in Rhode Island, Narragansett soils are underlain by till from crystalline rocks. The Enfield soils are underlain by stratified sands and gravels derived principally from reddish-brown Triassic rocks, and, in places, principally from crystalline rocks. Some physical, chemical, and mineralogical properties of the Narragansett and Enfield soils in the Central Lowland of Connecticut are described by Ritchie, Tamura, and others (*21*, *26*). The Melrose soils and associated Elmwood soils have developed from medium- to coarse-textured, water-laid sediment underlain by glaciolacustrine silt and clay.

Brown Podzolic soils on terraces that have developed on stratified sands and gravels are the Merrimac, Hartford, Branford, Hinckley, Manchester, and associated moderately well drained soils. The Merrimac and Hartford soils have moderately coarse textured sola. The Merrimac soils have moderately coarse textured sola and have developed on stratified sand and gravel derived mainly from crystalline rocks. The Hartford soils also have moderately coarse textured sola and have developed over coarse, stratified drift derived mainly from reddish-brown Triassic rocks. The Branford soils have medium-textured sola and have developed on coarse, stratified drift derived from Triassic sedimentary rock and basalt or traprock.

The Hinckley and Manchester soils are the shallow and gravelly counterparts of the Merrimac and Hartford soils respectively. Some of the physical, chemical, and mineralogical properties of Merrimac fine sandy loam are described by Tamura (*25*); Swanson, Shearin, and Bourbeau (*24*); and Bourbeau and Swanson (*4*). Gravel content, depth, and other characteristics of the Hinckley and Merrimac soils are described by Swanson and Ritchie (*23*).

The Hollis, Holyoke, and Sunderland soils are generally shallow over bedrock. They have developed from a thin mantle of glacial till and residuum from the underlying bedrock.

Sols Bruns Acides

Soils of the Wethersfield, Ludlow, and Berlin series fit the description of the Sols Bruns Acides great soil group (*3*). The Sols Bruns Acides are differentiated from the Brown Podzolic soils by (1) a weakly expressed A_2 horizon, (2) uniform color in contrast to color that fades with depth, (3) weak to moderate, subangular blocky structure in the B horizon in contrast to very weak or no structure. They are differentiated from the Gray-Brown Podzolic soils by uniform texture throughout the solum.

The Wethersfield and Ludlow soils are reddish and have medium-textured sola. They have a fragipan at a depth of about 2 feet that has developed in glacial till derived mainly from reddish-brown Triassic sedimentary rocks and basalt or traprock. The sola are acid, but the underlying material is slightly acid to neutral at depths of 8 to 15 feet in places. Some of the physical and mineralogical properties of the Wethersfield soils are discussed by Bourbeau and Swanson (*4*) and by Swanson, Shearin, and Bourbeau (*24*). A typical profile of the Wethersfield soils is given in the section Descriptions of the Soils.

The Berlin soils have developed from slightly acid to mildly alkaline varved silt and clay derived principally from reddish Triassic sediment. The Berlin and associated soils generally have some pebbles and small angular rock fragments in the sola, which are not characteristic of the Buxton and associated soils.

Low-Humic Gley soils

The Low-Humic Gley great soil group (*27*) consists of poorly drained soils that have very dark grayish-brown to very dark brown surface layers and mottled subsurface layers. Organic matter is incorporated in the dark A_1 horizon and does not accumulate on the surface. The water table in these soils is at or near the surface part of the time. Consequently, the soils are deficient in oxygen. Water-soluble products of plant decomposition move down through the profile causing solution, reduction, and removal of ferric compounds. The change in ferric compounds results in gray or strongly mottled horizons under the dark surface horizon.

Low-Humic Gley soils have developed from many kinds of parent material, and they vary in texture. The Leicester, Ridgebury, Scantic, and Walpole soils are representative of this great soil group. Profiles of these soils are described in the section Descriptions of the Soils.

Humic Gley soils

The Humic Gley great soil group (*27*) consists of the very poorly drained soils. They are acid, and they vary in texture. Their predominant characteristics are associated with gleying which is described under the Low-Humic Gley group. The Humic Gley soils have water on the surface most of the time. Organic matter decomposes slowly, and it accumulates on the surface. The very dark surface soil contains much more organic matter than that of the Low-Humic Gley soils. In addition, the iron compounds in the subsoil are considerably less well oxidized.

The Biddeford, Menlo, Saco, Scarboro, Whately, and Whitman soils are representative of this group. Profiles of these soils are described in the section Descriptions of the Soils.

Bog soils

The Bog great soil group consists of undifferentiated peats and mucks. These soils have developed in undrained depressions. Water-tolerant vegetation grows in

these wet areas, and the remains of plants sink to the bottom where they decay slowly. In this manner organic plant remains accumulate. Where only partial decomposition has taken place, the organic deposits are known as peat. If the organic deposits are so decomposed that the original plant remains cannot be recognized, they are known as muck.

Typical profiles of peat and muck soils are given in the section Descriptions of the Soils.

Alluvial soils

The Alluvial great soil group consists of flood-plain deposits that have been in place only a comparatively short time. The soils in this group have poorly defined genetic horizons, or none at all, because the horizons have not had time to develop. The Hadley soils differ from the Ondawa and the Winooski soils differ from the Podunk mainly in texture. The Bermudian and the Rowland soils are derived from reddish sediment and differ from Hadley and Winooski soils, respectively, mainly in color.

Typical profiles of these soils are given in the section Descriptions of the Soils.

Additional Facts About Hartford County

Climate [7]

The climate of Hartford County is principally of the continental type. Masses of cold, dry air from the subarctic regions of North America or warm, moist air from the Gulf of Mexico influence the day to day weather. Cool, moist air from the North Atlantic Ocean is a significant contributor to the climate, especially from November through March. The climatic summary for Hartford County according to the U.S. Weather Bureau records is given in table 11.

The average maximum temperature ranges from 35 to 40 degrees in winter to 80 to 85 degrees in summer. The average minimum temperature increases from near 20 degrees in winter to near 60 degrees in summer. Normally, temperatures of 90 degrees or higher can be expected 8 to 12 days per year. Cool summers may have only 5 days of this temperature and hot summers, as many as 25. A temperature of 100 degrees or higher has rarely been recorded in the county. The highest temperature on record is 101 degrees.

In winter the temperature drops to zero degrees or below on an average of 3 to 5 days per season. In very cold winters, however, such temperatures may occur 10 days or more. Extremes of 20 to 25 degrees below zero have been recorded, but a temperature lower than 10 degrees below zero is rarely recorded.

There are 120 to 130 days per year having minimum temperatures of 32 degrees or lower. Generally, minimum temperatures of 32 degrees or lower occur consistently from late in November until late in March. On the average, minimum temperatures of 32 degrees or lower do not occur beyond the middle of April in the central river valley and beyond the latter part of April in the cooler sections of the county. The first frost in fall normally occurs in the early part or middle of October. The growing season is 181 days in most years. Growing seasons as short as 130 to 140 days and as long as 200 days occur rarely.

Annual precipitation ranges from 46 inches in the extreme northwest corner of the county to near 41 inches in the northeast part of the valley of the Connecticut River. The extreme range in annual precipitation is 30 inches to more than 55 inches.

Precipitation is fairly evenly distributed throughout the year. Monthly averages of 3.40 to 3.75 inches occur in 9 months of the year. The months of least precipitation are February and October. From 2.5 to 4 inches may be expected in any month, but wide fluctuations often occur from one month to the next or for the same month in different years. Monthly totals of less than 1.5 inches and more than 7.0 inches have been recorded in all seasons. Precipitation of more than 3 inches in 24 hours is known to occur.

Precipitation during the growing season (May through September) averages about 18 inches. The normal weekly precipitation is about 0.5 of an inch. A sig-

TABLE 11.—*Temperature and precipitation at Hartford, Hartford County, Conn.*

[Elevation, 169 feet]

Month	Temperature [1]			Precipitation [2]			
	Average	Absolute maximum	Absolute minimum	Average	Driest year (1957)	Wettest year (1955)	Average snowfall
	°F.	°F.	°F.	*Inches*	*Inches*	*Inches*	*Inches*
December	31.0	61	−6	3.61	6.33	0.78	7.5
January	27.8	57	−17	3.61	1.91	.91	10.4
February	27.9	64	−6	3.15	1.54	3.42	12.0
Winter	28.9	64	−17	10.37	9.78	5.11	29.9
March	37.1	69	1	3.75	2.21	4.90	7.4
April	47.8	86	20	3.70	4.35	4.68	1.5
May	58.9	92	28	3.51	1.69	.78	0
Spring	47.9	92	1	10.96	8.25	10.36	8.9
June	67.6	97	38	3.48	1.99	3.46	0
July	73.0	98	48	3.67	2.65	2.55	0
August	70.7	101	43	4.02	1.27	21.87	0
Summer	70.4	101	38	11.17	5.91	27.88	0
September	63.7	91	30	3.40	1.22	3.15	0
October	53.4	86	24	3.09	2.06	11.61	[3]
November	42.2	72	12	3.71	5.04	4.83	1.9
Fall	53.1	91	12	10.20	8.32	19.59	1.9
Year	50.1	101	−17	42.70	32.26	62.94	40.7

[1] Average temperature based on a 55-year record, through 1959; highest and lowest temperatures on a 5-year record, through 1959.

[2] Average precipitation based on a 55-year record, through 1959; wettest and driest years based on a 55-year record, in the period 1905–1959; snowfall based on a 54-year record, through 1959.

[3] Trace.

[7] Prepared by climatologist for Connecticut, U.S. Weather Bureau.

nificant amount of the summer precipitation occurs in thunderstorms. Serious droughts or prolonged rainy periods in the growing season are the exception rather than the rule.

The county gets about 40 inches of snow per year except in the northwest corner, which generally gets more than 50 inches. The first significant snowfall normally occurs in November. The last, in about 1 year out of 3, occurs in April and is 1 inch or more deep. A measurable amount of snow can be expected to remain on the ground, for a few days at least, any time between early December and late March. Snow depths of more than 5 inches are usually of short duration unless a prolonged cold wave follows a heavy fall of snow. The ground stays frozen generally from early in December to the middle or latter part of March, although warm air may thaw the ground for short periods any time in winter.

The prevailing wind is from the south or southwest from April through September and from the north or northwest the rest of the year. The average monthly wind velocity ranges from 6 to 10 miles per hour. Winds of the highest velocity occur in the winter and spring; those of the lowest velocity occur late in summer and early in fall. Damaging winds may accompany summer thunderstorms, or they may occur in connection with intense coastal or eastern Canadian areas of low barometric pressure.

Fog and high humidity are fairly common near the Connecticut River late in summer and early in fall. These features make it difficult to cure the valuable tobacco crop. Very dry air from the Polar region prevails over the county in spring. Strong winds at this time of year reduce the frequency of fog.

Thunderstorms occur on 20 to 30 days per year. These storms are often accompanied by high winds or hail or both, and these cause considerable damage to crops and to the cloth tents covering shade-grown tobacco. Tornadoes are rare, but a few have hit the county in the past 10 years. Hurricanes generally occur at rare intervals, but this type of storm did considerable damage in the county in 1938, 1944, 1954, and 1955. Nearly every winter, freezing rain causes widespread damage to trees and powerlines and severely interferes with highway travel. Floods are not very frequent, but several major ones have occurred in the past 25 years.

Settlement and Development

Hartford County, as established in 1666, included all of the present Tolland County, most of Middlesex and Windham Counties, and parts of Litchfield and New London Counties. Settlement gradually spread inland from the Connecticut and Farmington Rivers.

Self-sufficient communities were predominant in Hartford County before 1810. Up to this time the acreage of improved land on farms increased steadily. After 1810, three distinct periods are recognized in the evolution of Connecticut Agriculture (*6*). The period from 1810 to 1840 marked the beginning of commercial agriculture and the coming of industries. In the period from 1840 to 1880, railroads were built, cities grew, industries expanded, and the Western States competed for the agricultural market in the East. During this period the acreage of improved land was not seriously reduced on Connecticut farms. The period from 1880 to 1920 brought a shift from extensive to intensive agriculture, partly because industries competed for the available labor. In this period much of the improved farmland was not maintained and its area decreased from about 1,600,000 acres in 1880 to about 700,000 acres in 1920. The number of sheep, beef cattle, and dairy cattle on farms decreased from about 174,180 in 1880 to about 10,843 in 1920.

Agriculture

About 19.6 percent of the area of Hartford County is cropland. However, the value of crops harvested is high in comparison to other Connecticut counties. The acreage of the main crops and nursery stock, and the numbers of peach and apple trees, are shown for stated years in table 12.

Tobacco has been important in the economy of the county since the early days (*17*). It is the most valuable crop in Hartford County, according to the 1954 census, but it is third in area of land occupied. Three types of tobacco are grown at the present time: Broadleaf, Havana Seed, and shade-grown. Broadleaf and Havana Seed are used as binder in the manufacture of cigars; shade-grown tobacco is used for the outer layer, or wrapper, on cigars. Broadleaf tobacco was first planted in Connecticut about 1833. Havana Seed tobacco was first grown successfully around 1870. Shade-

TABLE 12.—*Acreages of principal crops and nursery stock and the numbers of apple and peach trees of bearing age*

Crop	1939	1949	1954
Corn:	*Acres*	*Acres*	*Acres*
For all purposes	11, 838	8, 923	8, 083
Harvested for grain	3, 564	2, 022	1, 525
Silage, hogged or grazed and cut for green or dry fodder	8, 274	6, 901	6, 558
Hay, total	36, 258	33, 486	30, 629
Alfalfa and alfalfa mixtures	2, 639	3, 364	7, 208
Clover, timothy, and mixtures of clover and grass	20, 969	20, 963	14, 892
Small grains cut for hay	1, 326	524	738
Other hay	11, 324	8, 635	7, 791
Irish potatoes harvested for home use or for sale	4, 323	[1] 4, 078	[2] 3, 144
Vegetables for sale (excludes potatoes and sweet potatoes)	3, 356	3, 876	4, 390
Sweet corn	804	1, 132	1, 502
Other vegetables	2, 552	2, 744	2, 888
Tobacco, total	12, 389	16, 762	13, 291
Binder	[3]	[3]	8, 011
Wrapper	[3]	[3]	5, 280
Nursery products (trees, shrubs, vines, etc.)	386	552	1, 345
	Number [4]	*Number* [4]	*Number*
Apple trees	99, 305	93, 256	80, 323
Peach trees	33, 991	36, 234	40, 895

[1] Does not include acreage for farms with less than 15 bushels harvested.

[2] Does not include acreage for farms with less than 20 bushels harvested.

[3] Not reported.

[4] One year later than year at head of column.

grown tobacco was first grown in Hartford County about 1900 from seed that came from Cuba. The quality of this tobacco has been greatly improved through selective breeding, and it is considered by many manufacturers and judges of tobacco to be the best wrapper tobacco grown anywhere.

Hay occupies a larger acreage than any other crop in the county. Corn for grain, sweet corn, potatoes, and market vegetables also occupy a large acreage in the county. The acreage used for growing nursery stock is increasing.

According to the Connecticut Department of Agriculture, the 1954–56 acreage and yield of the principal vegetable crops in Hartford County, except potatoes and sweet corn, were as follows:

Crop:	*Acreage*	*Average acre yield*
Asparagus	50	3,000 lbs.
Beans, lima	20	112 bu.
Beans, snap	380	150 bu.
Beets	90	1,200 doz.
Cabbage, early and late	510	500 boxes
Carrots	270	1,600 doz.
Cauliflower	60	400 boxes
Celery, early and late	120	800 doz.
Cucumbers	200	220 bu.
Lettuce	290	1,300 doz.
Onions		300 bu.
Parsnips	70	350 bu.
Peas		150 bu.
Peppers	200	400 bu.
Spinach, early and late	360	450 bu.
Squash, summer	65	400 bu.
Strawberries	150	3,000 qts.
Tomatoes	450	530½ bu.
Turnips	80	350 bu.

The number of livestock and poultry on farms in stated years is shown in table 13.

TABLE 13.—*Number of livestock and poultry on farms*

Livestock and poultry	1940	1950	1954
	Number	*Number*	*Number*
Cattle and calves	[1] 27, 206	27, 553	28, 834
Milk cows	19, 103	17, 063	17, 057
Horses and mules	[1] 4, 126	1, 974	991
Sheep and lambs	[2] 303	1, 132	1, 155
Hogs and pigs	[3] 4, 420	8, 642	6, 990
Chickens	[3] 316, 864	[3] 446, 402	[3] 570, 448

[1] Over 3 months old.
[2] Over 6 months old.
[3] Over 4 months old.

Industries, Marketing Facilities, and Transportation

Hartford County is an important industrial center. Many widely known products are manufactured in the Hartford area. Figures of the Hartford Chamber of Commerce show that in 1957, 840 firms in the Greater Hartford area employed about 80,920 people, who were paid $429,000,000. The Greater Hartford area does not include the towns of New Britain, Plainville, Southington, and Bristol, which are important industrial centers in the county.

Some 38 insurance companies have home offices, executive offices, or American headquarters in Hartford. Among them is one of the oldest fire companies and one of the oldest casualty companies in the nation. These 38 companies underwrite all forms of insurance, employ about 22,000 people in Hartford, and have an annual payroll of about $100,000,000.

The Connecticut Marketing Authority operates a regional farmer-dealer market in Hartford. The market handles many kinds of produce, including meats and frozen foods. It houses 29 wholesale dealers and provides stalls for 200 market gardeners. About 12,000 carloads of goods are received and a business of about $27,000,000 is carried on annually.

The county has excellent facilities for transportation by railroad, highway, and air. The Springfield Division of the New York, New Haven and Hartford Railroad runs through the center of the county and connects the area with New Haven, Bridgeport, and New York to the south and southwest and with Springfield and Boston, Mass., and other points to the north and northeast. The terminal for United, American, Northeast, and Eastern Airlines is located at Bradley Field in Windsor Locks.

Hartford is the hub of a highway network and is served by numerous freight and passenger carriers. All towns in the county have good hard-surface roads.

Glossary

Definitions of technical terms are given for the convenience of readers who cannot refer to them easily elsewhere. Most of the definitions were obtained from the Soil Survey Manual (*29*) and the Yearbook of Agriculture, Soil (*30*).

Alluvial soil. Soil developing from transported and relatively recently deposited sediment (alluvium) with little or no modification of the original materials by soil-forming processes.

Association, soil. A group of defined and named soil units that occur in an individual geographic pattern. The soils in an association may be derived from the same kind of parent material and be similar in characteristics, or they may be derived from different kinds of parent material and be dissimilar in characteristics.

Azonal soil. A general group of soils having little or no soil profile development. Most of them are young. In the United States, the azonal soils are members of the Alluvial, Lithosol, and Regosol great soil groups.

Bedding, soil. Arranging the surface of fields by plowing and grading into a series of elevated beds separated by shallow ditches for drainage.

Bleicherde. The A_2 horizon of a Podzol soil that is a gray or light-colored leached layer.

Brown Podzolic soil. A zonal group of soils with raw humus forest floor, a thin mixed humus and mineral A_1 horizon, and a B horizon that shows no appreciable increase in clay. Colors in the B horizon fade with depth. These soils develop under deciduous or mixed deciduous and coniferous forests in cool-temperate humid regions.

Catena, soil. A group of soils within one zonal area, developed from similar parent material, but differing in profile characteristics because of differences in relief or drainage.

Consistence. The combination of properties of soil material that determine its resistance to crushing and its ability to be molded or changed in shape. Consistence depends mainly on the forces of attraction between soil particles. Terms commonly used to describe consistence are as follows:

Cemented. Hard and brittle, and little affected by moistening.
Firm. When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.
Friable. When moist, crushes easily under moderate pressure between thumb and forefinger, and coheres when pressed together.
Hard. When dry, moderately resistant to pressure; barely breakable between thumb and forefinger.
Loose. Noncoherent.

Plastic. When wet, readily deformed by moderate pressure, but cohesive.

Sticky. When wet, adheres to other material; usually very cohesive when dry.

Contour cultivation. Furrows plowed at right angles to the direction of slope, at the same level throughout, and ordinarily at comparatively close intervals.

Crystalline rock. A general term, which includes both igneous and metamorphic rocks, used for rocks composed of crystals or parts of crystals.

Diversion terraces. An embankment or ridge with a shallow ditch on the upper side constructed nearly parallel to the slope to direct runoff to an outlet at nonerosive velocity.

Drumlin. An oval hill of glacial drift, normally compact and unstratified, usually with its longer axis parallel to the movement of the ice responsible for its deposition.

Esker. A narrow ridge or mound of gravelly and sandy drift deposited by a subglacial stream.

Fertility, soil. The quality that enables a soil to provide the proper elements in the proper amounts and in the proper balance for the growth of specified plants when other factors such as light, temperature, and the physical condition of the soil are favorable.

Flood plain. The nearly level areas, subject to overflow, that occur along stream courses.

Fragipans. Compact horizons, rich in silt, sand, or both, and generally low in clay. They occur in many gently sloping or nearly level soils in humid, warm-temperate climates. The fragipan commonly interferes with water and root penetration. When dry, the compact material appears to be indurated, but the apparent induration disappears when the soil is moistened. Fragipans occur in soils developed either from residual or from transported parent materials.

Glacial drift. The material picked up, mixed, disintegrated, transported, and deposited through the action of glacial ice or the action of water melted from the glacial ice. In many places the glacial drift is covered by loess.

Glacial lake. A lake whose basin was formed by the action of glaciers. A water body held up by the damming action of glacier.

Glacial till. Material picked up, mixed, disintegrated, transported, and deposited through action of glacial ice, with little or no transportation by water.

Glaciofluvial deposits. The materials produced by glaciers and carried, sorted, and deposited by water that originated mainly from the melting of glacial ice.

Glaciolacustrine materials. Deposits that range from fine clays to sand. They were derived from glaciers and were reworked and laid down in glacial lakes. Many are interbedded or laminated.

Gleization. The process of soil formation leading to the development under the influence of excessive moisture of a gley horizon in the lower part of the solum. A soil horizon in which the material ordinarily is bluish gray or olive gray, more or less sticky, compact, and, in many places, structureless is called a gley horizon and has developed under the influence of excessive moistening.

Gneiss. A crystalline rock in which the component minerals are arranged in parallel bands or layers. This rock tends to cleave into slabs.

Granite. A light-colored (acid) igneous rock that is coarse grained and composed mainly of quartz and feldspar but that contains some other minerals.

Great soil group. A broad group of soils having common internal soil characteristics. It includes one or more families of soils.

Horizon, soil. A layer of soil, approximately parallel to the soil surface, with characteristics produced by soil-forming processes. Horizons are identified by letters of the alphabet.

Horizon A. The horizon at the surface. From this horizon the soluble minerals and clay have been removed by percolating water. The major A horizon may be subdivided into A_1, the part that is dark colored because of organic matter, and A_2, the part that is leached and light colored. In woodlands a layer of organic matter accumulates on top of the mineral soil; this layer is called the A_0 horizon. Depth of soil is measured from the top of the mineral soil, because the A_0 horizon is rapidly destroyed if fire occurs or if the soil is cultivated.

Horizon B. The horizon in which clay or other material has accumulated. It may be subdivided into B_1, B_2, or B_3 horizons; layers that contain iron are marked by a symbol such as B_{2ir}, and layers that contain humus, by a symbol such as B_{2h}.

Horizon C. The material immediately under the true soil. It is presumed to be similar in chemical, physical, and mineralogical composition to the material from which at least a part of the overlying solum has developed.

Horizon D. Bedrock strata or zones of unconformable geological materials unlike those from which the solum has developed.

Gleyed horizon. A strongly mottled horizon that occurs in wet soil and is designated by subscript *g*.

Humic Gley soils. An intrazonal group of very poorly drained hydromorphic soils that have dark-colored organic-mineral horizons of moderate thickness, underlain by mineral gley horizons. The Humic Gley soils have developed either under swamp-forest or under herbaceous marsh vegetation, mostly in humid or subhumid climates. Most of the soils range from medium acid to mildly alkaline; few are strongly acid.

Igneous rock. Rock produced through the cooling of melted mineral materials.

Internal drainage. That quality of a soil that permits the downward flow of excess water through it.

Intrazonal soil. Any of the great groups of soils having more or less well-developed soil characteristics that reflect the dominating influence of some local factor of relief, parent material, or age over the normal effect of the climate and vegetation.

Kame. A short irregular ridge, hill, or hillock of stratified glacial drift. Most kames are hilly and are interspersed with depressions, called kettles, that have no surface drainage.

Leaching, soil. Removal of materials in solution by the passage of water through soil.

Liquid limit. The moisture content at which a soil passes from a plastic state to a liquid state.

Low Humic Gley soils. An intrazonal group of poorly drained soils that have thin surface horizons, moderately high in organic matter. The surface layer overlies mottled gray and brown gleylike mineral horizons in which there is a low degree of textural differentiation.

Mapping unit, soil. Any soil, miscellaneous land type, soil complex, or undifferentiated soil group shown on the detailed soil map and identified by a letter symbol.

Maximum dry density. The highest density to which a soil can be compacted by mechanical manipulation at a certain moisture content called the optimum moisture.

Modal profile. The profile of a taxonomic unit representing the most usual condition of each property designated for the unit.

Mottling, soil. Contrasting color patches that vary in number and size. Descriptive terms are as follows: Contrast—faint, distinct, and prominent; abundance—few, common, and many; and size—fine, medium, and coarse. The size measurements are the following: Fine, commonly less than 5 millimeters in diameter along the greatest dimension; medium, commonly ranging from 5 to 15 millimeters in diameter along the greatest dimension; and coarse, commonly more than 15 millimeters in diameter along the greatest dimension.

Nutrients, plant. The elements taken in by a plant, essential to its growth, and used by it in the elaboration of its food and tissue. These include nitrogen, phosphorus, calcium, potassium, magnesium, sulfur, iron, manganese, copper, boron, zinc, and perhaps other elements obtained from the soil; and carbon, hydrogen and oxygen obtained largely from air and water.

Optimum moisture content. The amount of moisture in a soil necessary to obtain the maximum dry density.

Parent material. The unconsolidated mass from which the soil profile develops.

Permeability, soil. That quality of the soil that enables it to transmit water or air.

Phase, soil. A subdivision of a soil type, other than one based on kind, thickness, and arrangement of layers. Steepness or character of slope, number of rock outcrops, degree of erosion, depth of soil over the substratum, and natural drainage are all examples of characteristics that suggest dividing a soil type into phases.

Plasticity index. The numerical difference between the liquid limit and plastic limit.

Plastic limit. The moisture content at which a soil passes from a semisolid to a plastic state.

Plowsole. The zone of mechanical compaction or pan formed in normal tillage operations at the base of the plowshare.

Productivity, soil. The capability of a soil to produce a specified plant or sequence of plants under a given system of management.

Profile, soil. A vertical section of the soil through all its horizons and extending into the parent material.

Puddling, soil. Physical disturbance of a wet soil with an accompanying reduction in pore space brought about by mechanical breakdown of soil structure.

Reaction, soil. The degree of acidity or alkalinity of the soil mass, expressed in pH values or in words, as follows:

	pH		*pH*
Extremely acid	Below 4.5	Mildly alkaline	7.4 to 7.8
Very strongly acid	4.5 to 5.0	Moderately alkaline	7.9 to 8.4
Strongly acid	5.1 to 5.5	Strongly alkaline	8.5 to 9.0
Medium acid	5.6 to 6.0	Very strongly alkaline	9.1 and higher
Slightly acid	6.1 to 6.5		
Neutral	6.6 to 7.3		

Relief. The elevations or inequalities of a land surface, considered collectively.

Residual material. Unconsolidated and partly weathered parent material (residuum) for soils presumed to have developed from the same kind of rock as that on which it lies.

Runoff. Refers to the amount of water removed by flow over the surface of the soil. The amount and rapidity of runoff are affected by factors such as texture, structure, and porosity of the surface soil; the vegetative covering; the prevailing climate; and the slope. The degree of runoff is expressed by the terms very rapid, rapid, medium, slow, very slow, and ponded.

Schist. Any rock that splits or cleaves readily; a rock that has a parallel or foliated structure secondarily developed in it by shearing, a process generally accompanied by more or less recrystallization of the constituent minerals in layers parallel to the cleavage.

Sedimentary rock. A rock composed of particles deposited from suspension in water. Although there are many intermediate types, the principal groups of sedimentary rocks are: conglomerates (from gravels); sandstones (from sands); shales (from clays); and limestones (from soft masses of calcium carbonates).

Series, soil. A group of soils that, except for the texture of the surface soil, are similar in profile characteristics and in horizon arrangement. The soils of one series have developed from a particular type of parent material. A series may include two or more soil types, which differ primarily in texture of the surface soil.

Soil. The natural medium, composed of organic and mineral materials, for the growth of land plants on the surface of the earth.

Sols Bruns Acides. The Sols Bruns Acides are strongly acid to very strongly acid and have a low base status. They have a thin A_1 horizon, a paler intervening horizon (an A_2 or possibly a B_1) that is difficult to distinguish from the B_2 horizon, and a B_2 horizon that is uniform in color and has little or no accumulation of silicate clay.

Solum. The upper part of the soil profile above the parent material. The processes of soil formation take place in this part of the profile.

Structure, soil. The arrangement of the soil particles into lumps, granules, or other aggregates. Structure is described by grade (weak, moderate, or strong); that is, the distinctness and durability of the aggregates; by the size of the aggregates (very fine or very thin, fine or thin, medium, coarse or thick, or very coarse or very thick); and their shape (platy, prismatic, columnar, blocky, granular, or crumb). A soil is described as structureless if there are no observable aggregates. Structureless soils may be massive (coherent) or single grain (noncoherent).

Blocky, angular. Aggregates are block-shaped; they may have flat or rounded surfaces that join at sharp angles.

Blocky, subangular. Aggregates have some rounded and some plane surfaces; vertices are rounded.

Columnar. Aggregates are prismatic and are rounded at the upper ends.

Granular. Roughly spherical, firm, small aggregates that may be either hard or soft, but are generally firmer than crumb and without the distinct faces of blocky structure.

Platy. Soil particles are arranged around a plane, usually horizontal.

Prismatic. Soil particles are arranged around a vertical line; aggregates have flat vertical surfaces.

Subsoil. Technically, the B horizon; roughly, that part of the profile below plow depth.

Substratum. Material underlying the subsoil.

Terrace (geological). An old alluvial plain, usually flat or smooth, bordering a stream, a lake, or the sea; frequently called second bottom as contrasted to flood plain; seldom subject to overflow.

Texture, soil. Size of the individual particles making up the soil mass. The relative amounts of particles of different size classes, called sand, silt, and clay, determine texture. A coarse-textured soil is one high in content of sand; a fine-textured one contains a large proportion of clay.

Clay. Small mineral soil grains, less than 0.002 millimeter in diameter. Clay soils do not have definite structure and are described usually as massive.

Silt. Small mineral soil grains ranging from 0.05 millimeter to 0.002 millimeter in diameter, including all soil material that contains 80 percent or more silt and less than 12 percent clay.

Sand. Small rock or mineral fragments that have diameters ranging from 0.05 millimeter to 2.0 millimeters. The term *sand* is also applied to soils that contain 85 percent or more of sand.

Tilth, soil. The physical condition of a soil in respect to its fitness for the growth of a specified plant or sequence of plants. Ideal soil tilth is not the same for each kind of crop, nor is it uniform for the same kind of crop growing on different kinds of soil.

Triassic. The earliest period of the Mesozoic era occurring in the geological time scale.

Type, soil. A group of soils that have genetic horizons with similar differentiating characteristics, including texture and arrangement of the soil profile, and developed from a particular type of parent material.

Upland (geological). Lands consisting of materials unworked by water in recent geologic time and ordinarily lying at higher elevations than the alluvial plains.

Variant, soil. A taxonomic soil unit, small in extent, that is related to another taxonomic unit, but departing from it in at least one differentiating characteristic at the series level. A variant derives its name from the principal distinguishing feature.

Varves. Distinctly marked annual deposits of sediment, regardless of its origin, that usually consist of two layers.

Weathering, soil. The physical and chemical disintegration and decomposition of rocks and minerals.

Wisconsin glaciation (geological). The last glaciation that covered North America with a continental ice sheet estimated to be several thousands of feet thick.

Zonal soil. Any one of the great groups of soil that have well-developed soil characteristics reflecting the influence of the active factors of soil genesis—climate and living organisms, chiefly vegetation.

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GUIDE TO MAPPING UNITS AND CAPABILITY UNITS

Map symbol	Mapping unit	Page	Capability unit	Page
AcA	Acton fine sandy loam, 0 to 3 percent slopes	67	IIw-1	11
AcB	Acton fine sandy loam, 3 to 8 percent slopes	67	IIwe-1	13
AdB	Acton stony fine sandy loam, 3 to 8 percent slopes	67	IVws-1	18
AfA	Agawam fine sandy loam, 0 to 3 percent slopes	68	IIs-1	14
AfB	Agawam fine sandy loam, 3 to 8 percent slopes	68	IIs-2	14
AfC	Agawam fine sandy loam, 8 to 15 percent slopes	68	IIIe-3	15
AgA	Agawam very fine sandy loam, 0 to 3 percent slopes	68	I-1	10
AgB	Agawam very fine sandy loam, 3 to 8 percent slopes	69	IIe-1	11
AgC	Agawam very fine sandy loam, 8 to 15 percent slopes	69	IIIe-1	14
AkA	Agawam very fine sandy loam, overflow, 0 to 3 percent slopes	69	I-1	10
Am	Alluvial land (0 to 3 percent slopes)	69	IIIw-2	15
BaA	Belgrade silt loam, 0 to 3 percent slopes	69	IIw-3	12
BaB	Belgrade silt loam, 3 to 8 percent slopes	70	IIwe-3	13
BbA	Belgrade silt loam, reddish variant, 0 to 3 percent slopes	70	IIw-3	12
BbB	Belgrade silt loam, reddish variant, 3 to 8 percent slopes	70	IIwe-3	13
BcA	Berlin silt loam, 0 to 3 percent slopes	70	IIw-3	12
BcB	Berlin silt loam, 3 to 8 percent slopes	70	IIwe-3	13
BcC	Berlin silt loam, 8 to 15 percent slopes	70	IIIe-4	15
BdA	Bermudian sandy loam, 0 to 3 percent slopes	71	IIw-4	12
BeA	Bermudian silt loam, 0 to 3 percent slopes	71	IIw-4	12
BfA	Biddeford silt loam, 0 to 3 percent slopes	71	Vw-2	18
BgA	Biddeford silt loam, reddish variant, 0 to 3 percent slopes	71	Vw-2	18
BhA	Birchwood fine sandy loam, 0 to 3 percent slopes	72	IIw-2	12
BhB	Birchwood fine sandy loam, 3 to 8 percent slopes	72	IIwe-2	13
BmA	Bowmansville silt loam, 0 to 3 percent slopes	72	IIIw-2	15
BoA	Branford silt loam, 0 to 3 percent slopes	73	I-1	10
BoB	Branford silt loam, 3 to 8 percent slopes	73	IIe-1	11
BrA	Broadbrook silt loam, 0 to 3 percent slopes	73	I-2	11
BrB	Broadbrook silt loam, 3 to 8 percent slopes	73	IIe-2	11
BrB2	Broadbrook silt loam, 3 to 8 percent slopes, eroded	74	IIe-2	11
BrC	Broadbrook silt loam, 8 to 15 percent slopes	74	IIIe-2	14
BrC2	Broadbrook silt loam, 8 to 15 percent slopes, eroded	74	IIIe-2	14
BrD	Broadbrook silt loam, 15 to 25 percent slopes	74	IVe-2	17
BsA	Broadbrook stony silt loam, 0 to 3 percent slopes	74	IVes-2	17
BsB	Broadbrook stony silt loam, 3 to 8 percent slopes	74	IVes-2	17
BsC	Broadbrook stony silt loam, 8 to 15 percent slopes	74	IVes-2	17
BsD	Broadbrook stony silt loam, 15 to 25 percent slopes	74	VIes-2	19
BtB	Brookfield fine sandy loam, 3 to 8 percent slopes	75	IIs-2	14
BtC	Brookfield fine sandy loam, 8 to 15 percent slopes	75	IIIe-3	15
BvB	Brookfield stony fine sandy loam, 3 to 8 percent slopes	75	IVes-1	17
BvC	Brookfield stony fine sandy loam, 8 to 15 percent slopes	75	IVes-1	17
BxA	Buxton silt loam, 0 to 3 percent slopes	75	IIw-3	12
BxB	Buxton silt loam, 3 to 8 percent slopes	75	IIwe-3	13
BxC	Buxton silt loam, 8 to 15 percent slopes	75	IIIe-4	15
CaA	Charlton fine sandy loam, 0 to 3 percent slopes	76	I-1	10
CaB	Charlton fine sandy loam, 3 to 8 percent slopes	76	IIe-1	11
CaC	Charlton fine sandy loam, 8 to 15 percent slopes	76	IIIe-1	14
CaD	Charlton fine sandy loam, 15 to 25 percent slopes	76	IVe-1	16
ChB	Charlton stony fine sandy loam, 3 to 8 percent slopes	76	IVes-1	17
ChC	Charlton stony fine sandy loam, 8 to 15 percent slopes	76	IVes-1	17
ChD	Charlton stony fine sandy loam, 15 to 25 percent slopes	76	VIes-1	19
CrC	Charlton very stony fine sandy loam, 3 to 15 percent slopes	76	VIs-1	19
CrD	Charlton very stony fine sandy loam, 15 to 35 percent slopes	76	VIIs-1	20
CsA	Cheshire fine sandy loam, 0 to 3 percent slopes	77	I-1	10
CsB	Cheshire fine sandy loam, 3 to 8 percent slopes	77	IIe-1	11
CsB2	Cheshire fine sandy loam, 3 to 8 percent slopes, eroded	77	IIe-1	11
CsC	Cheshire fine sandy loam, 8 to 15 percent slopes	77	IIIe-1	14
CsC2	Cheshire fine sandy loam, 8 to 15 percent slopes, eroded	77	IIIe-1	14
CsD2	Cheshire fine sandy loam, 15 to 25 percent slopes, eroded	77	IVe-1	16
CtB	Cheshire stony fine sandy loam, 3 to 8 percent slopes	77	IVes-1	17
CtC	Cheshire stony fine sandy loam, 8 to 15 percent slopes	78	IVes-1	17
CtD	Cheshire stony fine sandy loam, 15 to 25 percent slopes	78	VIes-1	19
CvC	Cheshire very stony fine sandy loam, 3 to 15 percent slopes	78	VIs-1	19
CvD	Cheshire very stony fine sandy loam, 15 to 35 percent slopes	78	VIIs-1	20
EfA	Ellington fine sandy loam, 0 to 3 percent slopes	78	IIw-1	11
EmA	Elmwood loamy sand, 0 to 3 percent slopes	78	IIIs-1	16
EnA	Elmwood sandy loam, 0 to 3 percent slopes	79	IIw-1	11
EnB	Elmwood sandy loam, 3 to 8 percent slopes	79	IIwe-1	13
EoA	Elmwood very fine sandy loam, 0 to 3 percent slopes	79	IIw-1	11
EoB	Elmwood very fine sandy loam, 3 to 8 percent slopes	79	IIwe-1	13
EsA	Enfield silt loam, 0 to 3 percent slopes	79	I-1	10
EsA2	Enfield silt loam, 0 to 3 percent slopes, eroded	79	IIs-1	14
EsB	Enfield silt loam, 3 to 8 percent slopes	80	IIe-1	11
EsB2	Enfield silt loam, 3 to 8 percent slopes, eroded	80	IIs-2	14

GUIDE TO MAPPING UNITS AND CAPABILITY UNITS—Continued

Map symbol	Mapping unit	Page	Capability unit	Page
EsC	Enfield silt loam, 8 to 15 percent slopes	80	IIIe-1	14
EsC2	Enfield silt loam, 8 to 15 percent slopes, eroded	80	IIIe-3	15
EwA	Enfield silt loam, overflow, 0 to 3 percent slopes	80	I-1	10
GcA	Gloucester fine sandy loam, 0 to 3 percent slopes	81	IIs-1	14
GcB	Gloucester fine sandy loam, 3 to 8 percent slopes	81	IIs-2	14
GcC	Gloucester fine sandy loam, 8 to 15 percent slopes	81	IIIe-3	15
GcD	Gloucester fine sandy loam, 15 to 25 percent slopes	81	IVe-1	16
GsB	Gloucester stony fine sandy loam, 3 to 8 percent slopes	81	IVes-1	17
GsC	Gloucester stony fine sandy loam, 8 to 15 percent slopes	81	IVes-1	17
GsD	Gloucester stony fine sandy loam, 15 to 25 percent slopes	81	VIes-1	19
GvC	Gloucester and Brookfield very stony fine sandy loams, 3 to 15 percent slopes	81	VIs-1	19
GvD	Gloucester and Brookfield very stony fine sandy loams, 15 to 35 percent slopes	81	VIIs-1	20
HaA	Hadley silt loam, 0 to 3 percent slopes	82	IIw-4	12
HdA	Hartford fine sandy loam, 0 to 3 percent slopes	82	I-1	10
HdB	Hartford fine sandy loam, 3 to 8 percent slopes	82	IIe-1	11
HfA	Hartford sandy loam, 0 to 3 percent slopes	82	IIs-1	14
HfB	Hartford sandy loam, 3 to 8 percent slopes	82	IIs-2	14
HfC	Hartford sandy loam, 8 to 15 percent slopes	83	IIIe-3	15
HkA	Hinckley gravelly sandy loam, 0 to 3 percent slopes	83	IIIs-2	16
HkC	Hinckley gravelly sandy loam, 3 to 15 percent slopes	83	IIIse-1	16
HnC	Hinckley loamy sand, 3 to 15 percent slopes	84	IVs-1	18
HoC	Hollis rocky loam, 3 to 15 percent slopes	84	VIs-3	20
HoD	Hollis rocky loam, 15 to 35 percent slopes	84	VIIs-3	20
HsC	Hollis very rocky loam, 3 to 15 percent slopes	84	VIIs-3	20
HsE	Hollis very rocky loam, 15 to 35 percent slopes	84	VIIs-3	20
HtC	Holyoke rocky silt loam, 3 to 15 percent slopes	85	VIs-3	20
HtD	Holyoke rocky silt loam, 15 to 35 percent slopes	85	VIIs-3	20
HyC	Holyoke very rocky silt loam, 3 to 15 percent slopes	85	VIIs-3	20
HzE	Holyoke very rocky loam, 15 to 35 percent slopes	85	VIIs-3	20
LcA	Leicester loam, 0 to 3 percent slopes	85	IIIw-1	15
LeA	Leicester stony loam, 0 to 3 percent slopes	85	VIws-1	19
LdA	Leicester, Whitman, and Ridgebury very stony soils, 0 to 5 percent slopes	85	VIIs-4	20
LmA	Limerick silt loam, 0 to 3 percent slopes	86	IIIw-2	15
LoA	Ludlow loam, 0 to 3 percent slopes	86	IIw-2	12
LoB	Ludlow loam, 3 to 8 percent slopes	86	IIwe-2	13
LsB	Ludlow stony loam, 3 to 8 percent slopes	87	IVws-2	18
LwC	Ludlow and Watchaug very stony soils, 3 to 15 percent slopes	87	VIs-2	19
Ma	Made land	87	(None)	
McA	Manchester gravelly loam, 0 to 3 percent slopes	87	IIIs-2	16
McC	Manchester gravelly loam, 3 to 15 percent slopes	87	IIIse-1	16
MgA	Manchester gravelly sandy loam, 0 to 3 percent slopes	87	IIIs-2	16
MgC	Manchester gravelly sandy loam, 3 to 15 percent slopes	87	IIIse-1	16
MhC	Manchester loamy sand, 3 to 15 percent slopes	88	IVs-1	18
MmA	Melrose sandy loam, 0 to 3 percent slopes	88	IIs-1	14
MmB	Melrose sandy loam, 3 to 8 percent slopes	88	IIs-2	14
MnA	Melrose very fine sandy loam, 0 to 3 percent slopes	88	I-1	10
MnB	Melrose very fine sandy loam, 3 to 8 percent slopes	88	IIe-1	11
MoA	Menlo silt loam, 0 to 3 percent slopes	89	Vw-1	18
MpA	Menlo stony silt loam, 0 to 3 percent slopes	89	VIws-2	19
MrA	Merrimac fine sandy loam, 0 to 3 percent slopes	89	I-1	10
MrB	Merrimac fine sandy loam, 3 to 8 percent slopes	89	IIe-1	11
MrC	Merrimac fine sandy loam, 8 to 15 percent slopes	89	IIIe-1	14
MsA	Merrimac fine sandy loam, overflow, 0 to 3 percent slopes	89	I-1	10
MyA	Merrimac sandy loam, 0 to 3 percent slopes	90	IIs-1	14
MyB	Merrimac sandy loam, 3 to 8 percent slopes	90	IIs-2	14
MyC	Merrimac sandy loam, 8 to 15 percent slopes	90	IIIe-3	15
NaA	Narragansett silt loam, 0 to 3 percent slopes	91	I-1	10
NaB	Narragansett silt loam, 3 to 8 percent slopes	91	IIe-1	11
NaB2	Narragansett silt loam, 3 to 8 percent slopes, eroded	91	IIe-1	11
NaC	Narragansett silt loam, 8 to 15 percent slopes	91	IIIe-1	14
NaC2	Narragansett silt loam, 8 to 15 percent slopes, eroded	91	IIIe-1	14
NaD	Narragansett silt loam, 15 to 25 percent slopes	91	IVe-1	16
NgB	Narragansett stony silt loam, 3 to 8 percent slopes	91	IVes-1	17
NgC	Narragansett stony silt loam, 8 to 15 percent slopes	92	IVes-1	17
NgD	Narragansett stony silt loam, 15 to 25 percent slopes	92	VIes-1	19
NkC	Narragansett and Broadbrook very stony silt loams, 3 to 15 percent slopes	92	VIs-1	19
NmD	Narragansett and Broadbrook very stony soils, 15 to 35 percent slopes	92	VIIs-1	20
NnA	Ninigret fine sandy loam, 0 to 3 percent slopes	92	IIw-1	11
NnB	Ninigret fine sandy loam, 3 to 8 percent slopes	92	IIwe-1	13
NsA	Ninigret very fine sandy loam, 0 to 3 percent slopes	92	IIw-1	11
NsB	Ninigret very fine sandy loam, 3 to 8 percent slopes	93	IIwe-1	13
OnA	Ondawa sandy loam, 0 to 3 percent slopes	93	IIw-4	12
PaB	Paxton fine sandy loam, reddish substratum, 3 to 8 percent slopes	94	IIe-2	11
PaC	Paxton fine sandy loam, reddish substratum, 8 to 15 percent slopes	94	IIIe-2	14
PaD	Paxton fine sandy loam, reddish substratum, 15 to 25 percent slopes	94	IVe-2	17

GUIDE TO MAPPING UNITS AND CAPABILITY UNITS—Continued

Map symbol	*Mapping unit*	*Page*	*Capability unit*	*Page*
PbB	Paxton loam, 3 to 8 percent slopes	94	IIe–2	11
PbC	Paxton loam, 8 to 15 percent slopes	94	IIIe–2	14
PbD2	Paxton loam, 15 to 25 percent slopes, eroded	94	IVe–2	17
PcB	Paxton stony fine sandy loam, reddish substratum, 3 to 8 percent slopes	94	IVes–2	17
PcC	Paxton stony fine sandy loam, reddish substratum, 8 to 15 percent slopes	94	IVes–2	17
PcD	Paxton stony fine sandy loam, reddish substratum, 15 to 25 percent slopes	94	VIes–2	19
PdB	Paxton stony loam, 3 to 8 percent slopes	94	IVes–2	17
PdC	Paxton stony loam, 8 to 15 percent slopes	94	IVes–2	17
PdD	Paxton stony loam, 15 to 25 percent slopes	95	VIes–2	19
PeC	Paxton very stony loam, 3 to 15 percent slopes	95	VIs–2	19
PeD	Paxton very stony loam, 15 to 35 percent slopes	95	VIIs–2	20
PkA	Peats and Mucks	95	VIIIw–1	20
PmA	Peats and Mucks, shallow	95	VIIIw–1	20
PnA	Penwood loamy sand, 0 to 3 percent slopes	95	IIIs–1	16
PnB	Penwood loamy sand, 3 to 8 percent slopes	95	IIIs–1	16
PnC	Penwood loamy sand, 8 to 15 percent slopes	95	IVs–1	18
PoA	Podunk sandy loam, 0 to 3 percent slopes	96	IIw–5	13
PpB	Poquonock loamy sand, 3 to 8 percent slopes	96	IIs–2	14
PpC	Poquonock loamy sand, 8 to 15 percent slopes	96	IIIe–3	15
PuA	Poquonock sandy loam, 0 to 3 percent slopes	96	I–2	11
PuB	Poquonock sandy loam, 3 to 8 percent slopes	96	IIe–2	11
PuC	Poquonock sandy loam, 8 to 15 percent slopes	96	IIIe–2	14
RaA	Rainbow silt loam, 0 to 3 percent slopes	97	IIw–2	12
RaB	Rainbow silt loam, 3 to 8 percent slopes	97	IIwe–2	13
RbA	Rainbow stony silt loam, 0 to 3 percent slopes	97	IVws–2	18
RbB	Rainbow stony silt loam, 3 to 8 percent slopes	97	IVws–2	18
RdA	Ridgebury loam, 0 to 3 percent slopes	97	IIIw–1	15
Re	Riverwash	98	VIIIs–1	20
RhC	Rocky land, Hollis materials, 3 to 15 percent slopes	98	VIIIs–1	20
RhE	Rocky land, Hollis materials, 15 to 35 percent slopes	98	VIIIs–1	20
RkC	Rocky land, Holyoke materials, 3 to 15 percent slopes	98	VIIIs–1	20
RkE	Rocky land, Holyoke materials, 15 to 35 percent slopes	98	VIIIs–1	20
RoA	Rowland silt loam, 0 to 3 percent slopes	98	IIw–5	13
RuA	Rumney sandy loam, 0 to 3 percent slopes	98	IIIw–2	15
SaA	Saco sandy loam, 0 to 3 percent slopes	99	VIw–1	19
SbA	Saco silt loam, 0 to 3 percent slopes	99	VIw–1	19
ScA	Scantic silt loam, 0 to 3 percent slopes	99	IVw–1	18
SdA	Scantic silt loam, reddish variant, 0 to 3 percent slopes	99	IVw–1	18
SeA	Scarboro loam, 0 to 3 percent slopes	100	Vw–1	18
SsA	Sudbury fine sandy loam, 0 to 3 percent slopes	101	IIw–1	11
StA	Suncook loamy sand, 0 to 3 percent slopes	101	IIIs–1	16
SuC	Sunderland rocky fine sandy loam, 3 to 15 percent slopes	101	VIs–3	20
SuE	Sunderland rocky fine sandy loam, 15 to 35 percent slopes	101	VIIs–3	20
SvA	Sutton loam, 0 to 3 percent slopes	102	IIw–1	11
SvB	Sutton loam, 3 to 8 percent slopes	102	IIwe–1	13
SwA	Sutton stony loam, 0 to 3 percent slopes	102	IVws–1	18
SwB	Sutton stony loam, 3 to 8 percent slopes	102	IVws–1	18
SxC	Sutton and Acton very stony loams, 3 to 15 percent slopes	102	VIs–1	19
SyA	Swanton sandy loam, 0 to 3 percent slopes	102	IIIw–1	15
SzA	Swanton very fine sandy loam, 0 to 3 percent slopes	103	IIIw–1	15
Tc	Terrace escarpments, clay	103	VIe–1	19
Te	Terrace escarpments, sand and clay	103	VIe–1	19
Tg	Terrace escarpments, sand and gravel	103	VIe–1	19
TsA	Tisbury silt loam, 0 to 3 percent slopes	103	IIw–1	11
TsB	Tisbury silt loam, 3 to 8 percent slopes	103	IIwe–1	13
WaA	Wallington silt loam, 0 to 3 percent slopes	104	IIIw–1	15
WbA	Wallington silt loam, reddish variant, 0 to 3 percent slopes	104	IIIw–1	15
WcA	Walpole loam, 0 to 3 percent slopes	104	IIIw–1	15
WdA	Walpole sandy loam, 0 to 3 percent slopes	105	IIIw–1	15
WeA	Wapping silt loam, 0 to 3 percent slopes	105	IIw–1	11
WeB	Wapping silt loam, 3 to 8 percent slopes	105	IIwe–1	13
WfA	Wapping stony silt loam, 0 to 3 percent slopes	105	IVws–1	18
WfB	Wapping stony silt loam, 3 to 8 percent slopes	105	IVws–1	18
WgA	Watchaug loam, 0 to 3 percent slopes	106	IIw–1	11
WgB	Watchaug loam, 3 to 8 percent slopes	106	IIwe–1	13
WhA	Watchaug stony loam, 0 to 3 percent slopes	106	IVws–1	18
WhB	Watchaug stony loam, 3 to 8 percent slopes	106	IVws–1	18
WkA	Wethersfield loam, 0 to 3 percent slopes	106	I–2	11
WkB	Wethersfield loam, 3 to 8 percent slopes	106	IIe–2	11
WkB2	Wethersfield loam, 3 to 8 percent slopes, eroded	107	IIe–2	11
WkC	Wethersfield loam, 8 to 15 percent slopes	107	IIIe–2	14
WkC2	Wethersfield loam, 8 to 15 percent slopes, eroded	107	IIIe–2	14
WkD	Wethersfield loam, 15 to 25 percent slopes	107	IVe–2	17
WkD3	Wethersfield loam, 15 to 25 percent slopes, severely eroded	107	IVe–2	17
WmB	Wethersfield stony loam, 3 to 8 percent slopes	107	IVes–2	17

GUIDE TO MAPPING UNITS AND CAPABILITY UNITS—Continued

Map symbol	*Mapping unit*	*Page*	*Capability unit*	*Page*
WmC	Wethersfield stony loam, 8 to 15 percent slopes	107	IVes–2	17
WmD	Wethersfield stony loam, 15 to 25 percent slopes	107	VIes–2	19
WnC	Wethersfield very stony loam, 3 to 15 percent slopes	107	VIs–2	19
WnD	Wethersfield very stony loam, 15 to 35 percent slopes	107	VIIs–2	20
WoA	Whately loam, 0 to 3 percent slopes	107	Vw–1	18
WpA	Whitman stony loam, 0 to 3 percent slopes	108	VIws–2	19
WrA	Wilbraham silt loam, 0 to 3 percent slopes	108	IIIw–1	15
WsA	Wilbraham stony silt loam, 0 to 3 percent slopes	108	VIws–1	19
WtA	Wilbraham and Menlo very stony silt loams, 0 to 3 percent slopes	108	VIIs–4	20
WuA	Windsor loamy coarse sand, 0 to 3 percent slopes	109	IIIs–1	16
WuB	Windsor loamy coarse sand, 3 to 8 percent slopes	109	IIIs–1	16
WuC	Windsor loamy coarse sand, 8 to 15 percent slopes	109	IVs–1	18
WvA	Windsor loamy fine sand, 0 to 3 percent slopes	109	IIIs–1	16
WvB	Windsor loamy fine sand, 3 to 8 percent slopes	109	IIIs–1	16
WvC	Windsor loamy fine sand, 8 to 15 percent slopes	109	IVs–1	18
WwA	Winooski silt loam, 0 to 3 percent slopes	110	IIw–5	13
WxA	Woodbridge loam, 0 to 3 percent slopes	110	IIw–2	12
WxB	Woodbridge loam, 3 to 8 percent slopes	110	IIwe–2	13
WyA	Woodbridge loam, reddish substratum, 0 to 3 percent slopes	110	IIw–2	12
WyB	Woodbridge loam, reddish substratum, 3 to 8 percent slopes	110	IIwe–2	13
WzA	Woodbridge stony loam, 0 to 3 percent slopes	110	IVws–2	18
WzB	Woodbridge stony loam, 3 to 8 percent slopes	111	IVws–2	18
WzaB	Woodbridge stony loam, reddish substratum, 3 to 8 percent slopes	111	IVws–2	18
WzbC	Woodbridge very stony soils, 3 to 15 percent slopes	111	VIs–2	19

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