SOIL SURVEY

Tolland County Connecticut

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
In cooperation with
Connecticut Agricultural Experiment Station
and
Storrs Agricultural Experiment Station

Series 1961, No. 35

Issued December 1966

HOW TO USE THIS SOIL SURVEY REPORT

THIS SOIL SURVEY of Tolland County will serve several groups of readers. It will help farmers in planning the kind of management that will protect their soils and provide good yields; assist engineers in selecting sites for roads, buildings, ponds, and other structures; aid managers of forest and woodland; add to soil scientists' knowledge of soils; and help prospective buyers and others in appraising a farm or other tract.

Locating the Soils

At the back of this report is an index map and a soil map consisting of many sheets. On the index map are rectangles numbered to correspond to the sheets of the soil map so that the sheet showing any area can be located easily. On each map sheet, the soil boundaries are outlined and there is a symbol for each kind of soil. All areas marked with the same symbol are the same kind of soil. The soil symbol is inside the area if there is enough room; otherwise, it is outside the area and a pointer shows where it belongs. For example, an area on the map has the symbol CaB. The legend for the set of maps shows that this symbol identifies Charlton fine sandy loam, 3 to 8 percent slopes. That soil and all others mapped in the county are described in the section "Descriptions of the Soils."

Finding Information

In the "Guide to Mapping Units" at the back of this report, the soils are listed in the alphabetic order of their map symbols. This guide shows where to find a description of each soil and a discussion of its capability unit, woodland suitability group, and urban group. It also shows where to find the acreage of each soil, the yields that can be expected, and information about engineering uses of soils.

Farmers and those who work with farmers can learn about the soils on a farm by reading the description of each soil and of its capability unit and other groupings. A convenient way of doing this is to turn to the soil map, list the soil symbols on a farm, and then use the "Guide to Mapping Units" to find the pages where each soil and its groupings are described.

Foresters and others interested in woodland can refer to the subsection "Use of the Soils for Woodland." In that subsection the soils in the county are placed in groups according to their suitability for trees, and the management of each group is discussed.

Community planners and others concerned with suburban development can learn about the soil characteristics that affect the choice of homesites, industrial sites, schools, and parks in the subsection "Urban Development."

Engineers and builders will find in the subsection "Engineering Uses of Soils" tables that provide engineering descriptions of the soils in the county; name soil features that affect engineering practices and structures; and rate the soils according to their suitability for several kinds of engineering work.

Scientists and others who are interested can read about how the soils were formed and how they are classified in the section "Formation, Classification, and Morphology 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.

Newcomers in Tolland County will be especially interested in the section "General Soil Map," where broad patterns of soils are described. They may also be interested in the section "General Nature of the County," which gives additional information about the county.

* * * * *

Fieldwork for this survey was completed in 1961. Unless otherwise indicated, all statements in the report refer to conditions in the county at the time the survey was in progress. The soil survey of Tolland County was made as part of the technical assistance furnished by the Soil Conservation Service to the Tolland County Soil Conservation District.

Cover picture: Contour strips of corn and hay, mostly on Cheshire soils; Cheshire and Narragansett soils on low hills in background.

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Contents

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SOIL SURVEY OF TOLLAND COUNTY, CONNECTICUT

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

TOLLAND COUNTY is in northeastern Connecticut just south of Massachusetts (fig. 1). The county has a land area of 266,240 acres, or 416 square miles. The northwest corner of the county is in the Central Lowland,

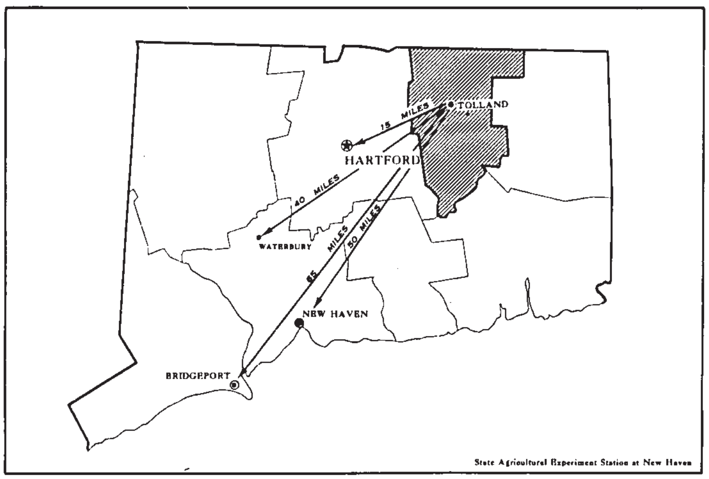

Figure 1.—**Location of Tolland County in Connecticut.**

and the rest of the county in the Eastern Highland physiographic division of the State. In 1960, according to the U.S. Census, the county was composed of 13 towns, with a total population of 68,737. Nearly half of the population was in the towns of Vernon and Mansfield.

According to the 1959 U.S. Census of Agriculture, 34.3 percent of the county area was in farms. Dairying is the main farming enterprise; forage, potatoes, and tobacco are the principal crops. Forage crops are grown mainly in support of dairying.

How the Soil Survey Was Made

Soil scientists made this survey to learn what kinds of soils are in Tolland County, where they are located, and how they can be used.

They went into the county knowing they likely would find many soils they had already seen, and perhaps some they had not. As they traveled over the county, they observed steepness, length, and shape of slopes; size and speed of streams; kinds of native plants or crops; kinds of rock; and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material that has not been changed much by leaching or by roots of plants.

The soil scientists made comparisons among the profiles they studied, and they compared these profiles with those in counties nearby and in places more distant. They classified and named the soils according to nationwide, uniform procedures. For efficient use of this report, it is necessary to know the kinds of groupings most used in a local soil classification.

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, all the soils of one series have major horizons that are similar in thickness, arrangement, and other important characteristics. Each soil series is named for a town or other geographic feature near the place where a soil of that series was first observed and mapped. Brimfield and Charlton, for example, are the names of two soil series. All the soils in the United States having the same series name are essentially alike in those characteristics that go with their behavior in the natural, untouched landscape. Soils of one series can differ somewhat in texture of the surface soil and in slopes, stoniness, or some other characteristic that affects use of the soils by man.

Because of differences in texture, soil types are designated within most soil series. All the soils having a surface layer of the same texture belong to one soil type. Fine sandy loam and sandy loam are two soil types in the Hartford series. The difference in texture of their surface layers is apparent from their names.

Some soil types vary so much in slope, degree of erosion, number and size of stones, or some other feature affecting their use, that practical suggestions about their management could not be made if they were shown on the soil map as one unit. Such soil types are divided into phases. The name of a soil phase indicates a feature that affects management. For example, Charlton fine sandy loam, 0 to 3 percent slopes, is one phase of Charlton fine sandy loam, a soil type that ranges from nearly level to steep.

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

The areas shown on a soil map are called mapping units. On most maps detailed enough to be useful in planning management of farms and fields, a mapping unit is nearly equivalent to a soil type or a phase of a soil type. Is it not exactly equivalent, because it is not practical to show on such a map all of the small, scattered bits of soil of some other kind that have been seen within an area that is dominantly of a recognized soil type or soil phase.

In preparing some detailed maps, the soil scientists have a problem of delineating areas where different kinds of soils are so intricately mixed, and so small in size, that it is not practical to show them separately on the map. Therefore, they show this mixture of soils as one mapping unit and call it a soil complex. Ordinarily, a soil complex is named for the major kinds of soil in it, for example, the Leicester-Ridgebury-Whitman very stony complex.

Soils of two or more series may be mapped in one unit if they are so nearly alike in slope, stoniness, or some other dominant characteristic that mapping them separately would add little information to the soil survey. This kind of unit is an undifferentiated group, such as the Gloucester and Charlton very stony soils. Also, on most soil maps, areas are shown that are so rocky, so shallow, or so frequently worked by wind and water that they scarcely can be called soils. These areas are shown on a soil map like other mapping units, but they are given descriptive names, such as Rock land, and are called land types rather than soils.

While a soil survey is in progress, samples of soils are taken, as needed, for laboratory measurements and for engineering tests. Laboratory data from the same kinds of soils in other places are assembled. Data on yields of crops under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soils. Yields under defined management are estimated for all the soils.

But only part of a soil survey is done when the soils have been named, described, and delineated on the map, and the laboratory data and yield data have been assembled. The mass of detailed information then needs to be organized in a way that it is readily useful to different groups of readers, among them farmers, managers of woodland, engineers, and homeowners. Grouping soils that are similar in suitability for each specified use is the method of organization commonly used in the soil survey reports. On the basis of the yield and practice tables and other data, the soil scientists set up trial groups, and test them by further study and by consultation with farmers, agronomists, engineers, and others. Then, the scientists adjust the groups according to the results of their studies and consultation. Thus, the groups that are finally evolved reflect up-to-date knowledge of the soils and their behavior under present methods of use and management.

General Soil Map

This section is for persons who want a general picture of the soils of the county. The information is helpful in determining the pattern, extent, and geographic distribution of broad groups of soils. It is useful, also, in determining the suitability of broad areas for agriculture, forestry, and other uses.

Soils occur together in characteristic geographic patterns. A group of soils associated in a defined pattern is called a soil association or a general soil area. The Charlton-Gloucester-Hollis association is an example.

After study of the soils in a locality and the way they are arranged, it is possible to make a general map that shows these soil associations. Such a map is the colored general soil map in the back of this report. Each association, as a rule, contains a few major soils and several minor soils in a pattern that is characteristic although not strictly uniform.

The soils within any one association are likely to differ from each other in some or in many properties; for example, slope, depth, stoniness, or natural drainage. Thus, the general soil map shows, not the kind of soil at any particular place, but patterns of soils, in each of which there are several different kinds of soils.

Each soil association is named for the major soil series in it, but, as already noted, soils of other series may also be present. The major soils of one soil association may also be present in other associations, but in different patterns.

The soils of Tolland County have been grouped into six soil associations, which are described in the following pages. In these descriptions the extent, the topography, and the uses and limitations of the soils are discussed. More detailed information about individual soils can be obtained from the section "Descriptions of the Soils."

1. Agawam-Enfield-Manchester association: Nearly level to gently undulating or sloping soils in glaciofluvial, windblown, and recent alluvial deposits

This association is in the northwestern part of the county at elevations that range from 175 to 250 feet above sea level. Most of it is nearly level to gently undulating or sloping, but there are scattered steeper areas. The soils of this association have developed in glaciofluvial, windblown, and recent alluvial deposits and therefore have a wide range of texture and drainage.

The Agawam and Enfield soils, and some of the less extensive soils, are important agriculturally. Among the minor soils suited to agriculture are the well-drained to somewhat excessively drained Hartford and Merrimac soils, the moderately well drained to somewhat poorly drained Ninigret soils, and the moderately well drained Ellington soils.

The Manchester and Windsor soils are very droughty and are not important for agriculture. The poorly drained Walpole soils are fairly extensive, but except for scattered areas that have been drained, they are mainly in forest or unimproved pasture. Also in the association are Peat and Muck and scattered areas of Sudbury, Raynham, Scarboro, Rumney, and Saco soils.

The soils in this association are free of stones and are very easy to work. Crops and pasture grown on soils of this group that have favorable texture and adequate drainage respond to fertilization and other management.

About 60 percent of the association has been cleared, and a small part of this is in housing and industrial developments. Tobacco, potatoes, hay, and pasture are the principal crops, but some acreage is used for silage corn, vegetables, nursery stock, and other crops.

2. Hinckley-Merrimac-Podunk association: Nearly level to undulating and sloping soils on flood plains and terraces

This association consists of a complex pattern of soils on terraces and flood plains in the narrow valleys along the larger streams in the central and southern parts of the county. Elevations range from about 250 feet above sea level on the flood plains to about 350 feet on the higher terraces. The relief is nearly level to undulating and sloping. Small, scattered, steep areas occur on terrace breaks.

The texture of these soils ranges from loamy sand or sand to silt loam. The drainage ranges from excessive to very poor.

The dominant soils on the terraces are the Hinckley and Merrimac. Other soils on terraces are the Enfield, Agawam, Tisbury, Sudbury, Windsor, Jaffrey, and Walpole. Areas of Peat and Muck are also on terraces. The dominant alluvial soil is the Podunk. On the flood plains with the Podunk soil are Ondawa, Rumney, Saco, Hadley, and Winooski soils. The association also includes many gravel pits and stripped areas, mainly in areas of Hinckley, Jaffrey, and Merrimac soils.

The Hinckley, Jaffrey, and Windsor soils are very droughty and are used little for agriculture. They are mainly in scrubby forest or are idle. The Merrimac, Agawam, and Enfield soils warm early in spring and are very easy to work. Crops grown on them respond to fertilizer and other good management. The Sudbury and Tisbury soils are slightly wet but are suitable for hay, pasture, and some crops.

The alluvial soils are subject to flooding, but the well-drained Ondawa and Hadley soils and the moderately well drained Podunk and Winooski soils are suitable for hay, pasture, silage corn, and other crops. The poorly drained Rumney and very poorly drained Saco soils are mainly in forest, are idle, or are in unimproved pasture. About 45 percent of the association is open land, some of which is idle. Crops grown are mainly hay, pasture, silage corn, sweet corn, and vegetables. Other crops are grown on small acreages.

3. Narragansett-Cheshire association: Nearly level to gently sloping soils formed over glacial till derived mainly from reddish-brown Triassic rocks

This association is made up of four small areas in the northwestern part of the county. The soils are mainly nearly level to gently sloping, but some areas are strongly sloping. The elevation ranges from about 250 to 450 feet above sea level.

These soils have formed over glacial till derived principally from reddish-brown Triassic rocks. The Narragansett, Wapping, Broadbrook, and Rainbow soils have formed in a silty mantle over the glacial till.

The most extensive soils in the association are the Narragansett and Cheshire, which are well drained, and the associated Wapping and Watchaug soils, which are moderately well drained. The less extensive are the Broadbrook, Rainbow, Poquonock, Birchwood, and Wilbraham soils.

Most of the surface stones have been removed from a large part of the association. The stony areas are mostly in forest. The stone-free Narragansett and Cheshire soils are suitable for general and special crops. These soils are fairly easy to work, and crops grown on them respond to the use of fertilizer and other good management.

About 50 percent of the association has been cleared and is used for crops, hay, pasture, and orchards, and some of it is in urban developments. Potatoes, tobacco, and silage corn are the principal crops, but some vegetables, sweet corn, nursery stock, and other crops are also grown.

4. Charlton-Gloucester-Hollis association: Gently undulating to steep, mostly stony and rocky soils

This extensive association occurs throughout the Eastern Highland section of the county, where it is interspersed with other associations. It ranges from gently undulating or sloping to hilly and steep. Elevations range from about 300 to 1,050 feet above sea level.

The association consists mainly of stony and rocky uplands, intervening narrow valleys, and scattered peat and muck bogs. Some areas on the uplands have been cleared or partly cleared of surface stones. The soils on terraces and flood plains in the narrow valleys are stone free.

The dominant soils are the Charlton, Gloucester, and Hollis. Other soils are the moderately well drained Sutton, the poorly to somewhat poorly drained Leicester, and the very poorly drained Whitman. The association also includes areas of Paxton, Woodbridge, and Brookfield soils and areas of Peat and Muck. In the narrow valleys are the Hinckley, Merrimac, Walpole, Enfield, Sudbury, and Scarboro soils on terraces and the Ondawa, Podunk, Rumney, and Saco soils on flood plains.

The Charlton, Sutton, and Gloucester are the important agricultural soils. The Charlton soils are well suited to general crops of the area. Though slightly wet, the Sutton soils are suitable for hay and pasture without drainage. The Gloucester soils are somewhat droughty. The few areas of Merrimac, Sudbury, and Enfield soils in the valleys are easy to work and are suitable for a wide variety of crops. The shallow Hollis soils, the wet Leicester and Whitman soils, and the Peat and Muck are mostly in forest.

At present about 10 percent of this association is cleared. Most of the cleared area is used for hay, pasture, and silage corn in support of dairy farming. Some areas are used for corn, sweet corn, potatoes, and other field or truck crops, or for orchards or plant nurseries. Some acreage is idle. Broiler chickens and eggs are also important sources of income.

5. Paxton-Charlton association: Gently sloping to sloping soils on smoothly rounded glacial hills

This association is in several areas, mainly in the southern half of the county. It is characterized by smoothly rounded glacial hills that are mostly gently sloping to sloping, but some areas are strongly sloping. Elevations generally range from 450 to 750 feet above sea level.

Paxton and Charlton and the associated moderately well drained Woodbridge and Sutton are the important agricultural soils in the association. The Paxton and Woodbridge soils have a hard, compact layer in glacial till at about 2 feet. The Charlton and Sutton soils have formed over friable to firm glacial till. The poorly drained Ridgebury and Leicester and the very poorly drained Whitman soils are fairly extensive and are mainly in forest. Scattered areas of Hollis, Merrimac, and other soils, and also Peat and Muck occur in this association.

Fairly large areas have been cleared or partly cleared of stones. The Paxton and Charlton soils are suitable for general crops and orchards. Without drainage, the Woodbridge and Sutton soils are suitable for hay, pasture, and some tilled crops.

About 40 percent of the association has been cleared and is used mostly for hay, pasture, and silage corn in support of dairy farming. Small acreages are used for corn, vegetables, potatoes, and other field and truck crops, or for orchards or plant nurseries.

6. Brimfield-Brookfield association: Gently sloping to steep, very rocky and stony soils

This association is in the northeast corner of the county at an elevation of about 600 to 1,200 feet above sea level. The topography is mainly gently sloping to steep.

The association is largely in forest and consists mainly of very rocky and very stony soils on uplands. The reddish Brimfield and Brookfield are the dominant soils, but areas of Charlton, Paxton, Gloucester, Jaffrey, and other soils occur, as well as Peat and Muck.

Because of stoniness, rockiness, steep slopes, and other unfavorable characteristics, the association is not generally suitable for intensive agriculture. Probably about 5 percent of the total acreage is cleared and used for crops, hay, pasture, and home gardens. Corn is the main crop.

Use and Management of the Soils

Discussed in this section are (1) the management of soils for crops and pasture, (2) the management of woodland, (3) the engineering uses of soils, and (4) the use of soils in urban development.

Management of Soils for Crops and Pasture

General practices for growing potatoes and forage crops are discussed in this subsection. Also, the soils are grouped in capability units according to their suitability for crops and pasture, and the estimated yields of principal crops are given for all the soils in the county.

Potatoes [1]

Well-drained silt loam, very fine sandy loam, and fine sandy loam on nearly level to gently undulating slopes 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 that have 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 than the coarse-textured soils.

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 are used for potatoes several years in succession than in soils where potatoes are grown in rotation with other crops. A rotation of potatoes with tobacco is very satisfactory because the soil is kept acid to control diseases of both crops. In addition, rye, for a winter cover, can be planted soon after the tobacco harvest to help maintain organic matter.

Experiments in the Connecticut River valley by the Storrs Agricultural Experiment Station (*12*, *13*, *14*) [2] have shown the importance of organic matter and the need of lime for excessively acid soils to prevent toxicity to potatoes, especially 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. The more sloping fields should be harvested for potatoes and seeded to rye earlier than the less sloping fields. Drilled rye produces heavier stands from less seed and has more time to grow in the fall than broadcast rye.

Rye, planted before the 15th of October in soil that has a low supply of nitrogen, responds to nitrogen fertilizer unless the weather is very unfavorable. From 20 to 30 pounds of nitrogen per acre in the form of ammonium nitrate should be applied; a second application of the same amount should be broadcast early in the spring.

For land that has been kept out of potatoes for a year, good soil-improving crops 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 in 1 year for improvement of potato soils. Redtop or redtop and alsike clover are especially good for soils that are to be kept out of potatoes for 2 years.

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

Most of the fertilizer for potatoes is applied in sidebands at planting time. Ammonia is the primary source of nitrogen in a complete fertilizer. Not much nitrate nitrogen is used in fertilizer mixtures, because it is more costly, is subject to leaching, and is less compatible in the mixture. Experiments on commercial potato farms in Hartford County show that yields of potatoes from soils that contain a small amount of available nitrogen can be progressively increased by applying 150 to 180 pounds, or slightly more, of nitrogen per acre. If such soils have a good moisture-holding capacity, or if they are irrigated, better yields can be obtained by applying the larger amount of nitrogen, provided insects and diseases are controlled. Less nitrogen is recommended if potatoes follow tobacco or legume crops.

[1] This subsection was prepared by Arthur Hawkins, agronomist, Storrs Agricultural Experiment Station, Storrs, Connecticut.

[2] Italic numbers in parentheses refer to Literature Cited, p. 108.

The experiments further showed that the application of part of the nitrogen as a sidedressing of ammonium nitrate or urea produces 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 applications of 150 pounds per acre or less of P_2O_5 produce as good yields as applications of larger amounts. In addition, applications of 150 pounds per acre of K_2O produce as good yields as applications of 200 pounds, or produce slightly better yields.

Soils that contain a medium, or larger, supply of available phosphorus and potassium can be fertilized effectively for potatoes by (a) using less fertilizer of 1–2–2 or 3–4–4 ratio in the row and broadcasting additional nitrogen or applying it as a sidedressing, or (b) using fertilizer having a 1–1–1 ratio. Fertilizers that have a 1–1–1 ratio are normally highly acid and are not suitable for excessively acid soils that are low in organic matter.

Soils that contain a small amount of available phosphorus and potassium should be fertilized with 200 pounds each per acre of P_2O_5 and K_2O. Fertilizers that have a ratio of 3–4–4, if applied at rates that provide 200 pounds each of P_2O_5 and K_2O per acre, will also furnish most or all of the nitrogen that is needed. An additional 30 to 50 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.

For potatoes on soils that test less than medium in available magnesium, the fertilizer applied at planting time should supply 30 pounds of highly water-soluble magnesium oxide (M_gO) per acre.

Tobacco

Practices for growing and managing tobacco in Connecticut are discussed in detail by Henry C. de Roo in the "Soil Survey of Hartford County, Connecticut" (*28*) and in Bulletin 613, "Fertilizing Connecticut Tobacco," by the Connecticut Agricultural Experiment Station (*7*).

Forage crops

Forage crops are grown on soils that are coarse to medium textured and excessively to poorly drained; but, generally, they grow best on soils that are medium to moderately coarse textured and well drained to moderately well drained. 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 clovers and grasses grow well on wet soils that are poorly suited to alfalfa. Corn grows best on well-drained soils that have a high moisture-holding capacity.

The soils in Tolland County are generally strongly to very strongly acid. 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 grain and corn can grow in acid soils, but they generally grow best if the pH is 5.8 or above.

All forage crops need liberal amounts of fertilizer; legumes also need lime. Potash is the most important nutrient in fertilizer for alfalfa and other legumes, and nitrogen is generally the most important for corn, grasses, and small grain. The quantity of plant nutrients and lime needed for highest yields depends on the soil type, on supplies of organic matter, and on previous management. Consequently, lime and fertilizer should be applied in amounts determined by soil tests.

In addition to liming and fertilizing, other management practices are important in forage production. Cutting at the proper time is necessary to maintain the stand and obtain good feeding quality. Feeding quality is best when grasses and legumes are cut at an early stage of maturity.

Recommendations for liming, fertilizing, and harvesting can be obtained from the Storrs Agricultural Experiment Station and the Extension Service, University of Connecticut. These recommendations are revised as new research information becomes available.

Capability groups of soils

The capability classification is a grouping of soils that shows, in a general way, how suitable they are for most kinds of farming. It is a practical grouping based on limitations of the soils, the risk of damage when they are used, and the way they respond to treatment.

In this system all the kinds of soil are grouped at three levels, the capability class, subclass, and unit. The eight capability classes in the broadest grouping are designated by Roman numerals I through VIII. In class I are the soils that have few limitations, the widest range of use, and the least risk of damage when they are used. The soils in the other classes have progressively greater natural limitations. In class VIII are soils and landforms so rough, shallow, or otherwise limited that they do not produce worthwhile yields of crops, forage, or wood products.

The subclasses indicate major kinds of limitations within the classes. Within most of the classes there can be up to four subclasses. The subclass is indicated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* means that water in or on the soil will interfere with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the country, indicates that the chief limitation is a climate that is too cold or too dry. In a combination of letters, the first letter indicates the main limitation.

In class I there are no subclasses, because the soils of this class have few or no limitations. Class V can contain, at the most, only subclasses *w*, *s*, and *c*, because the soils in it have little or no erosion hazard but have other limitations that limit their use largely to pasture, range, woodland, or wildlife.

Within the subclasses are the capability units, which are groups of soils enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity and other responses to management. Thus, the capability unit is a convenient grouping for making any statements about management of soils.

The capability units are identified by a statewide, consecutive numbering system. All of the units in the statewide system may not appear in the capability unit list for one county. For example, none of the soils in Tolland County are in capability unit IIw-3.

Soils are classified in capability classes, subclasses, and units in accordance with the degree and kind of their permanent limitations, but without consideration of major and generally expensive landforming and reclamation that would change the slope, depth, or other characteristics of the soil.

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

Class I. Soils that have few limitations that restrict their use.
- (No subclasses.)
  - Unit I-1. Nearly level, well-drained soils that are on uplands and terraces and are over firm or very friable glacial till and stratified sand and gravel.
  - Unit I-2. Nearly level, well-drained soils that are on uplands and have a compact, slowly to very slowly permeable pan layer at a depth of about 2 feet.

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

Class III. Soils that have severe limitations that reduce the choice of plants, or require special conservations practices, or both.
- Subclass IIIe. Soils that have a severe risk of erosion if they are cultivated and not protected.
  - Unit IIIe-1. Sloping or rolling, well-drained soils of uplands.
  - Unit IIIe-2. Sloping or rolling, well-drained soils with a compact, slowly to very slowly permeable pan layer.
- Subclass IIIw. Soils severely limited by wetness.
  - Unit IIIw-1. Nearly level, poorly drained soils of uplands and terraces.
  - Unit IIIw-2. Nearly level, poorly drained soils of flood plains.
- Subclass IIIs. Soils severely limited by capacity to hold moisture.
  - Unit IIIs-2. Nearly level, droughty soils.
- Subclass IIIse. Soils severely limited by capacity to hold moisture and by risk of erosion.
  - Unit IIIse-1. Gently sloping or rolling, somewhat excessively drained, somewhat droughty soils.

Class IV. Soils that have 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 cultivated and not protected.
  - Unit IVe-1. Strongly sloping or hilly soils of uplands.
  - Unit IVe-2. Strongly sloping or hilly soils that are on uplands and have a compact, slowly to very slowly permeable pan layer.
- 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 with a compact, slowly to very slowly permeable pan layer.
- Subclass IVse. Soils very severely limited by moisture-holding capacity and by risk of erosion.
  - Unit IVse-1. Gently sloping to rolling, extremely droughty soils.
- Subclass IVws. Soils very severely limited by wetness and stoniness.
  - 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 with a compact, slowly to very slowly permeable pan-layer.

Class V. Soils that have little or no erosion hazard but have other limitations that are impractical to remove and that limit their use mainly to pasture, woodland, or wildlife food and cover.
- Subclass Vw. Soils too wet for cultivation but not greatly limited for use as pasture or woodland.
  - Unit Vw-1. Very poorly drained soils on terraces.

Subclass Vs. Soils too stony for the usual cultivated crops but not greatly limited for pasture or woodland.

Unit Vs–1. Very stony, nearly level, glacial till soils that are deep and moderately well drained.

Subclass Vws. Soils severely limited by wetness and stoniness.

Unit Vws–1. Nearly level, very poorly drained, stony soils.

Unit Vws–2. Nearly level, poorly drained to somewhat poorly drained, stony soils.

Class VI. Soils that have severe limitations that make them generally unsuited to cultivation and limit their use mainly to pasture or woodland or to wildlife food and cover.

Subclass VIe. Soils too steep for cultivation and subject to severe erosion if not protected.

Unit VIe–1. Strongly sloping to steep soils on terrace breaks.

Subclass VIes. Soils that are severely limited by erosion and stones or by shallow depth and are suitable only for pasture, woodland, or wildlife.

Unit VIes–1. Strongly sloping or hilly, well-drained, stony soils.

Unit VIes–2. Strongly sloping or hilly, well-drained, stony soils that have a compact, slowly to very slowly permeable pan layer.

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

Unit VIw–1. Very poorly drained, very frequently flooded soils of flood plains, and shallow organic soils.

Subclass VIs. Soils not suitable for cultivation because of stones and shallow depth and limited to use as pasture or woodland.

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 that have a compact, slowly to very slowly permeable pan layer.

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

Class VII. Soils that have very severe limitations that make them unsuitable for cultivation without major reclamation and that restrict their use largely to grazing, woodland, or wildlife.

Subclass VIIs. Soils not suitable for cultivation and because of stones or shallow depth, limited to use as pasture or woodland.

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

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

Unit VIIs–3. Gently sloping to steep, very rocky and extremely rocky soils that are shallow to bedrock.

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

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Class VIII. Soils and landforms that, without major reclamation, have limitations that preclude their use for commercial plant production and restrict their use to recreation, wildlife, water supply, or esthetic purposes.

Subclass VIIIs. Soils or soil material very severely limited for use because of rocks and stones.

Unit VIIIs–1. Rock land, of which more than 50 percent of the surface is bedrock.

Descriptions of capability units

In this section each capability unit is described, the soils in it are listed, and suggestions are given for use and management. The soils in each unit have many similarities. Distinctive characteristics that affect the use and management of specific soils are given in the descriptions of some units.

All soils in the county have low to very low natural fertility and are naturally acid. Their need 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 for 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 staff of the Agricultural Extension Service and the Soil Conservation Service can help farmers interpret these recommendations for soils on their farms and can give technical assistance in planning land preparation, cropping systems, terracing, drainage, woodland management, pasture management, and other farming practices.

CAPABILITY UNIT I–1

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

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.
Hartford fine sandy loam, 0 to 3 percent slopes.
Merrimac fine sandy loam, 0 to 3 percent slopes.
Narragansett silt loam, 0 to 3 percent slopes.

Some of the soils have developed on firm to very friable glacial till, and others on stratified sand and gravel. Although these soils are essentially free of surface stones, the Charlton, Cheshire, and Narragansett soils are somewhat difficult to cultivate because they contain small angular rock fragments, cobbles, and subsurface stones. The other soils are easy to work.

These soils are suitable for all crops grown in the county, and some of them are the most desirable soils for potatoes and tobacco. Tobacco is grown on all the soils except the Charlton, which is in the Eastern Highland—an area where tobacco is not grown. Also, this soil is not so well suited to potatoes as the other soils in this unit.

A large part of the total acreage of the soils of this group 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, pasture, and hay are the principal crops.

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 commonly develops in soils intensively used for tobacco, potatoes, and other cultivated crops. This compacted layer can be broken up by deep plowing, by subsoiling, and by growing winter cover crops (*6*).

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. A winter cover crop should follow row crops each year. Some shade-tobacco farmers grow corn for 1 year in 4 or 5. Fumigation for nematodes is necessary after the corn crop.

Fertilization is needed to produce good yields. Lime and fertilizer should be applied according to needs 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 layer and subsoil are medium textured to moderately coarse textured and are friable to very friable. These soils are moderately permeable above the pan and have a high moisture-holding capacity. The soils are—

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

Because the pan interferes with internal drainage, these soils warm slowly in spring, but crops are seldom damaged by lack of moisture during the growing season. These soils are moderately easy to work, and crops grown on them are responsive to fertilization and other good management. They are essentially free of surface stones, but small, angular rock fragments and cobbles are common in the surface layer and subsoil of the Paxton and Broadbrook soils.

The soils of this unit are used mainly for silage, hay, pasture, and orchards, and they are best suited to these uses. Small acreages of Poquonock and Broadbrook soils are used for potatoes, tobacco, and other crops. Because they are slow to warm in spring, these soils are not well suited to tobacco. Alfalfa grows well, but it is subject to some heaving in winter and early in 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-legume mixture at least 1 year in 3 or 4. Winter cover crops should follow row crops.

Fertilization is necessary for good yields of 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 textured to medium textured soils, all very friable and moderately to rapidly permeable. Their moisture-holding capacity is high. These soils have developed over firm to very friable glacial till and stratified sand and gravel. The soils are—

Brookfield fine sandy loam, 3 to 8 percent slopes.
Charlton fine sandy loam, 3 to 8 percent slopes.
Cheshire fine sandy loam, 3 to 8 percent slopes.
Enfield silt loam, 3 to 8 percent slopes.
Hartford 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.

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 layer.

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

If they are managed well, and fairly short crop rotations are used, the soils are suitable for intensive cultivation. Good management is necessary to control erosion and to maintain organic matter and good tilth. Control of erosion should include contour cultivation and the use of cropland terraces and waterways on long slopes.

A suitable cropping system includes small grain, grass, or a grass-legume mixture 1 year in 3. Winter cover crops should follow row crops.

Fertilizer 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 textured 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 layer and subsoil above the pan are friable to very friable, are moderately permeable, and have a high moisture-holding capacity. The pan, however, is slowly permeable and interferes with internal drainage. Consequently, the soils warm more slowly in spring than those in capability unit IIe-1. The soils are—

Broadbrook silt loam, 3 to 8 percent slopes.
Paxton fine sandy loam, 3 to 8 percent slopes.
Poquonock sandy loam, 3 to 8 percent slopes.

These soils are well suited to silage corn, hay, pasture, and orchards. Alfalfa does well, but it is subject to heaving in winter and early in spring. Small acreages of tobacco, mainly the varieties grown without shade, are grown on the Broadbrook and Poquonock soils, but these soils are not considered ideal for tobacco. Crops, grasses, and legumes grown on these soils, however, are seldom damaged seriously 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, these soils should be protected by contour cultivation, by cropland terraces in places, and by waterways on long slopes. Drainage of small, seep spots is desirable in places.

A suitable cropping system should include a close-growing crop 1 year in 3; 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 needs determined by soil tests.

CAPABILITY UNIT IIw-1

This unit consists of nearly level, moderately well drained, medium textured 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 and stratified sand and gravel. Mottles at a depth of 10 to 20 inches indicate that the lower subsoil is saturated in very wet seasons. Seepage and a high water table interfere with drainage. The soils are—

Ellington fine sandy loam, 0 to 3 percent slopes.
Ninigret sandy loam, 0 to 3 percent slopes.
Sudbury fine sandy loam, 0 to 6 percent slopes.
Sutton fine sandy loam, 0 to 3 percent slopes.
Tisbury silt loam, 0 to 3 percent slopes.
Wapping silt loam, 0 to 3 percent slopes.
Watchaug fine sandy 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, the soils are suitable for the general crops grown in the area, including tobacco and potatoes. The Sutton and Watchaug soils are used mainly for hay and pasture and, to some extent, for silage corn. Potatoes are grown on a considerable acreage of the Ninigret, Tisbury, and Sudbury soils. Some shade tobacco is grown on the soils in this unit.

The lack of adequate drainage delays land preparation and planting in spring, and plowing these soils when too wet hastens the development of a plowsole. In cultivated areas careful management is necessary to maintain organic matter and good tilth. A desirable cropping system includes a small grain or a grass-legume mixture 1 year in 3. Row crops should be followed by winter cover crops.

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

CAPABILITY UNIT IIw-2

This unit consists of nearly level, moderately well drained, medium textured to moderately coarse textured soils that have a slowly to very slowly permeable, compact pan layer at a depth of 20 to 26 inches. The surface layer and subsoil above the pan are friable to very friable and moderately permeable. These layers have a high moisture-holding capacity. A perched water table commonly occurs above the pan in winter and early in spring. Mottles are at a depth of 10 to 20 inches. The soils in this group are similar to those in capability unit IIwe-2, except that they are nearly level and have slower surface drainage. The soils are—

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

These soils, if undrained, 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 Rainbow and Birchwood soils, where they occur as small areas in fields of well-drained soils, are used to some extent for tobacco and potatoes.

Because the surface of these soils is nearly level, the risk of erosion in cultivated areas is not great. 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 that intercept runoff and seepage water from higher areas. Good 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. Winter cover crops should follow row crops each year. Grazing of pastures should be controlled.

CAPABILITY UNIT IIw-4

Ondawa sandy loam is the only soil in this capability unit. This soil is on flood plains. It is a friable to very friable soil that is well drained and moderately coarse textured. It is moderately to rapidly permeable and has a moderate moisture-holding capacity.

This soil is easy to work. Flooding is the greatest hazard, but it seldom occurs during the growing season.

Ondawa sandy loam is 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, the soil is used mainly for hay, pasture, and silage corn. Some of it is used for cabbage and other vegetables. In some areas land preparation and planting in spring are somewhat delayed because of slow runoff and moderate permeability. The supply of moisture for plants is generally adequate during the growing season.

Good management practices consist of applying lime and fertilizer according to needs determined by soil tests and using crop rotations that 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 soils on flood plains. These soils are moderately well drained, except for the small areas of Hadley soils, which are well drained. The texture of the soils ranges from moderately coarse to medium. All of these soils except the Hadley soils are flooded at least once a year; the Hadley soils are flooded only occasionally. The soils of this unit are moderately to rapidly permeable, but a seasonally high water table restricts drainage. They have a moderate to high moisture-holding capacity. The soils are—

Podunk fine sandy loam.
Winooski and Hadley silt loams.

These soils are used mainly for hay and pasture and to some extent for silage corn and vegetables. If the soils are limed and fertilized, they are well suited to water-tolerant grasses and legumes for hay and pasture. A close-growing crop should be grown 1 year in 3 to maintain tilth and a supply of organic matter. When wet, these soils should not be worked, and pastures should not be grazed.

CAPABILITY UNIT IIwe-1

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

Ninigret sandy loam, 3 to 8 percent slopes.
Sutton fine sandy loam, 3 to 8 percent slopes.
Wapping silt loam, 3 to 8 percent slopes.
Watchaug fine sandy loam, 3 to 8 percent slopes.

Cleared areas of the Wapping, Sutton, and Watchaug soils are used mainly for hay and pasture, but some are used for corn and vegetables. Ninigret soils are used for potatoes and tobacco, as well as for other crops.

Drainage is generally necessary to obtain the best yields of potatoes and tobacco. Normally, drainage is not necessary for silage corn, hay, or 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.

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

CAPABILITY UNIT IIwe-2

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

Birchwood sandy loam, 3 to 8 percent slopes.
Rainbow silt loam, 3 to 8 percent slopes.
Woodbridge fine sandy loam, 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 yields when seeded in mixtures with other forage plants. Small areas of Birchwood and Rainbow soils are used for 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 needed on intensively cultivated fields include drainage in some places and the use of diversion terraces, graded stripcropping or contour cultivation, and waterways. The most intensive rotation should include a close-growing crop 1 year in 3, and winter cover crops should follow row crops. Cultivated crops need fertilizer for highest yields; grasses and legumes need lime and fertilizer.

CAPABILITY UNIT IIs-1

This unit consists of nearly level, well-drained to somewhat excessively drained soils. They are rapidly to very rapidly permeable and have a moderate to low water-holding capacity. The soils have developed on coarse-textured stratified sand and gravel or deep sand. They are somewhat droughty. They warm early in spring, however, and are easy to work, and crops grown on them are responsive to fertilization. The soils are—

Agawam sandy loam, 0 to 3 percent slopes.
Enfield silt loam, shallow, 0 to 3 percent slopes.
Hartford 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, hay, and pasture. The Merrimac, Hartford, and Agawam soils are well suited to shade-grown tobacco. Even if the soils are fertilized properly, crop yields, in most years, are limited by lack of moisture unless rainfall is supplemented by irrigation.

These soils can be used intensively with a minimum risk of erosion. Unprotected areas, however, are subject to wind erosion late in winter and in spring. Lime and fertilizer leach away fairly rapidly and should be applied according to needs determined by soil tests. A plowsole commonly develops in these soils if they are cultivated intensively. Therefore, careful management is necessary to maintain organic matter and good tilth.

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

CAPABILITY UNIT IIs-2

This capability unit consists of gently sloping or undulating, somewhat excessively drained soils of uplands and terraces. These soils are rapidly to very rapidly permeable and have a moderate moisture-holding capacity. They have developed over coarse-textured glacial till or sand and gravel. They have more runoff and are somewhat more droughty than those in capability unit IIs-1. The soils are—

Agawam sandy loam, 3 to 8 percent slopes.
Enfield silt loam, shallow, 3 to 8 percent slopes.
Gloucester sandy loam, 3 to 8 percent slopes.
Hartford sandy loam, 3 to 8 percent slopes.
Merrimac sandy loam, 3 to 8 percent slopes.

These soils are used for the same crops as those in capability unit IIs-1, and management of them is essentially the same, except for the control of runoff. Contour cultivation, field terraces, and waterways are needed in places.

CAPABILITY UNIT IIIe-1

This unit consists of sloping or rolling, moderately coarse textured to medium textured soils of 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. The eroded phase of Cheshire fine sandy loam has a shallower solum than the other soils in this group. The soils are—

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.
Gloucester sandy loam, 8 to 15 percent slopes.
Narragansett silt loam, 8 to 15 percent slopes.

A large part of the acreage is used for hay and pasture. Small areas are used for silage corn, tree fruits, and other crops. The soils are suitable for the general crops grown in the county.

Eroded areas are more droughty than the uneroded areas and need special management that will improve fertility and prevent further erosion. Intensively cultivated fields require practices that conserve moisture and control erosion. These practices include the use of contour stripcropping and waterways, as well as the use of diversion terraces that are spaced at intervals of about 300 feet or less.

A cropping system is needed that will maintain good tilth and organic matter and control erosion. A good cropping system consists of 2 years of row crops, each followed by a winter cover crop, and then 2 years of hay. Lime and fertilizer should be applied in amounts indicated by soil tests.

CAPABILITY UNIT IIIe-2

Paxton fine sandy loam, 8 to 15 percent slopes, is the only soil in this capability unit. It is a sloping, well-drained soil developed on glacial till. This soil has a compact pan at a depth of about 24 inches. It is friable to very friable and moderately permeable above the pan, and it has a high moisture-holding capacity. The pan is slowly permeable, and it restricts internal drainage to some extent.

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

A 5-year rotation consisting of 2 years of row crops, followed each year by a winter cover crop, and then by 3 years of hay, will help to control erosion and to maintain good tilth. Supporting conservation practices include contour stripcropping, drainage of seep spots, the use of diversion terraces at intervals of about 300 feet, and the construction of waterways.

CAPABILITY UNIT IIIw-1

This unit consists of nearly level, poorly drained to somewhat poorly drained soils of uplands and terraces that have developed on glacial till and stratified sand and gravel. The Ridgebury and Wilbraham soils have a hard layer at a depth of 20 to 30 inches. Runoff is slow to very slow. Permeability is moderate to rapid in the surface layer and subsoil, but a high water table restricts internal drainage. Some areas are ponded in very wet seasons. The soils are—

Leicester fine sandy loam.
Raynham silt loam.
Ridgebury fine sandy loam.
Walpole sandy loam.
Wilbraham silt loam.

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, but some areas are used for silage corn and other cultivated crops.

Drainage and fertilization are the improvements most necessary for 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. Cultivated crops should be limed and fertilized in amounts determined by soil tests. Areas that are to be used for pasture or hay should be limed and fertilized and seeded to water-tolerant grasses and legumes. Pastures should not be grazed when they are too wet.

If suitable outlets are available, most of these soils can be readily drained through the use of tile or open ditches. The Ridgebury and Wilbraham soils have a compact pan, however, and are somewhat more difficult to drain than the Walpole, Leicester, and Raynham soils.

CAPABILITY UNIT IIIw-2

This unit consists of nearly level soils in recent alluvium. All of these soils are poorly drained except Alluvial land, which varies in drainage. They are subject to fairly frequent flooding. They are moderately to rapidly permeable, but internal drainage is restricted by a seasonally high water table. The moisture-holding capacity is high to moderate. The soils are—

Alluvial land.
Limerick silt loam.
Rumney fine sandy loam.

In their natural undrained condition, these soils are more suitable for hay and pasture than for cultivated crops. Considerable acreage is idle or in bushy forest growth. Small, scattered areas of these soils are used for cultivated crops if they are in fields that consist mainly of well drained and moderately well drained alluvial soils.

Adequately drained areas are suitable for cultivated crops. Frequent flooding and the lack of suitable outlets, however, may prevent proper drainage. Partly drained areas that are limed and fertilized are suitable for water-tolerant legumes and grasses. Unimproved native pastures produce forage of poor quality but can be grazed during dry periods in summer and fall.

CAPABILITY UNIT IIIs-2

The soils in this unit are nearly level, excessively drained, shallow, and droughty. They are rapidly to very rapidly permeable and have a moderate to low moisture-holding capacity. They are underlain by coarse sand and gravel. The soils are—

Hinckley gravelly sandy 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 small acreage is used for tobacco, sweet corn, alfalfa, and vegetables. Alfalfa grows fairly well, if it is properly limed and fertilized. Because they are droughty, these soils are poorly suited to general crops and to hay and pasture. If they are irrigated and heavily fertilized, however, the soils are suitable for tobacco, early sweet corn, and early vegetables.

CAPABILITY UNIT IIIse-1

The soils in this unit are gently sloping or rolling, are excessively drained, and are shallow and droughty. They 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. These soils are similar to those in capability unit IIIs–2 except for the slopes. The soils are—

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

These soils are mainly in cutover forest or are idle. Small areas are used for tobacco, sweet corn, vegetables, orchards, alfalfa, hay, and pasture.

The soils are best suited to early vegetables, alfalfa, and grass-legume mixtures. Their use for grasses, legumes, and general crops, however, is limited by droughtiness. Alfalfa grows fairly well if the soils are limed and fertilized.

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

CAPABILITY UNIT IVe–1

This capability unit consists of strongly sloping or hilly, well-drained soils of the uplands. They have developed over firm to very friable glacial till. These soils are moderately permeable and have a moderate to high moisture-holding capacity. The eroded phases have a thinner surface layer and subsoil than the uneroded soils, and their surface layer generally contains a higher percentage of angular rock fragments. The soils are—

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

Cleared areas are used mainly for hay, pasture, and tree fruits, and the soils are suited to these uses. Small areas are used for corn and other crops, and some areas are idle.

The risk of erosion is high if these soils are used for cultivated crops. Cultivated crops can be grown, however, if a suitable cropping system and conservation practices are used. A row crop should be grown only about 1 year in 5 or 6. In addition, contour stripcropping, waterways, and diversion terraces should be used. The terraces should be spaced at intervals of about 300 feet.

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

CAPABILITY UNIT IVe–2

Paxton fine sandy loam, 15 to 25 percent slopes, is the only soil in this unit. It is a well-drained, strongly sloping soil with a very compact pan layer at a depth of 20 to 30 inches. This soil is moderately permeable above the pan, and has moderate to high moisture-holding capacity.

Cleared areas are used mostly for hay, pasture, and tree fruits, or they are idle. If properly fertilized, the soil is well suited to tree fruits and to grasses and legumes.

This soil is more subject to erosion than the soils in capability unit IVe–1 because it has a compact pan layer. Because of steep slopes and the risk of erosion, this soil should be cultivated only occasionally, and then only if erosion control practices are used. Erosion control practices should include contour stripcropping, the use of waterways, and the construction of diversion terraces at intervals of 300 feet or less. 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 5 or 6.

CAPABILITY UNIT IVes–1

This capability unit consists of gently sloping to rolling, mostly well-drained, stony soils. The Gloucester soils, however, are somewhat excessively drained. The soils in this capability unit 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 are—

Brookfield stony fine sandy loam, 3 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 sandy loam, 3 to 8 percent slopes.
Gloucester stony 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.

A large part of the acreage is in cutover forest. Cleared areas are used mainly for hay and pasture or are idle, but small, scattered areas are used for tree fruits and cultivated crops.

Stones severely limit the use of modern machinery that is needed to produce row crops on these soils. Most areas, however, can be cultivated to some extent. They can be used for hay, improved pasture, small grain, and tree fruits. The soils are well suited to hay, pasture, and orchards if properly limed and fertilized. They are also suited to forestry.

CAPABILITY UNIT IVes–2

This capability unit consists mainly of gently sloping to rolling, well-drained, stony soils. At a depth of about 24 inches, these soils have a compact pan layer that developed in glacial till. They are moderately permeable above the pan and have a high moisture-holding capacity. The soils are—

Broadbrook stony silt loam, 3 to 8 percent slopes.
Paxton stony fine sandy loam, 3 to 8 percent slopes.
Paxton stony fine sandy 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. These soils have somewhat better moisture-holding capacity, however, because of the pan and they are slightly better suited to cultivated crops, hay, pasture, and trees.

CAPABILITY UNIT IVse–1

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

Hinckley gravelly loamy sand, 3 to 15 percent slopes.
Jaffrey gravelly sandy loam and loamy sand, 3 to 15 percent slopes.
Manchester gravelly loamy sand, 3 to 15 percent slopes
Windsor loamy sand, 3 to 8 percent slopes.
Windsor loamy sand, 8 to 15 percent slopes.

These soils are mostly in cutover or scrub forest, or they are idle. Small areas are used for tobacco, sweet corn, vegetables, orchards, and alfalfa, and for hay and pasture. Because of droughtiness and very low fertility, these soils are not suited to cultivated crops unless they are irrigated and frequently receive large quantities of fertilizer. They are best suited to early vegetables, alfalfa, and other special crops. They are also fairly well suited to trees.

The risk of erosion on cultivated slopes is moderate to high. If possible, fields should be cultivated on the contour and protected by stripcropping, waterways, and diversion terraces. These practices are difficult in places, however, because the terrain is too irregular.

CAPABILITY UNIT IVws-1

This unit consists of nearly level to gently sloping, moderately well drained, stony soils that have developed in firm to very friable glacial till. They are moderately permeable, but their drainage is restricted by a seasonally high water table. The soils are—

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

A large part of the acreage is in cutover forest. 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 in cultivating row crops on these soils. Most areas, however, can be cultivated to some extent, and they can be used for hay, improved pasture, small grain, orchards, and small fruits. 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 needs determined by soil tests.

CAPABILITY UNIT IVws-2

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

Rainbow stony silt loam, 0 to 6 percent slopes.
Woodbridge stony fine sandy loam, 0 to 3 percent slopes.
Woodbridge stony fine sandy loam, 3 to 8 percent slopes.

These soils are used for the same purpose as those in capability unit IVws-1, and they have about the same limitations, but their internal drainage is somewhat slower because of the pan. They are well suited to hay, pasture, and forestry. In some places, crops grown on these soils would benefit by diversion terraces that intercept seepage.

CAPABILITY UNIT Vw-1

Scarboro fine sandy loam is the only soil in this unit. It is a nearly level, very poorly drained soil on terraces. In winter and spring, the water table is at or near the surface most of the time.

This soil is limited in use by very poor drainage. It is 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, this soil is fairly easy to drain if outlets are available. If adequately drained, some areas of this soil could be used for corn, late vegetables, and other crops, and for hay and pasture. Outlets are not available in places, however.

CAPABILITY UNIT Vs-1

This unit consists of very stony soils on glacial till. The soils are nearly level, are deep, and are moderately well drained. The Woodbridge soil has a slowly to very slowly permeable layer at a depth of about 2 feet. Both soils have a high moisture-holding capacity. The soils are—

Sutton very stony fine sandy loam, 0 to 3 percent slopes.
Woodbridge very stony fine sandy loam, 0 to 3 percent slopes.

These very stony soils are suitable for unimproved pasture. In areas used for pasture, moisture-tolerant grasses and legumes should be encouraged by topdressing.

Most areas of these soils are wooded and are used for woodland products. Scattered areas have been cleared and are used for unimproved pasture, which has low carrying capacity, and some areas are idle. If cleared of surface stones, these soils could be managed like the soils in capability units IIw-1 and IIw-2.

CAPABILITY UNIT Vws-1

Whitman stony fine sandy loam is the only soil in this capability unit. It is a nearly level, very poorly drained stony soil of the uplands. Runoff and internal drainage are very slow because of a high water table.

This soil is mostly in forest, but small areas are in unimproved pasture or are idle. The unimproved pastures furnish some grazing in dry periods. Because of severe stoniness and wetness—limitations that are generally not easily corrected—the use of this soil is limited mainly to pasture, forestry, and wildlife.

CAPABILITY UNIT Vws-2

This unit consists of nearly level, poorly drained to somewhat poorly drained stony soils on uplands. These soils are moderately permeable, but a high water table interferes with their internal drainage. The soils are—

Leicester stony fine sandy loam.
Ridgebury stony fine sandy loam.
Wilbraham stony silt loam.

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

Because of severe wetness and stoniness, these soils are not suitable for cultivated crops.

CAPABILITY UNIT VIe-1

This capability unit consists only of strongly sloping to steep Terrace escarpments and highly dissected areas on glaciofluvial terraces. This land type is excessively drained and very rapidly permeable. Runoff is moderate to rapid.

Because of steepness, droughtiness, and the risk of erosion, this land is not suitable for cultivation. It is best suited to trees and pasture and is used mainly for these purposes. Some cleared areas are idle.

CAPABILITY UNIT VIes-1

Charlton stony fine sandy loam, 15 to 25 percent slopes, is the only soil in this unit. This strongly sloping, stony, well-drained soil has developed over firm to very friable glacial till. The soil is moderately permeable and has a moderate to high moisture-holding capacity.

This soil is mainly in cutover forest, although small areas have been cleared and are used for orchards and improved pasture. The soil is best suited to pasture and forestry, but 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

Paxton stony fine sandy loam, 15 to 25 percent slopes, is the only soil in this capability unit. It is a strongly sloping, well-drained, stony soil that has a compact pan layer at a depth of about 24 inches. It is moderately permeable above the pan and has a high moisture-holding capacity, but internal drainage is restricted somewhat by the pan.

This soil is mainly in forest. Small areas have been cleared and are used for orchards and unimproved pasture, or they are idle. Because of stones and steep slopes, this soil is best suited to orchards, pasture, and forestry. It produces good pasture if properly fertilized.

CAPABILITY UNIT VIw-1

This capability unit consists of Peat and Muck and very poorly drained, very frequently flooded soils on flood plains. The soils are—

Peat and Muck.
Peat and Muck, shallow.
Saco fine sandy loam.
Saco silt loam.

The Saco soils, which consist of recent alluvium, range in texture from moderately coarse to medium. The deeper areas of Peat and Muck are included with this unit, although they are used mainly for woodland or wildlife.

Very frequent flooding and very poor drainage limit the use of the soils of this unit mainly to forestry, wildlife habitats, and unimproved pasture. Because of flooding and the lack of suitable outlets, draining the Saco soils generally is not practical. Some areas of Peat and Muck, shallow, can be drained where outlets are available. Pastures can be improved in places by applying fertilizer and by clipping weeds.

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 are—

Brookfield very stony fine sandy loam, 3 to 15 percent slopes.
Charlton very stony fine sandy loam, 3 to 15 percent slopes.
Gloucester and Charlton very stony soils, 3 to 15 percent slopes.
Sutton very stony fine sandy loam, 3 to 15 percent slopes.

Because of the very stony surface, these soils are best suited to pasture and woodland. Scattered areas have been cleared and are used for unimproved pasture that has low carrying capacity. Some of the cleared areas are idle. Pasture in some areas can be improved by lime and fertilizer.

CAPABILITY UNIT VIs-2

This capability unit consists of very stony, gently sloping to rolling and hilly soils. These soils 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 are—

Paxton very stony fine sandy loam, 3 to 15 percent slopes.
Woodbridge very stony fine sandy loam, 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 that has low carrying capacity, or they are idle. The soils in this unit can supply a little more moisture for growing plants than those in capability unit VIs-1 and are, therefore, slightly better suited to pasture and forestry. Pasture, in some areas, can be improved by use of lime and fertilizer.

CAPABILITY UNIT VIs-3

This unit consists of gently sloping to rolling, rocky and very rocky, shallow soils. They are well drained to somewhat excessively drained. Outcrops of bedrock range from a few to about 20 per acre. Most areas have loose stones on the surface, in addition to bedrock outcrops. The soil between outcrops ranges from a few inches to about 24 inches in thickness. The soils are—

Brimfield very rocky fine sandy loam, 3 to 15 percent slopes.
Hollis rocky fine sandy loam, 3 to 15 percent slopes.
Hollis very 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, and orchards. The soils are best suited to hay, pasture, and trees. Because of bedrock outcrops, loose stones, and boulders, most areas are difficult to work.

CAPABILITY UNIT VIIs-1

This capability unit consists of strongly sloping and hilly, well-drained and somewhat excessively 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 are—

Brookfield very stony fine sandy loam, 15 to 25 percent slopes.
Charlton very stony fine sandy loam, 15 to 25 percent slopes.
Gloucester and Charlton 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 that has low carrying capacity, or they are idle. Because of stones and steep slopes, these soils should be managed primarily for forestry, wildlife habitats, or unimproved pasture.

CAPABILITY UNIT VIIs-2

Paxton very stony fine sandy loam, 15 to 25 percent slopes, is the only soil in this capability unit. It is a strongly sloping and hilly, well-drained, very stony soil that has a compact pan layer at a depth of about 24 inches. The soil is moderately permeable above this layer and has a high moisture-holding capacity.

This soil is mainly in cutover forest. Small areas have been cleared and are used for unimproved pasture of low carrying capacity, or they are idle. Steep slopes and stones limit the use of this soil mainly to forestry, wildlife, and unimproved pasture, and the soil should be managed mainly for these purposes.

CAPABILITY UNIT VIIs-3

This capability unit consists of gently sloping to steep, very rocky and extremely rocky soils that are shallow to bedrock. Outcrops of bedrock occupy as much as 50 percent of the surface of the extremely rocky soils. The soils are—

- Brimfield very rocky fine sandy loam, 15 to 25 percent slopes.
- Brimfield extremely rocky fine sandy loam, 3 to 15 percent slopes.
- Brimfield extremely rocky fine sandy loam, 15 to 25 percent slopes.
- Hollis very rocky fine sandy loam, 15 to 35 percent slopes.
- Hollis extremely rocky fine sandy loam, 3 to 15 percent slopes.
- Hollis extremely rocky fine sandy loam, 15 to 35 percent slopes.

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

CAPABILITY UNIT VIIs-4

Leicester-Ridgebury-Whitman very stony complex is the only mapping unit in this capability unit. This complex consists of nearly level to very gently sloping, poorly and very poorly drained, very stony soils.

Some acreage has been cleared or partly cleared and is used for unimproved pasture, or it is idle. Unimproved pasture of native grasses and legumes provides fair grazing, especially in dry seasons. Because of stones and wetness, these soils are not suitable for crops or improved pasture. The most practical uses are forestry, unimproved pasture, and wildlife.

CAPABILITY UNIT VIIIs-1

This capability unit consists only of Rock land—a land type in which more than 50 per cent of the surface is occupied by bedrock exposures. This land is gently sloping to steep. It has little value except for wildlife habitats, recreation, and esthetic purposes.

Estimated yields

The estimated average acre yields of the principal crops in Tolland County are given in table 1. Except for shade-grown tobacco and potatoes, the yields are given for two levels of management, which are defined in the following paragraphs.

The yields in table 1 are the averages that can be expected over several years. Those in any one year may be affected by many factors, including weather, insects, and disease. Several years of improved management may be necessary before yields are consistently increased.

The yields in columns A can be expected under ordinary management. Under such management (1) lime, fertilizer, and manure are used in amounts that are not sufficient to produce maximum yields; (2) erosion is not controlled, the soils are not drained, and crops are not irrigated as needed; (3) improved varieties of crops and certified seed are not always used; (4) seedbeds are not always properly prepared; (5) insects and diseases are not adequately controlled; and (6) brush and weeds are not controlled in unimproved pastures.

TABLE 1.—*Estimated average acre yields of principal 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 on the soils]

Soil [1]	Shade-grown tobacco	Potatoes	Silage corn		Alfalfa hay		Mixed hay		Permanent pasture		Rotation pasture	
	B	B	A	B	A	B	A	B	A	B	A	B
	Lb.	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Cow-acre-days*	*Cow-acre-days*	*Cow-acre-days*	*Cow-acre-days*
Agawam sandy loam, 0 to 3 percent slopes	1,200	450	9	14	2.5	4.0	0.9	1.8	40	75	60	120
Agawam sandy loam, 3 to 8 percent slopes	1,150	450	9	14	2.5	4.0	.9	1.8	40	75	60	120
Alluvial land	----	----	----	----	----	----	----	----	30	65	----	----
Birchwood sandy loam, 0 to 3 percent slopes	1,000	550	9	14	1.5	3.0	1.1	2.1	40	75	75	145
Birchwood sandy loam, 3 to 8 percent slopes	950	550	9	14	1.5	3.0	1.1	2.1	40	75	75	145
Broadbrook silt loam, 0 to 3 percent slopes	1,200	650	13	18	2.0	3.5	1.5	2.5	50	110	100	170
Broadbrook silt loam, 3 to 8 percent slopes	1,150	650	13	18	2.0	3.5	1.5	2.5	50	110	100	170
Broadbrook stony silt loam, 3 to 8 percent slopes	----	----	----	----	----	----	----	----	40	75	----	----
Brookfield fine sandy loam, 3 to 8 percent slopes	----	----	12	17	3.5	5.0	1.3	2.3	40	100	90	155
Brookfield stony fine sandy loam, 3 to 15 percent slopes	----	----	----	----	----	----	.9	1.8	35	70	----	----
Charlton fine sandy loam, 0 to 3 percent slopes	----	----	12	17	3.5	5.0	1.3	2.3	40	100	90	155
Charlton fine sandy loam, 3 to 8 percent slopes	----	----	12	17	3.5	5.0	1.3	2.3	40	100	90	155
Charlton fine sandy loam, 8 to 15 percent slopes	----	----	10	15	3.0	4.5	1.1	2.1	35	90	75	145

See footnote at end of table.

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

Soil[1]	Shade-grown tobacco	Potatoes	Silage corn		Alfalfa hay		Mixed hay		Permanent pasture		Rotation pasture	
	B	B	A	B	A	B	A	B	A	B	A	B
	Lb.	*Bu.*	*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	------	------	------	------	------	------	.9	1.8	35	70	60	120
Charlton stony fine sandy loam, 3 to 8 percent slopes	------	------	------	------	------	------	1.0	2.0	40	75	------	------
Charlton stony fine sandy loam, 8 to 15 percent slopes	------	------	------	------	------	------	.9	1.8	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	550	12	17	3.5	5.0	1.3	2.3	40	100	90	155
Cheshire fine sandy loam, 3 to 8 percent slopes	1,150	550	12	17	3.5	5.0	1.3	2.3	40	100	90	155
Cheshire fine sandy loam, 8 to 15 percent slopes	------	500	10	15	3.0	4.5	1.1	2.1	35	90	75	145
Cheshire fine sandy loam, 8 to 15 percent slopes, eroded	------	------	------	------	------	------	.7	1.4	35	75	50	100
Cheshire fine sandy loam, 15 to 25 percent slopes, eroded	------	------	------	------	------	------	.7	1.4	35	75	50	100
Cheshire stony fine sandy loam, 3 to 8 percent slopes	------	------	------	------	------	------	1.0	2.0	40	75	------	------
Cheshire stony fine sandy loam, 8 to 15 percent slopes	------	------	------	------	------	------	.9	1.8	35	70	------	------
Ellington fine sandy loam, 0 to 3 percent slopes	1,050	450	11	16	2.0	3.5	1.3	2.3	40	100	90	155
Enfield silt loam, 0 to 3 percent slopes	1,300	650	13	18	3.5	5.0	1.5	2.5	50	110	100	170
Enfield silt loam, shallow, 0 to 3 percent slopes	1,200	500	9	14	3.0	4.5	1.1	2.1	35	90	75	145
Enfield silt loam, 3 to 8 percent slopes	1,250	650	13	18	3.5	5.0	1.5	2.5	50	110	100	170
Enfield silt loam, shallow, 3 to 8 percent slopes	1,150	450	7	12	2.5	4.0	.9	1.8	35	75	60	120
Gloucester sandy loam, 3 to 8 percent slopes	------	------	9	14	2.5	4.0	.9	1.8	35	75	60	120
Gloucester sandy loam, 8 to 15 percent slopes	------	------	6	10	2.0	3.5	.7	1.4	30	70	50	100
Gloucester stony sandy loam, 3 to 8 percent slopes	------	------	------	------	------	------	.7	1.5	35	70	------	------
Gloucester stony sandy loam, 8 to 15 percent slopes	------	------	------	------	------	------	.5	1.0	35	70	------	------
Hartford fine sandy loam, 0 to 3 percent slopes	1,250	550	11	16	3.0	4.5	1.1	2.1	35	90	75	145
Hartford fine sandy loam, 3 to 8 percent slopes	1,200	550	11	16	3.0	4.5	1.1	2.1	35	90	75	145
Hartford sandy loam, 0 to 3 percent slopes	1,200	450	9	14	2.5	4.0	.9	1.8	35	75	60	120
Hartford sandy loam, 3 to 8 percent slopes	1,150	450	9	14	2.5	4.0	.9	1.8	35	75	60	120
Hinckley gravelly sandy loam, 0 to 3 percent slopes	1,000	------	6	10	2.5	4.0	.7	1.4	25	50	50	100
Hinckley gravelly sandy loam, 3 to 15 percent slopes	900	------	6	10	2.0	3.5	.5	1.0	25	50	35	70
Hinckley gravelly loamy sand, 3 to 15 percent slopes	850	------	5	9	1.5	3.0	.5	1.0	25	50	35	70
Hollis rocky fine sandy loam, 3 to 15 percent slopes	------	------	------		------	------	1.0	2.0	35	70	------	------
Jaffrey gravelly sandy loam and loamy sand, 3 to 15 percent slopes	------	------	5	9	1.5	3.0	.5	1.0	25	50	35	70
Leicester fine sandy loam	------	------	------	------	------	------	.5	1.5	30	70	35	100
Leicester stony fine sandy loam	------	------	------	------	------	------	------	------	25	50	------	------
Limerick silt loam	------	------	9	14	------	------	.5	2.0	30	70	35	100
Manchester gravelly sandy loam, 0 to 3 percent slopes	1,000	------	6	10	2.5	4.0	.7	1.4	25	50	50	100
Manchester gravelly sandy loam, 3 to 15 percent slopes	900	------	6	10	2.0	3.5	.5	1.0	25	50	35	70
Manchester gravelly loamy sand, 3 to 15 percent slopes	850	------	5	9	------	------	.5	1.0	25	50	35	70
Merrimac fine sandy loam, 0 to 3 percent slopes	1,250	550	11	16	3.0	4.5	1.1	2.1	35	90	75	145
Merrimac fine sandy loam, 3 to 8 percent slopes	1,200	550	11	16	3.0	4.5	1.1	2.1	35	90	75	145
Merrimac sandy loam, 0 to 3 percent slopes	1,200	450	9	14	2.5	4.0	.9	1.8	35	75	60	120
Merrimac sandy loam, 3 to 8 percent slopes	1,150	450	9	14	2.5	4.0	.9	1.8	35	75	60	120
Narragansett silt loam, 0 to 3 percent slopes	1,250	650	13	18	3.5	5.0	1.5	2.5	50	110	100	170
Narragansett silt loam, 3 to 8 percent slopes	1,200	650	13	18	3.5	5.0	1.5	2.5	50	110	100	170
Narragansett silt loam, 8 to 15 percent slopes	1,150	550	11	16	2.5	4.0	1.3	2.3	40	100	90	155
Narragansett stony silt loam, 3 to 8 percent slopes	------	------	------	------	------	------	1.0	2.0	40	75	------	------

See footnote at end of table.

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

Soil[1]	Shade-grown tobacco	Potatoes	Silage corn		Alfalfa hay		Mixed hay		Permanent pasture		Rotation pasture	
	B	B	A	B	A	B	A	B	A	B	A	B
	Lb.	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Cow-acre-days*	*Cow-acre-days*	*Cow-acre-days*	*Cow-acre-days*
Narragansett stony silt loam, 8 to 15 percent slopes	----	----	----	----	----	----	.9	1.8	40	75	----	----
Ninigret sandy loam, 0 to 3 percent slopes	1,100	550	11	16	2.0	3.5	1.1	2.1	40	100	75	145
Ninigret sandy loam, 3 to 8 percent slopes	1,050	550	11	16	2.0	3.5	1.1	2.1	40	100	75	145
Ondawa sandy loam	----	----	11	16	2.5	4.0	1.1	2.1	40	100	75	145
Paxton fine sandy loam, 0 to 3 percent slopes	----	----	12	17	2.0	3.5	1.5	2.5	50	110	100	170
Paxton fine sandy loam, 3 to 8 percent slopes	----	----	12	17	2.0	3.5	1.5	2.5	50	110	100	170
Paxton fine sandy loam, 8 to 15 percent slopes	----	----	12	17	1.5	3.0	1.1	2.1	50	110	75	145
Paxton fine sandy loam, 15 to 25 percent slopes	----	----	----	----	----	----	.9	1.8	35	90	60	120
Paxton stony fine sandy loam, 3 to 8 percent slopes	----	----	----	----	----	----	1.0	2.0	40	75	----	----
Paxton stony fine sandy loam, 8 to 15 percent slopes	----	----	----	----	----	----	.8	1.6	35	70	----	----
Paxton stony fine sandy loam, 15 to 25 percent slopes	----	----	----	----	----	----	----	----	30	65	----	----
Peat and Muck, shallow	----	----	----	----	----	----	----	----	25	50	----	----
Podunk fine sandy loam	----	----	11	16	----	----	1.1	2.1	40	100	75	145
Poquonock sandy loam, 0 to 3 percent slopes	1,200	500	11	16	3.0	4.5	1.1	2.1	35	90	75	145
Poquonock sandy loam, 3 to 8 percent slopes	1,150	500	11	16	3.0	4.5	1.1	2.1	35	90	75	145
Rainbow silt loam, 0 to 3 percent slopes	950	550	9	14	1.5	3.0	1.3	2.3	35	90	90	155
Rainbow silt loam, 3 to 8 percent slopes	900	550	9	14	1.5	3.0	1.3	2.3	35	90	90	155
Rainbow stony silt loam, 0 to 6 percent slopes	----	----	----	----	----	----	1.0	2.0	30	60	----	----
Raynham silt loam	----	----	11	16	----	----	.5	2.0	30	70	35	140
Ridgebury fine sandy loam	----	----	9	14	----	----	.5	2.0	30	65	30	100
Ridgebury stony fine sandy loam	----	----	----	----	----	----	----	----	30	65	----	----
Rumney fine sandy loam	----	----	9	14	----	----	.5	1.5	30	70	35	100
Saco fine sandy loam	----	----	----	----	----	----	----	----	25	50	----	----
Saco silt loam	----	----	----	----	----	----	----	----	25	50	----	----
Scarboro fine sandy loam	----	----	----	----	----	----	----	----	30	55	----	----
Sudbury fine sandy loam, 0 to 6 percent slopes	1,050	550	11	16	2.0	3.5	1.1	2.1	35	90	75	145
Sutton fine sandy loam, 0 to 3 percent slopes	----	----	11	16	2.0	3.5	1.3	2.3	40	100	90	155
Sutton fine sandy loam, 3 to 8 percent slopes	----	----	11	16	2.0	3.5	1.3	2.3	40	100	90	155
Sutton stony fine sandy loam, 0 to 3 percent slopes	----	----	----	----	----	----	1.0	2.0	30	60	----	----
Sutton stony fine sandy loam, 3 to 8 percent slopes	----	----	----	----	----	----	1.0	2.0	30	60	----	----
Terrace escarpments	----	----	----	----	----	----	.7	1.4	25	50	40	155
Tisbury silt loam, 0 to 3 percent slopes	1,050	550	11	16	2.0	3.5	1.3	2.3	40	100	90	155
Walpole sandy loam	----	----	11	16	----	----	.5	1.5	30	70	35	100
Wapping silt loam, 0 to 3 percent slopes	1,050	550	11	16	2.0	3.5	1.3	2.3	35	90	90	155
Wapping silt loam, 3 to 8 percent slopes	1,000	550	11	16	2.0	3.5	1.3	2.3	35	90	90	155
Wapping stony silt loam, 3 to 8 percent slopes	----	----	----	----	----	----	1.0	2.0	30	60	----	----
Watchaug fine sandy loam, 0 to 3 percent slopes	----	500	11	16	2.5	4.0	1.1	2.1	35	90	75	145
Watchaug fine sandy loam, 3 to 8 percent slopes	----	500	11	16	2.5	4.0	1.1	2.1	35	90	75	145
Whitman stony fine sandy loam	----	----	----	----	----	----	----	----	25	50	----	----
Wilbraham silt loam	----	----	----	----	----	----	.5	2.0	30	65	35	140
Wilbraham stony silt loam	----	----	----	----	----	----	----	----	30	55	----	----
Windsor loamy sand, 3 to 8 percent slopes	1,000	----	5	9	1.5	3.0	.5	1.0	25	50	35	70
Windsor loamy sand, 8 to 15 percent slopes	----	----	----	----	2.0	3.5	.5	1.0	25	50	35	70
Winooski and Hadley silt loams	----	----	12	17	2.5	4.0	1.3	2.3	50	110	100	170
Woodbridge fine sandy loam, 0 to 3 percent slopes	----	----	9	14	1.5	3.0	1.3	2.3	35	90	90	155
Woodbridge fine sandy loam, 3 to 8 percent slopes	----	----	9	14	1.5	3.0	1.3	2.3	35	90	90	155
Woodbridge stony fine sandy loam, 0 to 3 percent slopes	----	----	----	----	----	----	1.0	2.0	30	60	----	----
Woodbridge stony fine sandy loam, 3 to 8 percent slopes	----	----	----	----	----	----	1.0	2.0	30	60	----	----

[1] The very stony, very rocky, and extremely rocky soil types, the miscellaneous land types, and the deep peat and muck are omitted from this table because they are not generally used for the stated crops and for hay; some acreage, however, may be used for unimproved pasture.

Yields in columns B reflect improved management. Improved management of crops includes the following practices: (1) Applying sufficient amounts of lime, manure, and fertilizer; (2) using suitable cropping systems and making use of crop residue; (3) draining and irrigating as needed; (4) controlling runoff and erosion; (5) controlling weeds, insects, and diseases; (6) preparing seedbeds properly; and (7) selecting suitable crops and varieties. Improved management of pasture includes the following: (1) Applying fertilizer and lime; (2) controlling brush and weeds; (3) seeding desirable forage plant mixture; and (4) regulating grazing.

Yield data were obtained from cooperating farmers, the county agent, marketing and conservation agencies, some farm records, and State agricultural experiment stations. At Storrs, experiments have been conducted on several of the major soils in the county and on similar soils at Windsor in Hartford County and at Mt. Carmel in New Haven County. Estimated yields of the other soils were based on knowledge of their physical and chemical properties that would affect crop growth.

Some yield estimates in table 1 are explained in the following paragraphs.

Yields of shade-grown tobacco and potatoes are estimated only under columns B because most farmers growing these crops have to operate at a high level of management. The yields of vegetables other than potatoes are not given because they are grown on small acreages, although a variety of market garden vegetables are grown for the wholesale and retail market.

Yields of potatoes are for the Katahdin variety, U.S. No. 1 and No. 2 grades. The Green Mountain variety produces slightly higher yields but is grown less frequently in Tolland County.

The yields of silage corn include all field moisture—the weight of the green crop as it came from the field. Yields of alfalfa hay and mixed hay (timothy and red clover) include only 15 percent of the 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 permanent pasture. Permanent pasture is used for seasonal grazing every year, but it does not include woodland pasture or meadows that are grazed following an early spring cutting of hay. The yields of rotation pasture and of permanent pasture were projected from forage production studies at the University of Connecticut (*9*). The term *cow-acre-days* is the number of days a year that 1 acre can be grazed, without injury to the pasture, by a cow, giving 25 pounds of milk (3.5 percent fat) a day.

Use of the Soils for Woodland

This section contains a general discussion of the woodland of the county. In addition it contains a grouping of the soils based primarily on their productivity for trees. The factors that determine the grouping are defined. Each woodland suitability group of soils is described and management is discussed.

Woodland of the county

The woodland of Tolland County has contributed to its economy for several centuries. It has provided timber and wood products and also watershed protection, recreation, wildlife preserves, and esthetic beauty.

Extent and ownership.—In percentage of total area in woodland, Tolland County is among the highest in the State. According to an inventory in 1962 (*4*), about 183,455 acres, or 69 percent of the county's 266,240 acres, is woodland. About 90 percent of the woodland is privately owned, and the rest is under Federal, State, or municipal ownership. More than 50 percent of the private owners have less than 100 acres each, and 36 percent own between 100 and 500 acres each (*11*).

A total of 18,500 acres of parks and forests are under the supervision of the State. The largest holdings are the Nipmuck State Forest (8,578 acres in Union), the Shenipsit State Forest (6,144 acres in Stafford), and Gay City State Park (1,512 acres in Bolton and Hebron). The Nathan Hale and Nye Holman State Forests and the Bigelow Hollow, Mansfield Hollow, and Bolton Notch State Parks are the other State-controlled areas. In addition to watershed protection, the State Forests provide hunting and fishing, and the parks provide a variety of recreation.

Because of the rapid encroachment of urban development, people have become conscious of the need for maintaining open spaces. More woodland is being set aside for multiple use in the county. An example is the woodland around the Mansfield Dam. The impoundment area, primarily for flood control, is being developed by the State as a recreation area.

Although most of the Tolland County woodland that is actively managed is under State or Federal control, the Yale Forest in Union and the Connecticut Water Company woodland are privately owned and are also actively managed.

Distribution.—The distribution of woodland in the county varies. Woodland in the Central Lowland section of the county is inextensive and is confined primarily to areas of poor or very poor drainage, to areas of droughty, coarse soils, and to very stony areas.

Woodland is extensive in the Eastern Highlands section of the county. Parts of the Eastern Highlands that are in Coventry, Hebron, Columbia, and Mansfield are characterized by low, smoothly rounded, drumloidal ridges, which have been used for dairy farming since the land was first settled and cleared. Here, the woodland soils are mostly poorly and very poorly drained, steeply sloping, or very stony and shallow. To the north, notably in the towns of Stafford and Union, the soils are steeper and stonier and are broken by many rock outcrops, and woodland is most extensive.

Composition.—The composition of the woodland reflects the history of land use in the county. The virgin forest, which covered the land when the first settlers arrived, was severely depleted by 1800. By this time nearly 80 percent of the land had been cleared. Most of the land was cleared by burning, but a considerable quantity of wood was exported to other States and abroad as building supplies and ship timber (*15*). During the succeeding 50 years, a great demand for wood was created by the growth of railroad systems. Most of the virgin timber that remained was cut for this purpose.

About 1860, landowners began migrating westward, and farmland was abandoned. Natural reforestation on abandoned land occurred during the next half century, but periodically some of these areas were clean cut on short rotations.

In 1910, the production of timber products reached a peak as salvage of the blight-stricken chestnut began. Income from timber decreased during the next 50 years, except during the two World Wars when the need for timber increased.

During the twentieth century, two natural catastrophes influenced forest composition. The chestnut blight wiped out this important timber species by 1925. The 1938 hurricane overthrew stands of hardwoods and softwoods of all ages and sizes, especially the older stands of white pine.

Tolland County is at the northern end of the Central Hardwood Region and the woodland is predominantly oak and hickory. In the northern part of the county, hemlock, white pine, and other conifers and white birch, yellow birch, sugar maple, and other northern hardwoods have increased. The increase reflects the adaptability of these trees to the colder climate at higher elevations.

The foregoing changes in composition were revealed by a detailed study that was made to determine the composition of woodland that is characteristic of the northern and southern parts of the county, exclusive of the small percentage of woodland in the Connecticut River valley. Vegetation-type maps compiled by the Connecticut Agricultural Experiment Station were used in the representative towns of Union in the north and Columbia in the south. The data for Columbia were compiled in 1947, and that for Union in 1955.

An examination of the woodland composition in both towns, as shown in table 2, reveals differences that can be attributed to the history of land use, local climate, altitude, and relief. The topography and soils of Columbia have favored agriculture, whereas the rugged terrain and shallow, stony soils of Union are more suitable for forestry. About 20 percent of Columbia is open land, used for agriculture, urban housing, business, and light industry, whereas only 5 percent of Union is open land. That agriculture in Columbia was even more prominent in the past than today is reflected in the composition of its woodland. Short-lived, pioneer species of poplar, alder, and gray birch are dominant in the woodland. Ash, a short-lived species, is also important, but this species tends to decrease as oak and hickory begin to dominate in the canopy.

In Union, the rugged topography, higher altitude, and stony soils have been less conducive to agriculture. Significant pioneer species that generally are established on open, abandoned land are absent in these areas. Gray birch, poplar, and alder are among the accessory species that constitute less than 5 percent of the total vegetation. In contrast, hemlock and white pine dominate about 6 percent of the area, a reflection of a more favorable climate for these species. Such northern hardwoods as yellow birch and white birch are among the minor species. Red and white pine plantations, in pure or mixed stands, are common in Union. Of the long-lived hardwood species, oak, hickory, black birch, and red maple are important in the woodland of both Union and Columbia.

Wood products.—The woodland of Tolland County is the source of a variety of commercial products, but there are only a few sawmills in the county. Some larger mills in the State, permanent in location, receive material from the county. A few small sawmills on farms operate part time to supplement farm income and supply lumber for construction on the farm.

Railroad ties remain in demand in a stable market, although the demand cannot compare with that of the past. Oak is the primary source for railroad ties and is supplemented by birch and maple. The demand for pallet lumber has increased substantially in recent years. Oak, elm, and birch are the main sources of the rough lumber used in pallets. Poles and pilings are in steady

TABLE 2.—*Woodland vegetation groups in two Tolland County towns*

[Absence of figures indicates vegetation group does not grow in the town]

Major species that constitute 75 percent of the total trees in each group, listed in descending order of dominance.	Minor species, constituting 5 to 25 percent of the total trees in each group.	Union [1] (29.1 sq. mi.)	Columbia [2] (22.5 sq. mi.)
		Percent of area	*Percent of area*
Red maple, black birch, oak	Hemlock, yellow birch, hickory, white birch, white pine, ash.	53. 1	
Oak, red maple, hickory	Black birch, white birch, yellow birch, hemlock	30. 8	
Hemlock, white pine, oak, red maple	Black birch, yellow birch	3. 2	
White pine,[3] oak, red maple, hemlock	Black birch, red pine	2. 8	
Red pine,[3] white pine	Oak, red maple	. 9	0. 1
Gray birch, oak, red maple, hickory	Black birch, ash, poplar, elm, yellow birch, alder, white pine.		30. 7
Red maple, ash, hickory, gray birch	Oak, elm, black birch, yellow birch		30. 1
Gray birch, juniper, red maple, alder, cedar (old-field pasture).	Blueberry, sumac, oak, cherry, apple		8. 9
Oak, gray birch, red maple	Black birch, ash, hickory		4. 2
Red maple, oak, gray birch, ash	Hickory, black birch, alder, yellow birch		3. 0

[1] Of the total area, 5.7 percent is urban or tilled land, and 3.5 percent is water.

[2] Of the total area, 20.1 percent is urban or tilled land, and 2.9 percent is water.

[3] Includes plantations.

demand. Although long sizes cannot be supplied with regularity, shorts and mediums can. Oak and hickory are cut and treated with preservatives for this purpose. Fenceposts, farm construction materials, and foundation timbers are other woodland products in periodic demand. Occasionally, pine from plantation thinning is used for pulpwood. Very little of birch, beech, and maple, once in demand for furniture, is cut for that purpose.

Wood chips and sawdust, mostly from pine and poplar, are used in moderate quantity for bedding poultry and for dairy farming. Wood that comes from sites cleared for farm ponds or buildings is often used for this purpose. Some wood chips and sawdust are also used in the production of wallboard and insulation materials.

The largest charcoal kilns in the State are located in Union, and they use slabwood from sawmills in Hebron and Andover. The kilns can process about 80 cords of wood per burn. In addition, cordwood is needed at the center of the burn and is obtained locally. The charcoal is used primarily in brass and metal processing. A few part-time, one-cord kilns are in operation in Stafford. Much of this charcoal is produced for fuel and backyard picnics.

Seasonal forest products include maple syrup and cordwood for fuel. Maple syrup is processed in Stafford and Union, where more sugar maples grow than in other parts of the county. Production is limited, however, and many landowners process a few quarts or gallons for their own tables.

Christmas trees are the most popular seasonal forest product. Each year more landowners are planting small acreages of open land to Christmas trees. Hillsides, old pastures, and house lots are favorite locations.

White spruce and Douglas-fir are the two most popular species for Christmas trees. They are adapted to a wide variety of soils and climates and produce compact growth with minimum care. Douglas-fir, in low spots, may be subject to early frost. Norway spruce requires greater attention than white spruce or Douglas-fir. Rank growth often occurs, requiring more shaping and pruning. It is also susceptible to attack by gall aphids. Its needles have a tendency to drop sooner after being cut. It can, however, be planted in shady areas and is more tolerant of wet soil than white spruce or Douglas-fir.

Scotch pine and balsam fir are planted occasionally for Christmas trees. Balsam fir is better suited to the climate of northern New England than to Connecticut, but it grows satisfactorily at the higher elevations on north-facing slopes in Tolland County.

Other softwood species in the county are also gaining popularity. White pine and hemlock are planted and grow well in stands that are mixed with hardwoods to provide variety. Variety in stands is desirable because woodland that is dominated by one species can be completely devastated by insects or disease. White pine and hemlock are not only potential sources of timber but also provide cover for small game and are often used for windbreaks.

Red pine is suitable for planting in the northern parts of the county at higher elevations. In the southern parts of the county, it is severely damaged by *Fomes annosus*, a fungus that causes root rot.

Larch is planted to some extent. Its growth rate is very fast, but it sheds its needles in the winter; therefore, it has limited use for game cover and windbreaks. Northern white-cedar is occasionally planted and used for posts.

Woodland suitability groups of soils

Soils that have similar properties and therefore similar limitations and potentials for producing trees are placed, for management purposes, in woodland suitability groups. These groups of soils and information about their productivity, their limitations, and the trees that grow best on them are given in table 3. More detailed information is given for each group in the text.

In table 3 the potential productivity of a site is the growth potential for indigenous species of oak and white pine (natural stands or plantations), assuming that soil factors have the major influence on the growth potential. The potential productivity ratings for mixed oak and white pine are broadly estimated. The productivity of a given site depends upon many interrelated factors, including soil properties, climate, aspect, altitude, and history, but only soil factors can be evaluated in this report; hence, the ratings are somewhat biased. Individual sites can be evaluated by plotting age and height data of dominant or codominant trees on published growth curves that have been established for individual tree species (*10*, *26*).

Among the limitations that affect management are plant competition, windthrow hazard, and use of equipment. For each woodland suitability group these limitations are rated *slight*, *moderate*, or *severe*.

Plant competition is the invasion by undesirable tree species or brush where openings have been made in the canopy. Plant competition also refers to the rate of brush encroachment in old fields that have been planted to conifers. Competition is *slight* if the invasion of undesirable species offers no special problem and natural regeneration of designated species occurs unhindered; *moderate* if the invasion of undesirable species offers some competition and the establishment and initial growth of designated species may be delayed somewhat, although extensive management is not necessary; *severe* if undesirable species compete vigorously with designated species and natural regeneration is difficult without chemical control, girdling, periodic restocking, or other special site treatment.

Windthrow hazard is the risk of trees being blown over by wind, especially after thinning, release cutting, and harvesting. The hazard is *slight* if there is no special problem and normal root growth is unhindered by bedrock, a hardpan layer, or a high water table; *moderate* if the soil provides good anchorage, except during excessive wetness or winds of hurricane force; *severe* if root development is severely hindered by bedrock, a hardpan, or a high water table, and individual trees that are released on all sides cannot stand during excessive wetness and moderate or high wind. Because of the restricted root growth, trees that grow on soils underlain by a fragipan are more susceptible to windthrow than trees that grow on soils without a fragipan. Conifers have a shallow root system and are generally more susceptible to windthrow than other trees.

TABLE 3.—*Woodland suitability groups of soils*

[Tree species groups A, B, C, and D are defined in the text]

Woodland suitability groups	Mapping symbol	Potential productivity for oak and white pine	Limitations: Plant competition for— Oak	Limitations: Plant competition for— White pine	Limitations: Windthrow hazard	Limitations: Use of equipment	Tree species groups in order of tolerance
Group 1—Deep, moderately well drained, nonstony to very stony soils that are medium to moderately coarse textured; most slopes are less than 8 percent.	BhA, BhB, EfA, NrA, NrB, Po, RaA, RaB, RbB, SsA, SvA, SvB, SwA, SwB, SxA SxB, TsA, WeA, WeB, WfB, WgA, WgB, Ww, WxA, WxB, WyA, WyB, WzA, WzC.	Good to excellent.	Moderate	Severe	Slight to moderate.	Moderate	B-C-D-A.
Group 2—Deep, well-drained, nonstony to very stony soils that are medium to moderately coarse textured; slopes are less than 15 percent.	BrA, BrB, BsB, BtB, BvC, ByC, CaA, CaB, CaC, ChB, ChC, CrC, CsA, CsB, CsC, CsC2, CtB, CtC, EsA, EsB, EtA, EtB, HdA, HdB, MrA, MrB, NaA, NaB, NaC, NgB, NgC, On, PbA, PbB, PbC, PdB, PdC, PeC, PuA, PuB.	Good	Moderate	Severe	Slight to moderate.	Slight to moderate.	B-A-C-D.
Group 3—Deep, well-drained, nonstony to very stony soils that are moderately coarse textured; slopes are greater than 15 percent.	ByD, CaD, ChD, CrD, CsD2, GeE, PbD, PdD, PeD, Tg.	Good	Moderate	Severe	Slight to moderate.	Moderate	B-A-C-D.
Group 4—Deep, poorly to somewhat poorly drained, nonstony to stony soils that are medium to moderately coarse textured; slopes are less than 3 percent; a water table is near the surface from late fall until late spring.	Am, Lc, Le, Lm, Rc, Rd, Rg, Ru, Wd, Wr, Ws.	Good to fair.	Moderate	Severe	Severe	Moderate to severe.	B-C-D-A.
Group 5—Shallow, somewhat excessively drained, rocky to extremely rocky soils that are moderately coarse textured; rock outcrops cover 5 to 50 percent of the surface; slopes are less than 15 percent.	BnC, BpC, HoC, HrC, HxC.	Good to fair.	Moderate	Severe	Severe	Moderate to severe.	A-B-C-D.
Group 6—Shallow, somewhat excessively drained, very rocky and extremely rocky soils that are moderately coarse textured; rock outcrops cover 5 to 50 percent of the surface; slopes are greater than 15 percent.	BnD, BpD, HrE, HxE.	Fair	Moderate	Severe	Severe	Severe	A-B-C-D.

TABLE 3.—*Woodland suitability groups of soils*—Continued

Woodland suitability groups	Mapping symbol	Potential productivity for oak and white pine	Limitations				Tree species groups in order of tolerance
			Plant competition for—		Windthrow hazard	Use of equipment	
			Oak	White pine			
Group 7—Deep, somewhat excessively to excessively drained, moderately coarse textured to coarse textured soils on stony, bouldery glacial till, on stratified sand and gravel, and on deep sands; slopes are less than 15 percent.	AbA, AbB, GaB, GaC, GbB, GbC, GeC, HfA, HfB, HkA, HkC, HmC, JaC, MgA, MgC, MhC, MyA, MyB, WvB, WvC.	Fair	Slight	Slight	Slight	Slight	A–B–C–D.
Group 8—Deep, very poorly drained, nonstony to very stony soils that are medium to moderately coarse textured; also very poorly drained Peat and Muck; a water table is near the surface from late fall until late spring and restricts root growth.	Lg, Pk, Pm, Sa, Sb, Sf, Wp.	Poor	Severe	Severe	Severe	Severe	D–C–B–A.
Group 9—Rock land, Made land, and borrow and fill areas; outcrops cover more than 50 percent of the surface of the Rock land.	Bk, Bl, Ma, Rk	Poor	Variable	Variable	Severe	Severe	

Equipment limitations (trafficability) are based on features of the soil or topography that hinder the use of equipment in tree planting, tending, and harvesting. The limitations are *slight* if they do not restrict the kind of equipment that can be used or the time of year that it can be used. Soils with slight limitations have slopes that are less than 15 percent, a nonstony or stony surface, and good drainage. Equipment limitations are *moderate* if the use of equipment is moderately restricted by one or more factors such as slope, stones, or obstructions, seasonal wetness, physical soil characteristics, and injury to tree roots. Soils with moderate limitations are moderately well drained, have slopes that may exceed 15 percent, or have a very rocky or extremely rocky surface. Equipment limitations are *severe* if special equipment is needed, and its use is severely restricted by one or more of the items listed for "moderate" or by safety in operations. Soils with severe limitations have slopes that exceed 15 percent and a surface that is very stony and has many rock outcrops, or they are poorly drained or very poorly drained.

In table 3, the tree species are grouped according to their natural preference for, or tolerance of, soil-moisture conditions in each of the woodland suitability groups. The order in which they are listed does not indicate relative optimum growth of the species in each woodland suitability group. For example, of the species in the four groups, those of group A are the most tolerant of soil-moisture conditions in woodland suitability group 7, which includes somewhat excessively drained to excessively drained soils, but their optimum growth occurs on the moderately well drained soils of woodland suitability group 1.

The tree species groups are as follows: Group A—trees that grow fairly well on soils of low moisture-holding capacity. The trees are white pine (natural and planted stands), pitch pine, and hemlock. Group B—trees that are tolerant of a fairly wide range of soil-moisture conditions. The trees are white, black, red, and scarlet oak, hickory, black and white birch, and plantings of fir and spruce. Group C—trees that grow well on soils that have ample moisture and good aeration. The trees are yellow birch, sugar maple, beech, tulip-poplar, and white ash. Group D—trees that are tolerant of excessive soil moisture. They are red maple, elm, black ash, blackgum, swamp white oak, pin oak, and sycamore.

A discussion of the nine woodland suitability groups in the county follows.

WOODLAND SUITABILITY GROUP 1

These soils are moderately well drained and are medium to moderately coarse textured throughout their profile. They have formed in a variety of underlying materials, including glacial till, stratified sand and gravel, and alluvium. The soils are—

Birchwood sandy loam, 0 to 3 percent slopes.
Birchwood sandy loam, 3 to 8 percent slopes.
Ellington fine sandy loam, 0 to 3 percent slopes.
Ninigret sandy loam, 0 to 3 percent slopes.
Ninigret sandy loam, 3 to 8 percent slopes.
Podunk fine sandy loam.
Rainbow silt loam, 0 to 3 percent slopes.
Rainbow silt loam, 3 to 8 percent slopes.
Rainbow stony silt loam, 0 to 6 percent slopes.

Sudbury fine sandy loam, 0 to 6 percent slopes.
Sutton fine sandy loam, 0 to 3 percent slopes.
Sutton fine sandy loam, 3 to 8 percent slopes.
Sutton stony fine sandy loam, 0 to 3 percent slopes.
Sutton stony fine sandy loam, 3 to 8 percent slopes.
Sutton very stony fine sandy loam, 0 to 3 percent slopes.
Sutton very stony fine sandy loam, 3 to 15 percent slopes.
Tisbury silt loam, 0 to 3 percent slopes.
Wapping silt loam, 0 to 3 percent slopes.
Wapping silt loam, 3 to 8 percent slopes.
Wapping stony silt loam, 3 to 8 percent slopes.
Watchaug fine sandy loam, 0 to 3 percent slopes.
Watchaug fine sandy loam, 3 to 8 percent slopes.
Winooski and Hadley silt loams.
Woodbridge fine sandy loam, 0 to 3 percent slopes.
Woodbridge fine sandy loam, 3 to 8 percent slopes.
Woodbridge stony fine sandy loam, 0 to 3 percent slopes.
Woodbridge stony fine sandy loam, 3 to 8 percent slopes.
Woodbridge very stony fine sandy loam, 0 to 3 percent slopes.
Woodbridge very stony fine sandy loam, 3 to 15 percent slopes.

The Ellington, Ninigret, Sudbury, and Tisbury soils, all on stratified terraces, are coarse textured below a depth of 2 feet. The Rainbow, Sutton, Wapping, Watchaug, and Woodbridge soils, all on glacial till, include nonstony, stony, and very stony phases on slopes of less than 15 percent.

Soils of this woodland group are considered among the best in Connecticut for the production of timber. Good to excellent growth of oaks and white pine can be expected in natural and planted stands. The fast growth can be attributed to favorable soil moisture and aeration. Moderately well drained soils, such as those of this group, tend to retain moisture for longer periods in the spring than well drained soils, because drainage is slightly impeded at a lower depth. A perched water table is common in the Birchwood, Rainbow, and Woodbridge soils, but these soils are not saturated above the fragipan long enough to damage the root system and impair growth. The balance between moisture and aeration is favorable during the rapid growth in spring, and the balance continues to be favorable late in spring and early in summer.

Plant competition may suppress desirable trees on these soils. The competition between oaks and other hardwoods is moderate. Thinning the stands and removing less desirable trees reduces competition. Reinvasion by competitors is usually not severe. Competition is severe between white pine and hardwoods. The establishment of planted white pine usually must be followed by control of invading hardwoods. Chemical growth inhibitors have produced good results.

Windthrow is a slight to moderate hazard. Trees on moderately well drained soils may be blown over by high winds during periods of intensive rainfall. The hazard increases in severely thinned stands where support of surrounding trees is lacking. It also increases on soils with a fragipan, which limits the growth of roots and does not allow secure anchorage.

Equipment limitations are moderate. The saturation of the soils early in spring, especially those with a fragipan, may limit the use of wheeled vehicles. Stoniness may also cause local problems.

White spruce is the most suitable species for Christmas tree planting. It grows slowly and produces a dense, compact tree. The rapid-growing Norway spruce and Douglas-fir, in contrast, may produce tall, spindly trees that require more pruning. Furthermore, Norway spruce is subject to attack by gall aphids and white pine weevils. Douglas-fir is more resistant to insect infestation, but can be seriously damaged by deer browsing. Balsam fir is occasionally planted on cool, moist, northeast to northwest slopes in the northern part of the county.

WOODLAND SUITABILITY GROUP 2

The soils of this group have formed in a variety of underlying material, including glacial till, stratified sandy and gravelly drift, and alluvium. The soils are—

Broadbrook silt loam, 0 to 3 percent slopes.
Broadbrook silt loam, 3 to 8 percent slopes.
Broadbrook stony silt loam, 3 to 8 percent slopes.
Brookfield fine sandy loam, 3 to 8 percent slopes.
Brookfield stony fine sandy loam, 3 to 15 percent slopes.
Brookfield very stony fine sandy loam, 3 to 15 percent slopes
Charlton fine sandy loam, 0 to 3 percent slopes.
Charlton fine sandy loam, 3 to 8 percent slopes.
Charlton 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.
Charlton very stony fine sandy loam, 3 to 15 percent slopes.
Cheshire fine sandy loam, 0 to 3 percent slopes.
Cheshire fine sandy loam, 3 to 8 percent slopes.
Cheshire fine sandy loam, 8 to 15 percent slopes.
Cheshire fine sandy loam, 8 to 15 percent slopes, eroded.
Cheshire stony fine sandy loam, 3 to 8 percent slopes.
Cheshire stony fine sandy loam, 8 to 15 percent slopes.
Enfield silt loam, 0 to 3 percent slopes.
Enfield silt loam, 3 to 8 percent slopes.
Enfield silt loam, shallow, 0 to 3 percent slopes.
Enfield silt loam, shallow, 3 to 8 percent slopes.
Hartford fine sandy loam, 0 to 3 percent slopes.
Hartford fine sandy loam, 3 to 8 percent slopes.
Merrimac fine sandy loam, 0 to 3 percent slopes.
Merrimac fine sandy loam, 3 to 8 percent slopes.
Narragansett silt loam, 0 to 3 percent slopes.
Narragansett silt loam, 3 to 8 percent slopes.
Narragansett silt loam, 8 to 15 percent slopes.
Narragansett stony silt loam, 3 to 8 percent slopes.
Narragansett stony silt loam, 8 to 15 percent slopes.
Ondawa sandy loam.
Paxton fine sandy loam, 0 to 3 percent slopes.
Paxton fine sandy loam, 3 to 8 percent slopes.
Paxton fine sandy loam, 8 to 15 percent slopes.
Paxton stony fine sandy loam, 3 to 8 percent slopes.
Paxton stony fine sandy loam, 8 to 15 percent slopes.
Paxton very stony fine sandy loam, 3 to 15 percent slopes.
Poquonock sandy loam, 0 to 3 percent slopes.
Poquonock sandy loam, 3 to 8 percent slopes.

These soils are well drained and are medium textured to moderately coarse textured in the surface layer and subsoil. The Enfield, Hartford, Ondawa, and Merrimac soils have a coarse-textured sandy and gravelly substratum. The soils on glacial till include nonstony, stony, and very stony phases on slopes of less than 15 percent.

These soils have good potential productivity. Their moisture reserve is influenced by their texture and, in some of the soils, by a fragipan. The soils of this group that have a silt loam surface layer and subsoil have a high moisture-holding capacity, which extends the growth period. The soils that are coarse textured in the substratum have a less adequate moisture reserve and are therefore less productive. The Broadbrook, Paxton, and Poquonock soils have a strong fragipan, which provides an adequate moisture reserve late in spring, especially on lower slopes, as the water moves laterally over the fragipan.

Plant competition is moderate between oaks and other hardwoods. Removing undesirable species and poorly formed trees reduces competition, but control of stump regeneration may be necessary. Competition is severe between white pine and hardwoods. If it is desirable to release white pine in mixed pine and hardwood stands, it is necessary to eliminate competing hardwoods by physical and chemical controls. On some northern sites in the county, notably in Union and Stafford, white pine competes successfully with hardwoods. Hemlock is more abundant in the north and grows under a wider range of drainage than in the southern part, where it is confined to cool, moist ravines and steep slopes.

The windthrow hazard is slight on soils without a fragipan but moderate on soils with a fragipan because the root system is shallow and unstable. Shallow-rooted white pine is also more susceptible to windthrow than more deeply rooted species.

Equipment limitations are slight to moderate. There are no limitations on the operation of equipment on the terrace soils. In spring, however, local seepage may occur in the soils that are in glacial till and have a fragipan. Use of equipment may also be limited on the very stony soils.

White spruce and Douglas-fir are suitable for Christmas tree planting, although excessive growth of Douglas-fir may occur on lower slopes. Norway spruce is better adapted to upper slopes, but spruce gall, aphids, and white pine weevils may infest these stands.

WOODLAND SUITABILITY GROUP 3

The soils of this group have formed in glacial till and on terrace escarpments in stratified deposits of sand and gravel. The soils are—

- Brookfield very stony fine sandy loam, 15 to 25 percent slopes.
- Charlton fine sandy loam, 15 to 25 percent slopes.
- Charlton stony fine sandy loam, 15 to 25 percent slopes.
- Charlton very stony fine sandy loam, 15 to 25 percent slopes.
- Cheshire fine sandy loam, 15 to 25 percent slopes, eroded.
- Gloucester and Charlton very stony soils, 15 to 35 percent slopes.
- Paxton fine sandy loam, 15 to 25 percent slopes.
- Paxton stony fine sandy loam, 15 to 25 percent slopes.
- Paxton very stony fine sandy loam, 15 to 25 percent slopes.
- Terrace escarpments.

These soils are moderately coarse textured in the surface layer and subsoil and are moderately coarse to coarse textured in the substratum. The substratum of the terrace escarpments is mostly sand and gravel. All soils are on slopes greater than 15 percent.

These soils have good potential productivity. The upper slopes may be less favorable for tree growth than the lower slopes because of rapid surface runoff. In the Paxton soils, water may move laterally over the fragipan and benefit tree growth on lower slopes.

Plant competition between white pine and hardwoods is severe; that between oaks and other hardwoods is moderate. Removing undesirable species and poorly formed trees may reduce competition, but the resprouting of stumps should be controlled.

The windthrow hazard is slight to moderate. It is apt to be greater on the Paxton soils, which have a fragipan that restricts the tree roots. Shallow-rooted white pines are also more susceptible to windthrow than deeply rooted oaks.

Equipment limitations are moderate. Steep slopes, bedrock outcrops, and large boulders may limit the use of some equipment.

White spruce and Douglas-fir are suitable for Christmas tree planting. Norway spruce grows well on upper slopes.

WOODLAND SUITABILITY GROUP 4

In this group are poorly drained to somewhat poorly drained soils that formed in glacial till, stratified deposits of sand and gravel, and alluvium. The soils are—

- Alluvial land.
- Leicester fine sandy loam.
- Leicester stony fine sandy loam.
- Limerick silt loam.
- Raynham silt loam.
- Ridgebury fine sandy loam.
- Ridgebury stony fine sandy loam.
- Rumney fine sandy loam.
- Walpole sandy loam.
- Wilbraham silt loam.
- Wilbraham stony silt loam.

These soils are medium to moderately coarse textured in the surface layer and subsoil. Alluvial land and the Limerick, Raynham, Rumney, and Walpole soils may be coarse textured in the substratum. As the names indicate, some of the Leicester, Ridgebury, and Wilbraham soils (all on glacial till) are stony.

Soil moisture and aeration are not so favorable for tree growth as in the moderately well drained soils of group 1, but potential productivity is good to fair. The water table is usually within 18 inches of the surface from late in fall to late in spring. The water comes from runoff and from underground seepage. Although the water table is high, aeration is satisfactory if subsurface drainage permits a steady flow of water. In spring the water table falls less rapidly than in most of the moderately well drained soils. In areas on slopes of less than 1 percent, stagnation of water during active tree growth early in spring may limit root development. Growth of foliage in the spring, however, increases transpiration and helps to lower the water table.

In some areas an irregular microrelief is favorable to the growth of trees on these soils. Many trees grow on mounds resulting from windthrow, and the upper parts of their root systems are not affected by a high water table.

Competition between oak and other hardwood species is moderate. Red maple, which is more tolerant of excessive moisture, tends to dominate in these wet areas. Hardwoods compete severely with white pine. Species tolerant of a high water table encroach rapidly.

Windthrow is a severe hazard. A high water table, a hardpan layer in the Ridgebury and Wilbraham soils, and local stoniness all limit growth of roots. Trees growing on saturated soil are unstable because their root system is shallow. In the 1938 hurricane, poorly drained and very poorly drained areas were damaged severely.

Equipment limitations are moderate to severe. Tree tending and harvesting may be limited late in fall and in spring because the soils are wet. Crawler-type vehicles should be used in preference to wheeled vehicles.

Christmas tree plantings are not suited to these areas. Poor growth, competition of woody species, and frost early in spring limit productivity of most species used for Christmas trees.

WOODLAND SUITABILITY GROUP 5

This group consists of the rocky to extremely rocky phases of soils that are shallow to bedrock. They are—

Brimfield very rocky fine sandy loam, 3 to 15 percent slopes.
Brimfield extremely rocky fine sandy loam, 3 to 15 percent slopes.
Hollis rocky fine sandy loam, 3 to 15 percent slopes.
Hollis very rocky fine sandy loam, 3 to 15 percent slopes.
Hollis extremely rocky fine sandy loam, 3 to 15 percent slopes.

These soils are somewhat excessively drained, are moderately coarse textured, and on the average are about 12 to 14 inches in depth. They are mainly on slopes of less than 15 percent.

The productivity potential ranges from good to fair. The extremely rocky soils are somewhat more droughty than the others and have outcrops covering as much as 50 percent of their surface. The rocky and very rocky soils have a potential for tree growth, even though they are shallow and have limited moisture-holding capacity. In highly fissured bedrock, the roots may penetrate to considerable depth and use moisture that is channeled through the fissures, but this is less likely on rocky ridgetops.

Plant competition for oak is moderate and for white pine, severe. Thinning the stands and removing less desirable species reduces competition. Reinvasion can be controlled by chemical growth inhibitors.

The windthrow hazard is severe because the soils and root systems are shallow, but where tree roots can penetrate cracks and fissures in the rocks, the trees are anchored more securely.

Equipment limitations are moderate in areas that have few rock outcrops, but severe in extremely rocky areas.

White spruce and Douglas-fir are suitable to plant for Christmas trees where the soil is deeper than 18 inches and in areas on lower slopes.

WOODLAND SUITABILITY GROUP 6

This group consists of the very rocky and extremely rocky phases of soils that are shallow to bedrock and are steeper than those in woodland suitability group 5. The soils are—

Brimfield very rocky fine sandy loam, 15 to 25 percent slopes.
Brimfield extremely rocky fine sandy loam, 15 to 25 percent slopes.
Hollis very rocky fine sandy loam, 15 to 35 percent slopes.
Hollis extremely rocky fine sandy loam, 15 to 35 percent slopes.

These soils are somewhat excessively drained, moderately coarse textured, and about 10 to 12 inches in depth.

The potential productivity is fair. In comparison with the deeper soils, these shallow soils have restricted moisture reserves, but tree roots can penetrate rock fissures through which water is channeled. On very rocky ridgetops and in extremely rocky areas, the growth potential is limited because of the lack of adequate moisture.

Windthrow hazard is severe because of the shallow root systems. Where the bedrock is highly fractured, however, roots penetrate the fissures and are anchored more securely.

Plant competition is moderate for oak and severe for white pine. Pioneer species are commonly found where stands are thin.

Equipment limitations are severe. Steep, very rocky slopes with many outcrops limit the use of most tending and harvesting equipment.

Christmas tree plantings are usually unsatisfactory on these slopes. Growth is often too slow, and access may be limited.

WOODLAND SUITABILITY GROUP 7

Most of these soils are on stratified sand and gravel and deep sand deposits. The Gloucester soils are on coarse granitic glacial till. The soils are—

Agawam sandy loam, 0 to 3 percent slopes.
Agawam sandy loam, 3 to 8 percent slopes.
Gloucester sandy loam, 3 to 8 percent slopes.
Gloucester sandy loam, 8 to 15 percent slopes.
Gloucester stony sandy loam, 3 to 8 percent slopes.
Gloucester stony sandy loam, 8 to 15 percent slopes.
Gloucester and Charlton very stony soils, 3 to 15 percent slopes.
Hartford sandy loam, 0 to 3 percent slopes.
Hartford sandy loam, 3 to 8 percent slopes.
Hinckley gravelly sandy loam, 0 to 3 percent slopes.
Hinckley gravelly sandy loam, 3 to 15 percent slopes.
Hinckley gravelly loamy sand, 3 to 15 percent slopes.
Jaffrey gravelly sandy loam and loamy sand, 3 to 15 percent slopes.
Manchester gravelly sandy loam, 0 to 3 percent slopes.
Manchester gravelly sandy loam, 3 to 15 percent slopes.
Manchester gravelly loamy sand, 3 to 15 percent slopes.
Merrimac sandy loam, 0 to 3 percent slopes.
Merrimac sandy loam, 3 to 8 percent slopes.
Windsor loamy sand, 3 to 8 percent slopes.
Windsor loamy sand, 8 to 15 percent slopes.

These somewhat excessively drained to excessively drained soils have a moderately coarse textured to coarse textured surface layer and subsoil and a coarse textured substratum. The Hinckley, Manchester, and Jaffrey soils are gravelly throughout. The slopes are less than 15 percent.

The productivity potential is fair. The soils have a low moisture-holding capacity and dry out rapidly early in spring. Moisture deficiencies may reduce the period of rapid growth.

Plant competition is slight for oaks and white pine. Invasion of oak stands by other hardwood species is not great on these droughty soils. Plantings of pines grow well because competition of invading hardwoods is less severe than on soils with greater moisture reserves. Abandoned open fields and pastures are favorable sites for plantings of white pine.

The windthrow hazard is slight, as the root systems are usually deep enough to provide adequate anchorage for trees, and rapid percolation of water through the soil prevents prolonged saturation. Shallow-rooted white pine is more susceptible to windthrow than deeper rooted hardwoods.

Equipment limitations are slight. Operation of tree-planting, tending, and harvesting equipment generally is not limited, but stoniness may limit the use of planting equipment on Gloucester soils.

White spruce, Douglas-fir, and Norway spruce are suitable for Christmas tree planting. On these droughty sites, growth is not excessive, and the trees are dense and compact. Insect damage to Norway spruce may require control.

WOODLAND SUITABILITY GROUP 8

This group includes nonstony, stony, and very stony phases of very poorly drained soils on glacial till, on stratified sand and gravel terraces, and in recent alluvium, and it also includes deep and shallow phases of Peat and Muck. The mapping units are—

Leicester-Ridgebury-Whitman very stony complex.
Peat and Muck.
Peat and Muck, shallow.
Saco fine sandy loam.
Saco silt loam.
Scarboro fine sandy loam.
Whitman stony fine sandy loam.

These soils are medium to moderately coarse textured. The substratum of the Saco and Scarboro soils is sand and gravel in some places. Peat and Muck deposits vary in depth from 1½ to more than 25 feet. All soils are on slopes of less than 3 percent.

Tree growth potential on these soils is poor and is limited by a permanent high water table and poor aeration. The water table falls below 18 inches only during dry summers. In many very poorly drained areas, the microrelief is irregular. Root systems are usually shallow, but some trees grow on mounds of fallen trees and have better aeration in the upper part of the root system. Stagnant water produces poor tree growth. Dense thickets of herbaceous species are common, and reed and sedge meadows occur on peat and muck deposits in places.

Some trees make satisfactory growth because they are tolerant of excessive moisture. Oaks grow poorly on these soils, except swamp white oak and pin oak, which have limited market value.

Plant competition is severe for oaks and white pine. Undesirable species and a high water table severely limit management of these sites for wood production, but they are excellent for wetland wildlife.

The windthrow hazard is severe because of shallow root systems and saturated soil.

A high water table also severely limits the use of most equipment. Crawler-type vehicles operate satisfactorily during dry summers and in winter when the ground is frozen.

Christmas tree plantings are not suited to these very poorly drained soils.

WOODLAND SUITABILITY GROUP 9

This woodland suitability group consists of miscellaneous land types, including Rock land with outcrops covering more than 50 percent of the land surface. The land types are—

Borrow and fill land, coarse materials.
Borrow and fill land, loamy materials.
Made land.
Rock land.

These land types have poor potential for wood production, but they can provide some watershed protection or wildlife cover. Tree growth is severely limited on Rock land because of droughty conditions, especially on ridgetops. Stunted trees usually grow in small pockets of deeper soils between outcrops.

Natural regeneration of vegetation on borrow and fill areas is generally very slow. Fill areas along roads and highways are usually covered with topsoil before grass and trees are planted. Little is known about the establishment of tree species in borrow areas, but a sod cover is desirable.

Christmas tree plantings are not suitable for Rock land because access and management would be difficult. White spruce could be planted on an experimental basis in borrow areas that have an established sod cover.

Engineering Uses of Soils [3]

Soil properties are important in engineering because they affect such work as the construction and maintenance of roads, airports, building foundations, water storage facilities, erosion control structures, drainage systems, and sewage disposal systems. The properties most important are permeability to water, shear strength, compaction characteristics, drainage, shrink-swell characteristics, grain size, plasticity, and pH. Other factors that affect engineering are topography, depth to water table, and depth to bedrock.

Information in the report can be used to:

1. Make studies that will aid in selecting and developing industrial, business, residential, and recreational sites.
2. Make preliminary estimates of the engineering properties of soils in the planning of agricultural drainage systems, farm ponds, irrigation systems, and diversion terraces.
3. Make preliminary evaluations of soil and ground conditions that will aid in selecting locations for highways, airports, pipelines, and cables and in planning detailed investigations at the selected locations.
4. Locate probable sources of gravel and other construction materials.
5. Correlate performance of engineering structures with soil mapping units to develop information that will be useful in designing and maintaining the structures.
6. Determine the suitability of soils for cross-country movement of vehicles and construction equipment.
7. Supplement the information obtained from other sources to make maps and reports that can be used readily by engineers.

The engineering interpretations in this report can be useful for many purposes. These interpretations do not eliminate the need for sampling and testing at the site of specific engineering works where heavy loads are involved and where the excavations are deeper than the layers here reported. Even in these situations, the soil map is useful for planning more detailed field investigations and for suggesting the kinds of problems that may be expected.

Each kind of soil has local variations that affect engineering performance or design. The interpretations in this report have been based upon laboratory data and field experiences of engineers and indicate the modal or average conditions for each kind of soil. Further, the interpretations are based primarily on the characteristics of the upper 5 feet of soil. The characteristics of deeper materials can be estimated from surficial geology reports and hydrology and ground water reports of the U.S. Geological Survey.

[3] MEYER D. HELFGOTT, engineering specialist, Soil Conservation Service, assisted in preparing this section.

Engineering classification systems

Most highway engineers classify soil materials according to the system approved by the American Association of State Highway Officials (AASHO) (*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 that has 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 in parentheses following the soil group symbol.

Some engineers prefer to use the Unified soil classification system (*34*), which is used by the Corps of Engineers. This system has three main groups—coarse-grained material, fine-grained material, and highly organic material. The coarse-grained materials are gravels (G) and sands (S) and are identified as GW, GP, GM, GC, SW, SP, SM, and SC. The fine-grained soils are silts and clays and are identified as ML, CL, OL, MH, CH, and OH. The highly organic material is identified as Pt. Thus, the system has 15 classes—8 classes for coarse-grained material, 6 for fine-grained, and 1 for highly organic material. Mechanical analyses 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.

Soil test data

Samples from 15 profiles of five extensive soil series in Tolland County were tested by the Connecticut State Highway Department 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 that have profiles within the range of characteristics established for the series. The results of these tests are given in table 4.

The engineering classifications of soils 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 consistency of the soil. As the moisture content of a clayey soil increases, the soil changes from a semisolid to a plastic, and then to a liquid state. The plastic limit is the moisture content at which the material passes from a semisolid to a plastic state and the liquid limit is the moisture content at which the soil passes from a plastic to a liquid state. The plasticity index is the numerical difference in moisture content between the liquid limit and the plastic limit and indicates the moisture range in which a soil is plastic.

Table 4 also gives moisture-density compaction data for the tested soils. If a soil material is compacted at sucessively higher moisture content, assuming that the compactive effort remains constant, its density 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, the greatest stability is obtained if the soil is compacted to about the maximum density when it is at approximately the optimum moisture content.

Estimated physical properties of soils

A brief description of the soils of Tolland County and their estimated physical properties are given in table 5. The estimates are based on field observations and interpretations of actual tests by the Soil Conservation Service and the Connecticut Highway Department.

Each soil series is classified according to the AASHO and Unified systems. Many soil series have more than one classification group because of the defined textural range of the series or because of textural changes within the profile. Variations in texture within the profile are generally noted by giving the classification separately for the solum and for the substratum. The solum is the upper part of the profile and generally includes the A and B horizons. The substratum is any layer beneath the solum.

The depth to bedrock in soils of the uplands is difficult to estimate because of the undulation of the bedrock. Unless otherwise stated, the depth to bedrock generally is more than 5 feet.

The erosion hazard is the susceptibility of a soil to erosion when not protected by vegetation. Erosion may occur during tillage, construction, or excavation.

The depth to a seasonal water table is the depth to a normal water table or to a temporary water table that occurs over an impervious hardpan or over strata of clay. A temporary water table usually disappears in spring and is generally recharged early in winter. Its persistence in any area that is underlain by impervious strata depends upon the frequency and intensity of rainfall, upon the length and degree of slope, and upon the texture and structure of the soil immediately above the impervious strata. A temporary water table persists on lower slopes longer than on middle or upper slopes. On many lower slopes, subsurface water seeps out on the surface.

The depth to a seasonal water table is estimated by the depth to the mottled layer, which indicates that the soil is saturated part of the time. The depth is also estimated from measurements of seasonal water tables in several field experiments performed by the Connecticut Agricultural Experiment Station.

Permeability is expressed as inches of water per hour and is the average rate for the section of the soil profile under consideration. An individual horizon within the solum and substratum may have a permeability rate that varies considerably from that of the other horizons. This is especially true of the solum of cultivated soils where a plowpan or another mechanically compacted layer has a permeability rate that is much lower than that of the overlying plow layer or the underlying subsoil. Variation within the substratum is often caused by stratification of the soil.

Furthermore, because of soil aggregation or root channels, permeability may be considerably higher in wooded or recently cleared areas than in cultivated areas. As a general rule, permeability is one class higher in the solum of soils in wooded sites than in open sites. In the substratum, however, permeability varies less among wooded and cultivated sites because it is less affected by tree roots.

The estimated permeability rates in table 5 represent the vertical drainage when the soil is saturated. Soil permeability rates for the design of sewage disposal systems are generally obtained from field tests. Often percolation rates determined in the field may be substantially greater than permeability estimates because of the lateral movement of water. Additional information on permeability is in the section "Urban Development."

Available moisture in the solum is expressed as inches per inch of soil in the solum and is related to the textural class designated for the soil series. When the soil is air dry, this amount of water will wet the soil to a depth of one inch without deeper percolation. If more than one textural class has been designated, the range has been expanded to include all of the classes.

Suitability of soils for engineering

The suitability of the soils for construction materials and the soil characteristics that affect earth construction are given in table 6. The soils were evaluated on the basis of the test data in table 4, the estimates in table 5, and experiences in field use.

During most construction, the topsoil is stripped off and sold or later replaced. In some areas that were farmland or woodland, the topsoil is too thin for stripping. Good topsoil is free of stones, has a medium texture, and contains a fair amount of organic matter.

Stones limit the usefulness of some soils as topsoil. The quality of the topsoil depends upon texture. The Enfield and Tisbury soils are good sources of topsoil, because they are medium textured, are free of stones, and have a moisture-holding capacity adequate for establishing and maintaining a lawn. The Windsor, Jaffrey, Manchester, Hinckley, Merrimac, and Hartford are sandy soils and are only fair to poor for topsoil because they have a low moisture-holding capacity and are droughty.

The topsoil obtained from alluvial soils varies in quality. Medium or moderately coarse textured alluvium is more satisfactory than coarse-textured alluvium.

The poorly and very poorly drained soils generally have a rich, dark-colored surface horizon. 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. Also, color is not a reliable indicator of the amount of organic matter in soils.

TABLE 4.—*Engineering test data for*

[Tests performed by the Connecticut State Highway Department and Bureau of Public Roads (BPR) in

Soil name and location	Parent material	SCS report No.	Depth	Horizon	Moisture-density [2]	
					Maximum dry density	Optimum moisture
		S-60-Conn—	*Inches*		*Lb. per cu. ft.*	*Percent*
Charlton stony fine sandy loam:						
1 mile S. of University of Connecticut campus in Mansfield on S. Eagleville Rd. (Modal)	Glacial till.	7-7-1	0-8	Ap	101	19
		7-7-2	8-20	B21	107	9
		7-7-4	30-48	C	120	12
0.9 mile SW. of Grant School in Tolland. (Fragipan at 33 inches.)	Glacial till.	7-4-3	5. 5-16	B22	115	14
		7-4-5	26-33	C1	118	10
		7-4-6	33-45	Cx	120	12
100 feet E. of Goose Lane and 1.9 miles SE. of Tolland Center. (Intergrade to Brookfield in color; fragipan at 36 inches.)	Glacial till.	7-5-1	0-4	Ap	93	23
		7-5-3	10-24	B22	105	15
		7-5-4	24-36	C1	102	13
		7-5-5	36-44	Cx	110	16
Charlton stony sandy loam:						
0.1 mile W. of Shenipsit Lake Rd. on Crystal Lake Rd. (Intergrade to Gloucester—coarser material.)	Glacial till.	7-1-3	3-12	B22	107	16
		7-1-6	23-40	C2	116	9
Gloucester stony sandy loam:						
0.7 mile W. of State Line Pond and 150 ft. S. of Crow Hill Rd. (Modal).	Glacial till.	7-2-2	1. 5-8	B21	112	13
		7-2-3	8-21	B22	121	10
		7-2-4	21-40	C	120	10
1 mile S. of Crystal Lake on Sugar Hill Rd. (Less stony; weakly stratified substratum.)	Glacial till.	7-3-2	1. 5-12	B21	116	11
		7-3-3	12-23	B22	115	12
		7-3-4	23-40	C	116	11

See footnotes at end of table.

Soils underlain by deposits of water-stratified materials are the most common source of sand and gravel. These include the Hinckley, Jaffrey and Manchester soils. Although the soils on uplands are generally poor sources, the Charlton, Cheshire, and Gloucester soils are fair, because they have developed on moderately coarse to coarse gravelly till.

The suitability of the soils as material for road subgrade is indicated by the AASHO and Unified classifications. Soils that have been rated A–2 or SP, SP–SM, and SM are considered good material for subgrade. Those classified A–4 or ML are considered fair to poor.

The poorly and very poorly drained soils vary in their suitability for road subgrade. Although textural analyses may indicate that these soils are A–1 or A–2 materials, a permanent high water table may interfere with their excavation.

In many of the soils of uplands and terraces, the substratum is the best source of road subgrade material. The solum may be too fine in texture for subgrade material. In such cases, stripping the solum would be beneficial.

The only soils that are not suitable for road fill are peat and muck, those that contain much clay, and those that contain stumps and brush.

The poorly drained and very poorly drained soils are rarely used as sources of fill material. High water tables usually inhibit their excavation. If certain characteristics of the soil materials make them satisfactory for use as fill, the surface organic layers are generally stripped because they have poor stability. During site preparation for construction, most poorly drained and very poorly drained areas are normally filled in with materials from other sources.

Soils that are most suitable for winter grading are loamy sand, sandy loam, and gravelly sandy loam. The fine sandy loam and very fine sandy loam are fairly good to poor for winter grading. Loam, silt loam, and silty clay loam 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, but those that are underlain by a hardpan are moderately susceptible. Most moderately well drained soils are moderately susceptible to heaving, and

soil samples taken from 15 soil profiles [1]

accordance with standard procedures of the American Association of State Highway Officials (AASHO)]

Mechanical analysis [3]											Liquid limit	Plasticity index	Classification	
Percentage discarded in field sampling (estimate)	Percentage passing sieve—						Percentage smaller than—						AASHO [4]	Unified [5]
Larger than 3-in.	3-in.	¾-in.	No. 4 (4.7 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.				
5	100	98	90	83	70	38	24	13	5	2	NP [6]	NP [6]	A–4(1)	SM.
10	100	87	75	71	61	35	29	20	12	7	NP	NP	A–2–4(0)	SM.
5	100	66	52	48	40	20	14	7	3	2	NP	NP	A–1–b(0)	GM.
	100	79	72	69	60	32	26	14	5	3	NP	NP	A–2–4(0)	SM.
	100	95	85	81	66	29	22	14	5	3	NP	NP	A–2–4(0)	SM.
	100	88	82	78	67	34	28	18	7	3	NP	NP	A–2–4(0)	SM.
15		100	95	92	81	50	41	15	6	4	NP	NP	A–4(3)	SM.
	100	88	70	64	53	32	28	18	9	5	NP	NP	A–2–4(0)	SM.
	100	77	69	63	51	24	19	11	4	2	NP	NP	A–2–4(0)	SM.
15	100	82	70	64	48	27	21	13	5	3	NP	NP	A–2–4(0)	SM.
5	100	82	75	72	60	32	28	16	5	3	NP	NP	A–2–4(0)	SM.
10	100	72	60	55	39	14	12	6	1	0	NP	NP	A–1–b(0)	SM.
5	100	89	85	82	73	46	24	9	4	3	NP	NP	A–4(2)	SM.
5	100	90	76	72	62	28	27	11	5	3	NP	NP	A–2–4(0)	SM.
15	100	74	56	51	41	13	10	3	2	1	NP	NP	A–1–b(0)	GM.
5	100	88	84	82	70	27	18	10	3	1	NP	NP	A–2–4(0)	SM.
		100	96	93	80	34	27	14	3	2	NP	NP	A–2–4(0)	SM.
	100	94	89	88	75	30	22	12	3	1	NP	NP	A–2–4(0)	SM.

TABLE 4.—*Engineering test data for soil*

[Tests performed by the Connecticut State Highway Department and Bureau of Public Roads (BPR) in

Soil name and location	Parent material	SCS report No.	Depth	Horizon	Moisture-density [2]	
					Maximum dry density	Optimum moisture
		S-60-Conn—	*Inches*		*Lb. per cu. ft.*	*Percent*
Merrimac sandy loam: 0.75 mile SE. of West Stafford on Cooper Lane Rd. (Modal)	Terrace.	7–11–1	0–10	Ap	104	17
		7–11–2	10–19	B21	112	13
		7–11–5	26–44	IIC	135	9
0.4 mile NW. of North Somers. (Intergrade to Hartford.)	Terrace.	7–10–1	0–10	Ap	114	12
		7–10–2	10–18	B21	(7)	(7)
		7–10–5	26–42	IIC	122	11
0.8 mile SE. of Orcutts on State Highway 32. (Intergrade to Hinckley.)	Terrace.	7–12–1	0–9	Ap	100	17
		7–12–2	9–17	B21	115	14
		7–12–4	19–40	IIC	127	11
Saco silt loam: 1.5 miles SW. of North Somers. (Modal along larger streams.)	Alluvium (no coarse skeleton).	7–13–1	6–18	A1	54	58
		7–13–2	18–30	C1g	91	21
		7–13–3	30–48	C2	98	18
0.25 mile N. of University of Conn. Vegetable Breeding Lab. at U.S. Highway 44A and North River Rd. (Modal along smaller streams; intergrades to poorly drained Limerick.)	Alluvium (coarse skeleton; 50 percent crystalline and 50 percent soft, red triassic fragments).	7–14–1	0–14	A1	71	38
		7–14–3	17–28	C2	107	17
		7–14–4	28–36	C3	115	12
1.25 miles SW. of Flanders School in Coventry. (Shallower; silt over gravel at 36 inches.)	Alluvium (coarse skeleton; 100 percent crystalline fragments.)	7–15–1	0–9	A11	71	52
		7–15–2	9–18	A12	86	22
		7–15–4	26–36	C2	103	16
Woodbridge loam: 0.6 mile SW. of junction of State Highway 31 and U.S. Highway 44A in Coventry. (Modal.)	Glacial till	7–6–1	0–8	Ap	90	23
		7–6–2	8–16	B21	108	15
		7–6–4	24–40+	B23gx	122	11
0.5 mile SW. of Sweetheart Lake on Plains Rd. in Tolland. (Coarser textured B23gx.)	Glacial till	7–8–1	0–6	Ap	78	16
		7–8–2	6–15	B21	111	15
		7–8–4	23–36	B23gx	124	9
0.8 mile SW. of Staffordville on Stafford St. (Finer textured, intergrades to poorly drained Ridgebury.)	Glacial till	7–9–1	0–8	Ap	98	16
		7–9–3	12–23	B22g	118	13
		7–9–4	23–36	B23gx	122	12

[1] Additional test data are in table 5 of the Hartford County Soil Survey Report (*28*).
[2] Based on "The Moisture-density Relations of Soils Using a 5.5-lb. Rammer and 12-in. Drop"; AASHO Designation T 99–57, Methods A and C.
[3] Mechanical analyses according to AASHO Designation T 88–57 (*1*). Results by this procedure may differ from results 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

the poorly drained and very poorly drained soils are highly susceptible because they contain much moisture.

The characteristics of each soil series have been evaluated in terms of its 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 impervious silt and clay or by a hardpan. Some of the poorly drained and very poorly drained soils of the upland tills and water-lain terraces are underlain by coarse material. In these soils the seasonal fluctuation of the water table is considerable. Because of seepage when the water table is low, these soils are not so favorable for farm ponds. Seepage losses, however, can be minimized by proper excavation and by lining the surface with impervious material.

The embankments and dams of a farm pond should *samples taken from 15 soil profiles* [1]—Continued

accordance with standard procedures of the American Association of State Highway Officials (AASHO)]

Mechanical analysis [3]											Liquid limit	Plasticity index	Classification	
Percentage discarded in field sampling (estimate)	Percentage passing sieve—						Percentage smaller than—						AASHO [4]	Unified [5]
Larger than 3-in.	3-in.	¾-in.	No. 4 (4.7 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	94	94	78	38	33	18	4	(7)	NP	NP	A-4(1)	SM.
5	------	100	99	97	77	35	30	16	6	4	NP	NP	A-2-4(0)	SM.
35	100	95	70	55	26	7	5	3	2	1	NP	NP	A-1-b(0)	SW-SM.
5	100	92	83	79	59	21	19	9	3	2	NP	NP	A-2-4(0)	SM.
5	100	97	91	86	64	28	19	10	3	1	NP	NP	A-2-4(0)	SM.
5	100	95	68	59	38	3	0	0	0	0	NP	NP	A-1-b(0)	SP.
5	100	99	93	89	49	7	(7)	(7)	(7)	(7)	NP	NP	A-1-b(0)	SW-SM.
5	------	100	95	90	63	37	29	19	3	2	NP	NP	A-4(0)	SM.
20	100	80	61	56	34	7	4	2	1	1	NP	NP	A-1-b(0)	SW-SM.
----------	------	------	------	100	90	84	79	46	21	12	117	24	A-7-5(18)	OH.
----------	------	------	------	------	100	89	72	32	11	7	NP	NP	A-4(8)	ML.
----------	------	------	------	------	100	86	48	17	(7)	(7)	NP	NP	A-4(8)	ML.
----------	------	------	100	99	94	67	58	34	8	3	NP	NP	A-4(6)	ML or OL.
----------	------	------	------	100	99	77	60	30	14	10	NP	NP	A-4(8)	ML.
5	100	97	83	76	63	36	29	19	9	7	NP	NP	A-4(0)	SM.
----------	------	------	------	------	100	79	58	28	8	3	NP	NP	A-4(8)	ML or OL.
----------	------	------	------	100	93	63	22	9	5	2	NP	NP	A-4(6)	ML or OL.
----------	------	------	------	100	96	18	10	3	1	0	NP	NP	A-2-4(0)	SM.
5	100	99	95	93	83	54	47	25	8	3	NP	NP	A-4(4)	ML.
5	------	100	92	88	75	40	31	15	3	1	NP	NP	A-4(1)	SM.
----------	------	100	95	89	78	45	38	24	7	3	NP	NP	A-4(2)	SM.
5	100	90	81	77	67	37	33	22	12	7	NP	NP	A-4(0)	SM.
5	------	100	92	86	72	35	26	10	3	2	NP	NP	A-2-4(0)	SM.
10	100	79	72	65	54	25	20	11	3	2	NP	NP	A-2-4(0)	SM.
5	100	89	86	85	72	45	39	22	7	2	22	2	A-4(2)	SM.
----------	100	98	91	85	66	37	29	19	11	6	NP	NP	A-4(0)	SM.
5	100	76	70	66	48	22	18	9	4	2	NP	NP	A-1-b(0)	SM.

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

[4] Based on Standard Specifications for Highway Materials and Methods of Sampling and Testing (Pt. 1, Ed. 8): The Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes, AASHO Designation M 145–49.

[5] Based on the Unified Soil Classification System, Technical Memorandum No. 3–357, v. 1, Waterways Experiment Station, Corps of Engineers, March 1953.

[6] NP=Nonplastic.

[7] Data not available.

consist of materials that have strength and stability and that are impervious to water. Medium-textured and coarse-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 contain much silt and clay, though not strong or stable enough, have very low seepage losses.

764-869—66——3

The embankments and dams of farm ponds can be made impervious by the proper mixing and compaction of soil material, by lining them with an impervious face, or by sealing them. Similarly, soil materials that are not strong or stable enough can be improved by mixing in and compacting coarser materials.

Drainage systems are established mainly to lower the

TABLE 5.—*Brief descriptions of soils*

[Absence of figures indicates data

Soil series and geographic position	Thickness of solum	Dominant texture		Classification			
				AASHO		Unified	
		Solum	Substratum	Solum	Substratum	Solum	Substratum
Soils of uplands [2]:	*Inches*						
Brimfield (BnC, BnD, BpC, BpD).	4–20	Very rocky fine sandy loam; extremely rocky fine sandy loam.	Generally less than 20 inches to brown mica schist bedrock.	A–4	----------	SM or ML.	----------
Brookfield (BtB, BvC, ByC, ByD).	24–30	Fine sandy loam; stony fine sandy loam; very stony fine sandy loam.	Very friable, highly micaceous gravelly fine sandy loam to loamy sand.	A–4 or A–2.	A–2, A–1, or A–4.	SM or ML.	SM or GM.
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 to loamy sand.	A–4 or A–2.	A–2, A–1, or A–4.	SM or ML.	SM or GM.
Cheshire (CsA, CsB, CsC, CsC2, CsD2, CtB, CtC).	24–30	Fine sandy loam; stony fine sandy loam.	Firm to very friable gravelly fine sandy loam to loamy sand.	A–4 or A–2.	A–2, A–1, or A–4.	SM or ML.	SM or GM.
Gloucester (GaB, GaC, GbB, GbC, GeC, GeE).	20–26	Sandy loam; stony sandy loam; very stony sandy loam.	Very friable gravelly sand or loamy sand.	A–2 or A–4.	A–1 or A–2.	SM	GM or SM.
Hollis (HoC, HrC, HrE, HxC, HxE).	4–20	Rocky fine sandy loam; very rocky fine sandy loam; extremely rocky fine sandy loam.	Generally less than 20 inches to schist, gneiss, or granite bedrock.	A–4	----------	SM or ML.	----------
Leicester (Lc, Le, Lg).	24–30	Fine sandy loam; stony fine sandy loam.	Firm to very friable gravelly sandy loam to loamy sand.	A–4	A–4 or A–2.	SM or ML.	SM or GM.
Paxton (PbA, PbB, PdC, PbD, PdB, PdC, PdD, PeC, PeD).	22–30	Fine sandy loam; stony fine sandy loam; very stony fine sandy loam.	Very firm and compact fine sandy loam and sandy loam.	A–4	A–2, A–4, or A–1.	SM or ML.	SM
Ridgebury (Rd, Rg)	20–24	Fine sandy loam; stony fine sandy loam.	Very firm and compact fine sandy loam and sandy loam.	A–4	A–2, A–4, or A–1.	SM or ML.	SM
Rock land (Rk)	-------	Bedrock is exposed on more than 50 percent of the surface.	----------	----------	----------	----------	----------
Sutton (SvA, SvB, SwA, SwB, SxA, SxB).	22–30	Fine sandy loam; stony fine sandy loam; very stony fine sandy loam.	Firm to very friable gravelly fine sandy loam to sandy loam.	A–4 or A–2.	A–2, A–1, or A–4.	SM or ML.	SM or GM.
Watchaug (WgA, WgB).	22–30	Fine sandy loam	Firm to very friable gravelly sandy loam to loamy sand.	A–2 or A–4.	A–2, A–1, or A–4.	SM or ML.	SM or GM.
Whitman (Wp)	8–16	Stony fine sandy loam	Very firm to very friable gravelly sandy loam to loamy sand.	A–2 or A–4.	A–1 or A–2.	SM	SP or SM.
Wilbraham (Wr, Ws).	20–30	Silt loam; stony silt loam.	Very firm and compact gravelly loam.	A–4	A–4	ML or ML–CL.	ML or SM.
Woodbridge (WxA, WxB, WyA, WyB, WzA, WzC).	20–30	Fine sandy loam; stony fine sandy loam; very stony fine sandy loam.	Very firm and compact gravelly fine sandy loam and sandy loam.	A–4	A–2, A–4, or A–1.	SM or ML.	SM

See footnotes at end of table.

and their estimated physical properties

are not available or are not applicable]

Solum: Percentage passing sieve—			Substratum: Percentage passing sieve—			Range of predominant slopes	Erosion hazard	Depth to seasonal water table	Drainage class	Permeability [1]		Available moisture in solum
No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)					Solum	Substratum	
Percent	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*		*Inches*		*Inches of water per hour*	*Inches of water per hour*	*Inches per inch of soil*
70–85	65–80	35–55				3–25	Low to medium.	(3)	Somewhat excessively drained to well drained.	0.63–6.3		0.13–0.17
70–90	65–85	30–55	55–80	50–75	20–40	3–25	Medium	(3)	Well drained	0.63–2.0	0.63–6.3	0.13–0.17
70–90	65–85	30–55	55–80	50–75	20–40	2–25	Medium	(3)	Well drained	0.63–2.0	0.63–6.3	0.15–0.18
70–90	65–85	30–55	55–80	50–75	20–40	2–25	Medium	(3)	Well drained	0.63–2.0	0.63–6.3	0.15–0.18
70–95	65–90	20–40	45–80	40–70	10–25	2–25	Medium	(3)	Somewhat excessively drained.	2.0–6.3	6.3+	0.13–0.17
70–85	65–80	35–55				3–35	Low to medium.	(3)	Somewhat excessively drained to well drained.	0.63–6.3		0.17–0.20
70–90	65–85	30–55	60–80	50–70	20–40	0–5	Low	0–8	Poorly to somewhat poorly drained.	0.63–2.0	0.63–6.3	0.15–0.18
80–95	75–95	35–55	65–95	65–90	20–45	2–25	High	(4)	Well drained	0.63–2.0	<0.2–0.63	0.17–0.20
80–95	75–95	40–60	65–90	65–90	20–45	0–5	Low	0–12	Poorly to somewhat poorly drained.	0.63–2.0	<0.2–0.63	0.17–0.20
						3–45			Excessively drained			
70–90	65–85	30–55	55–80	50–75	20–40	0–15	Low to medium.	10–20	Moderately well drained.	0.63–2.0	0.63–6.3+	0.17–0.20
70–90	65–80	30–55	55–80	50–75	20–40	0–8	Low to medium.	12–20	Moderately well drained.	0.63–2.0	0.63–6.3	0.17–0.20
75–90	65–85	25–50	70–80	50–70	5–35	0–3	Low	0	Very poorly drained	0.63–2.0	0.63–6.3	0.17–0.20
75–90	70–85	50–70	70–85	65–80	40–65	0–3	Low	0–8	Poorly to somewhat poorly drained.	0.63–2.0	<0.2–0.63	0.20–0.23
80–95	75–95	35–55	65–95	65–90	20–45	0–8	Medium	12–20	Moderately well drained.	0.63–2.0	<0.2–0.63	0.17–0.20

TABLE 5.—*Brief descriptions of soils*

Soil series and geographic position	Thickness of solum	Dominant texture		Classification			
				AASHO		Unified	
		Solum	Substratum	Solum	Substratum	Solum	Substratum
Soils of uplands over nonconforming substrata:	*Inches*						
Birchwood (BhA, BhB).	24–30	Sandy loam	Very firm and compact gravelly loam.	[5] A–4 or A–2.	[5] A–4	[5] SM	[5] ML or SM.
Broadbrook (BrA, BrB, BsB).	20–36	Silt loam; stony silt loam.	Very firm and compact gravelly loam.	[5] A–4	[5] A–4	[5] ML	[5] ML or SM.
Narragansett (NaA, NaB, NaC, NgB, NgC).	20–30	Silt loam; stony silt loam.	Firm to friable gravelly sandy loam to loamy sand.	[5] A–4	[5] A–2	[5] ML	[5] SM
Poquonock (PuA, PuB).	24–36	Sandy loam	Very firm and compact gravelly loam.	[5] A–2 or A–4.	[5] A–4	[5] SM or SP–SM.	[5] ML or SM.
Rainbow (RaA, RaB, RbB).	24–36	Silt loam; stony silt loam.	Very firm and compact gravelly loam.	[5] A–4	[5] A–4	[5] ML	[5] ML or SM.
Wapping (WeA, WeB, WfB).	24–36	Silt loam; stony silt loam	Firm to very friable gravelly sandy loam to loamy sand.	[5] A–4	[5] A–2	[5] ML	[5] SM
Soils on terraces—wind- and water-deposited materials:							
Agawam (AbA, AbB).	24–30	Sandy loam	Loamy sand and sand; generally free of gravel to a depth of 4 or 5 feet.	A–4 or A–2.	A–2 or A–1.	SM	SM or SP–SM.
Ellington (EfA)	24–30	Fine sandy loam	Sand and gravel from red Triassic rocks.	A–4 or A–2.	A–2 or A–1.	SM or ML.	SM or SP–SM.
Enfield (EsA, EsB, EtA, EtB).	18–30	Silt loam	Coarse sand and gravel	[5] A–4	[5] A–2 or A–1.	[5] ML	[5] SM or SP–SM.
Hartford (HdA, HdB, HfA, HfB).	18–30	Fine sandy loam; sandy loam.	Sand and gravel from red Triassic rocks.	A–2 or A–4 or A–1.	A–2 or A–1.	SM	SM or SP–SM.
Hinckley (HkA, HkC, HmC).	6–18	Gravelly sandy loam; gravelly loamy sand.	Sand and gravel from granite, gneiss, and schist.	A–2 or A–1.	A–1 or A–2.	SM or GM.	GW to SM.
Jaffrey (JaC)	6–18	Gravelly sandy loam; gravelly loamy sand.	Sand and gravel with high proportion of brown mica schist.	A–2 or A–1.	A–1 or A–2.	SM or GM.	GW to SM.
Manchester (MgA, MgC, MhC).	6–18	Gravelly sandy loam; gravelly loamy sand.	Sand and gravel from red Triassic rocks.	A–2 or A–1.	A–1 or A–2.	SM or GM.	GW to SM.
Merrimac (MrA, MrB, MyA, MyB).	18–30	Fine sandy loam; sandy loam.	Sand and gravel derived principally from granite, gneiss, and schist.	A–2 or A–4 or A–1.	A–2 or A–1.	SM	SM or SP–SM.
Ninigret (NrA, NrB).	24–36	Sandy loam	Generally loamy sand and sand with thin strata of finer textured material in places.	A–4 or A–2.	A–2 or A–1.	SM	SM
Raynham (Rc)	20–30	Silt loam	Loamy fine sand	A–4	A–2 or A–3.	ML or SM.	SM
Scarboro (Sf)	18–24	Fine sandy loam	Loamy sand and sand with some gravel in places.	A–4 or A–2.	A–2 or A–3.	SM or ML.	SM or SP–SM.

See footnotes at end of table.

and their estimated physical properties—Continued

Solum: Percentage passing sieve—			Substratum: Percentage passing sieve—			Range of predominant slopes	Erosion hazard	Depth to seasonal water table	Drainage class	Permeability [1]		Available moisture in solum
No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)					Solum	Substratum	
Percent	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*		*Inches*		*Inches of water per hour*	*Inches of water per hour*	*Inches per inch of soil*
75–90	70–85	30–50	70–85	65–80	40–65	0–8	Low to medium.	0–8	Moderately well drained.	2.0–6.3	<0.2–0.63	0.15–0.18
70–95	65–90	50–75	70–85	65–80	40–65	0–15	High	(4)	Well drained	0.63–2.0	<0.2–0.63	0.20–0.23
70–95	65–90	50–75	70–85	65–80	20–35	0–15	High	(3)	Well drained	0.63–2.0	2.0–6.3+	0.20–0.23
70–90	65–80	10–40	70–85	65–80	40–65	1–8	Medium	(4)	Well drained	2.0–6.3	<0.2–0.63	0.08–0.15
70–95	65–90	50–75	70–85	65–80	40–65	0–6	Medium to low.	12–20	Moderately well drained.	0.63–2.0	<0.2–0.63	0.20–0.23
70–95	65–90	50–75	70–85	65–80	20–35	0–8	Medium to low.	10–20	Moderately well drained.	0.63–2.0	2.0–6.3+	0.20–0.23
95–100	80–95	30–50	95–100	90–95	10–30	0–8	Low to medium.	(3)	Well drained to somewhat excessively drained.	2.0–6.3	6.3+	0.13–0.18
75–90	65–70	30–55	55–70	40–65	5–25	0–3	Low	12–20	Moderately well drained.	2.0–6.3	2.0–6.3+	0.15–0.18
75–95	70–90	55–75	55–95	40–70	5–20	0–8	High	(3)	Well drained	0.63–2.0	6.3+	0.20–0.23
80–95	70–90	20–40	55–95	35–70	5–20	0–8	Low to medium.	(3)	Well drained to somewhat excessively drained.	2.0–6.3+	6.3+	0.13–0.18
60–85	50–70	10–35	45–70	35–60	3–20	2–15	Low to medium.	(3)	Excessively drained	2.0–6.3+	6.3+	0.08–0.13
60–85	50–70	10–35	45–70	35–60	3–20	2–15	Low to medium.	(3)	Excessively drained	2.0–6.3+	6.3+	0.08–0.13
60–85	50–70	10–35	45–70	35–60	3–20	2–15	Low to medium.	(3)	Excessively drained	2.0–6.3+	6.3+	0.08–0.13
80–95	70–90	20–40	55–95	35–70	5–20	0–8	Low to medium.	(3)	Well drained to somewhat excessively drained.	2.0–6.3	6.3+	0.13–0.18
90–100	80–95	30–50	95–100	90–95	20–35	0–8	Low	12–20	Moderately well drained to somewhat poorly drained.	2.0–6.3	2.0–6.3+	0.13–0.18
90–100	80–100	40–60	80–100	70–100	5–25	0–3	Low	0–8	Poorly to somewhat poorly drained.	0.63–2.0	2.0–6.3+	0.20–0.23
70–100	65–90	25–55	75–95	65–90	5–25	0–3	Low	0	Very poorly drained	0.63–6.3	2.0–6.3+	0.17–0.20

TABLE 5.—*Brief description of soils*

Soil series and geographic position	Thickness of solum	Dominant texture		Classification			
				AASHO		Unified	
		Solum	Substratum	Solum	Substratum	Solum	Substratum
Soils of uplands over nonconforming substrata—Continued	*Inches*						
Sudbury (SsA)	20–30	Fine sandy loam	Sand and gravel from granite, gneiss, and schist.	A–2, A–4, or A–1.	A–2 or A–1.	SM	SM or SP–SM.
Terrace escarpments (Tg)	6–12	Gravelly loamy sand	Sand and gravel	A–2 or A–4.	A–1, A–2, or A–4.	SM	GW to ML.
Tisbury (TsA)	24–30	Silt loam	Sand and gravel	[5] A–4	[5] A–2 or A–1.	[5] SM or ML.	[5] SM or SP–SM.
Walpole (Wd)	20–30	Sandy loam	Sand and gravel	A–2 or A–4.	A–1, A–2, or A–3.	SM	SM or SP–SM.
Windsor (WvB, WvC).	18–24	Loamy sand	Coarse to fine sand, with some gravel in places.	A–2	A–2 or A–3.	SM	SM or SP–SM.
Alluvial soils:							
Alluvial land (Am)		Variable; silt loam to sandy loam.	Variable; fine sandy loam to loamy sand with some gravel in places.	(6)	(6)	(6)	(6)
Limerick (Lm)		Silt loam	Variable; loamy sand and sand with some gravel in places.	A–4	A–2 or A–4.	ML	SM or ML.
Ondawa (On)		Sandy loam	Variable; loamy sand and sand with some gravel in places.	A–2 or A–4.	A–2 or A–4.	SM	SM or ML.
Podunk (Po)		Fine sandy loam	Variable; loamy sand and sand with some gravel in places.	A–2 or A–4.	A–2 or A–4.	SM	SM or ML.
Rumney (Ru)		Fine sandy loam	Variable; loamy sand and sand with some gravel in places.	A–2 or A–4.	A–2 or A–4.	SM	SM or ML.
Saco (Sa, Sb)		Fine sandy loam; silt loam.	Variable; silt loam to coarse sand and gravel.	A–4	A–2 or A–4.	SM or ML.	ML or SM.
Winooski and Hadley (Ww).		Silt loam	Variable; loamy sand and sand with some gravel in places.	A–4	A–2 or A–4.	ML	SM or ML.
Organic soils:							
Peat and Muck (Pk, Pm).		Deposits of decomposed or undecomposed material derived from reeds, sedges, and sphagnum moss, in many places, mixed with woody debris.				Pt	Pt

[1] Permeability classes are as follows: Less than 0.2 inch per hour—very slow; 0.2 to 0.63 inch per hour—slow; 0.63 inch to 2.0 inches per hour—moderate; 2.0 to 6.3 inches per hour—rapid; greater than 6.3 inches per hour—very rapid.

[2] Upland soils range from nonstony to very stony. Nonstony soils in fields may have had stones removed from the surface; but the soils may still be stony or very stony in the subsoil and substratum. The depth to bedrock is generally 5 feet or more unless otherwise stated.

[3] Deep.

and their estimated physical properties—Continued

Solum: Percentage passing sieve—			Substratum: Percentage passing sieve—			Range of predominant slopes	Erosion hazard	Depth to seasonal water table	Drainage class	Permeability [1]		Available moisture in solum
No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)					Solum	Substratum	
Percent	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*		*Inches*		*Inches of water per hour*	*Inches of water per hour*	*Inches per inch of soil*
80–95	70–90	20–40	55–95	35–70	5–20	0–6	Low	12–20	Moderately well drained.	2. 0–6. 3	2. 0–6. 3+	0. 13–0. 18
70–90	50–80	10–40	50–95	40–70	3–70	15–35	Medium	(3)	Somewhat excessively drained.	2. 0–6. 3	6. 3+	0. 08–0. 13
75–95	70–90	55–75	55–95	40–70	5–20	0–5	Medium	12–20	Moderately well drained.	0. 63–2. 0	6. 3+	0. 20–0. 23
80–100	70–90	30–50	80–100	70–100	5–25	0–3	Low	0–8	Poorly to somewhat poorly drained.	0. 63–6. 3	2. 0–6. 3+	0. 13–0. 18
95–100	95–100	10–30	95–100	90–100	5–15	3–15	Low	(3)	Excessively drained	2. 0–6. 3+	6. 3+	0. 08–0. 13
(6)	(6)	(6)	(6)	(6)	(6)	0–3	Low	------	(6)	(6)	(6)	(6)
90–100	80–95	50–85	70–100	60–100	20–90	0–3	Low	0–8	Poorly to somewhat poorly drained.	0. 63–6. 3	2. 0–6. 3+	0. 20–0. 23
80–95	70–90	30–45	70–100	60–100	20–90	0–3	Low	(3)	Well drained	0. 63–6. 3	2. 0–6. 3+	0. 13–0. 17
80–95	70–90	30–45	70–100	60–100	20–90	0–3	Low	12–20	Moderately well drained.	0. 63–6. 3	2. 0–6. 3+	0. 13–0. 17
80–95	70–90	30–45	70–100	60–100	20–90	0–3	Low	0–8	Poorly to somewhat poorly drained.	0. 63–6. 3	2. 0–6. 3+	0. 13–0. 17
75–100	70–100	35–85	70–100	60–100	25–90	0–3	Low	0	Very poorly drained	0. 63–6. 3	2. 0–6. 3+	0. 13–0. 23
90–100	80–95	50–85	70–100	60–100	20–90	0–3	Low	(3)	Moderately well drained and well drained.	0. 63–6. 3	2. 0–6. 3+	0. 20–0. 23
------	------	------	------	------	------	0–3	Low	0	Very poorly drained	(6)	(6)	

[4] May have a perched water table above the fragipan in winter and early in spring.
[5] Soil has a lithologic change in the profile. Solum occurs as a mantle over a substratum of different geologic origin.
[6] Variable.

TABLE 6.—*Interpretations of*

[Absence of information means the

Soil series and topographic positions	Estimated suitability for—				
	Topsoil	Sand and gravel	Road subgrade	Road fill	Winter grading
Soils of uplands:					
Brimfield (BnC, BnD, BpC, BpD)	Poor	Not suitable	Poor	Poor	Poor
Brookfield (BtB, BvC, ByC, ByD)	Poor to fair	Fair	Good	Good	Fair
Charlton (CaA, CaB, CaC, CaD, ChB, ChC, ChD, CrC, CrD).	Poor to fair	Fair	Good	Good	Fair
Cheshire (CsA, CsB, CsC, CsC2, CsD2, CtB, CtC).	Poor to fair	Fair	Good	Good	Fair
Gloucester (GaB, GaC, GbB, GbC, GeC, GeE).	Poor	Fair	Good	Good	Good
Hollis (HoC, HrC, HrE, HxC, HxE)	Poor	Not suitable	Poor	Poor	Poor
Leicester (Lc, Le, Lg)	Poor	Poor	Poor	Poor	Not suitable
Paxton (PbA, PbB, PbC, PbD, PdB, PdC, PdD, PeC, PeD).	Poor to fair	Poor	Fair to poor	Fair	Fair
Ridgebury (Rd, Rg)	Poor	Poor	Poor [2]	Poor [2]	Not suitable
Rock land (Rk)	Not suitable	Not suitable	Not suitable	Not suitable	Not suitable
Sutton (SvA, SvB, SwA, SwB, SxA, SxB).	Poor to fair	Poor	Fair	Good	Poor
Watchaug (WgA, WgB)	Poor to fair	Poor to fair	Fair	Good	Poor
Whitman (Wp)	Poor	Poor	Poor [2]	Poor [2]	Not suitable
Wilbraham (Wr, Ws)	Poor	Poor	Poor [2]	Poor [2]	Not suitable
Woodbridge (WxA, WxB, WyA, WyB, WzA, WzC).	Poor to fair	Poor	Fair to 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, BsB)	Fair	Poor	Solum poor; substratum poor.	Solum poor; substratum fair.	Fair
Narragansett (NaA, NaB, NaC, NgB, NgC).	Fair	Poor to fair	Solum poor; substratum good.	Solum poor; substratum good.	Fair
Poquonock (PuA, PuB)	Poor to fair	Poor	Solum good; substratum poor.	Solum good; substratum fair.	Good
Rainbow (RaA, RaB, RbB)	Poor to fair	Poor	Solum poor; substratum poor.	Solum poor; substratum fair.	Poor
Wapping (WeA, WeB, WfB)	Poor to fair	Poor to fair	Solum poor; substratum good.	Solum poor; substratum good.	Poor

See footnotes at end of table.

engineering properties of soils

interpretation is not applicable]

Susceptibility to frost action	Soil features affecting— Construction of farm ponds: Impounding area	Soil features affecting— Construction of farm ponds: Embankments	Soil features affecting— Artificial drainage	Soil features affecting— Vertical alinement of roads
Low	Excessive seepage; soil too shallow and too steep.	Inadequate strength and stability; moderate permeability.	Natural drainage adequate	Shallowness over bedrock.
Low	Slow seepage	Adequate strength and stability; moderate permeability.	Natural drainage adequate	(1).
Low	Slow seepage	Adequate strength and stability; moderate permeability.	Natural drainage adequate	(1).
Low	Slow seepage	Adequate strength and stability; moderate permeability.	Natural drainage adequate	(1).
Low	Excessive seepage	Adequate strength and stability; rapid permeability.	Natural drainage adequate	(1).
Low	Excessive seepage; soil too shallow and too steep.	Inadequate strength and stability; moderate permeability.	Natural drainage adequate	Shallowness over bedrock.
High	Slow seepage when water table is low.	Adequate strength and stability; moderate permeability.	High water table; suitable for tile and open ditches.	(1).
Medium	Very slow seepage because of hardpan.	Stability only on mild slopes; substratum can be used for impermeable structures.	Natural drainage adequate	Subject to seepage and sliding above pan.
High	Very slow seepage because of hardpan.	Moderate stability: impermeable.	Perched water table; open drains better than tile.	(1).
Low	Shallowness to bedrock	Shallowness to bedrock		Shallowness to bedrock.
Medium	Moderate to excessive seepage.	Adequate strength and stability; moderate permeability.	Seasonally high water table; suitable for tile.	(1).
Medium	Moderate seepage when water table is low.	Adequate strength and stability; moderate permeability.	Seasonally high water table; suitable for tile and intercepting drainage ditches.	(1).
High	Very slow seepage because of permanently high water table.	Adequate strength and stability; variable permeability.	Permanently high water table; best suited to intercepting ditches and random ditches.	(1).
High	Slow to moderate seepage	Moderate strength and stability; moderate to slow permeability.	Perched water table; better suited to open drains than to tile.	(1).
Medium to high	Seepage very slow because of hardpan.	Moderate stability can be used for impervious structures.	Perched water table; better suited to intercepting ditches than to tile.	Subject to seepage and sliding above pan.
Medium	Very slow seepage because of hardpan.	Surface sand moderately stable; moderate permeability.	Perched water table; suitable for intercepting ditches and random tile.	Subject to seepage and sliding above pan.
Medium	Very slow seepage in underlying hardpan.	Surface silt unstable; moderate permeability.	Natural drainage adequate	Subject to seepage and sliding above pan.
Low	Excessive seepage	Surface silt unstable; moderate permeability.	Natural drainage adequate	Subject to erosion.
Low	Very slow seepage in underlying hardpan.	Surface sand has adequate strength and stability; rapid permeability.	Natural drainage adequate	Subject to seepage and sliding above pan.
Medium	Very slow seepage in underlying hardpan.	Surface silt unstable; moderate permeability.	Perched water table; suitable for intercepting ditches and random tile.	Subject to seepage and sliding above pan.
Medium	Excessive seepage	Surface silt unstable; moderate permeability.	Seasonal high water table; suitable for intercepting ditches and tile.	Subject to erosion.

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TABLE 6.—*Interpretations of*

Soil series and topographic positions	Estimated suitability for—				
	Topsoil	Sand and gravel	Road subgrade	Road fill	Winter grading
Soils on terraces—wind- and water-deposited materials:					
Agawam (AbA, AbB)	Fair	Fair to good	Good	Good	Good
Ellington (EfA)	Fair	Fair	Good	Good	Fair
Enfield (EsA, EsB, EtA, EtB)	Good	Good	Solum poor; substratum good.	Solum poor; substratum good.	Fair
Hartford (HdA, HdB, HfA, HfB)	Fair	Good	Good	Good	Good
Hinckley (HkA, HkC, HmC)	Poor	Good	Good	Good	Good
Jaffrey (JaC)	Poor	Good	Good	Good	Good
Manchester (MgA, MgC, MhC)	Poor	Good	Good	Good	Good
Merrimac (MrA, MrB, MyA, MyB)	Fair	Good	Good	Good	Good
Ninigret (NrA, NrB)	Fair to good	Poor	Good	Good	Fair
Raynham (Rc)	Fair	Poor	Fair to poor [2]	Fair [2]	Poor
Scarboro (Sf)	Poor	Poor	Fair to poor [2]	Fair [2]	Not suitable
Sudbury (SsA)	Fair	Fair	Good	Good	Fair
Terrace escarpments (Tg)	Not suitable	Good	Good	Good	Good
Tisbury (TsA)	Good	Fair	Solum poor; substratum good.	Solum poor; substratum good.	Poor
Walpole (Wd)	Fair	Fair	Good to poor [2]	Good to poor [2]	Poor
Windsor (WvB, WvC)	Poor	Fair	Good	Good	Fair
Alluvial soils:					
Alluvial land (Am)	Good to fair	Poor	Not suitable	Poor	Poor
Limerick (Lm)	Fair	Poor	Poor [2]	Poor [2]	Not suitable
Ondawa (On)	Fair	Poor	Good to fair	Good to fair	Fair
Podunk (Po)	Fair	Poor	Good to fair	Good to fair	Poor
Rumney (Ru)	Fair	Poor	Poor [2]	Poor [2]	Not suitable
Saco (Sa, Sb)	Poor	Poor	Poor [2]	Poor [2]	Not suitable
Winooski and Hadley (Ww)	Good	Poor	Poor [2]	Poor [2]	Poor
Organic soils:					
Peat and Muck (Pk, Pm)	Not suitable: can be used as a topsoil amendment.	Not suitable	Not suitable	Not suitable	Not suitable

[1] No special problems in vertical alinement.

engineering properties of soils—Continued

Susceptibility to frost action	Soil features affecting—			
	Construction of farm ponds		Artificial drainage	Vertical alinement of roads
	Impounding area	Embankments		
Low	Excessive seepage	Adequate strength and stability; rapid permeability.	Natural drainage adequate	(1).
Medium	Excessive seepage	Adequate strength and stability; rapid permeability.	Seasonally high water table; suitable for tile.	(1).
Low	Excessive seepage	Surface silt unstable; moderate permeability.	Natural drainage adequate	Subject to erosion.
Low	Excessive seepage	Adequate strength and stability; rapid permeability.	Natural drainage adequate	(1).
Low	Excessive seepage	Adequate strength and stability; very rapid permeability.	Natural drainage adequate	(1).
Low	Escessive seepage	Adequate strength and stability; very rapid permeability.	Natural drainage adequate	(1).
Low	Excessive seepage	Adequate strength and stability; very rapid permeability.	Natural drainage adequate	(1)
Low	Excessive seepage	Adequate strength and stability; rapid permeability.	Natural drainage adequate	(1).
Medium	Excessive seepage	Adequate strength and stability; rapid permeability.	Seasonally high water table; suitable for tile.	(1).
High	Excessive seepage when water table is low.	Adequate strength and stability; moderate permeability.	Seasonally high water table; suitable for tile and open ditches.	(1).
High	Moderate seepage	Adequate strength and stability; rapid permeability.	Permanently high water table; suitable for open ditches and tile.	(1).
Medium	Excessive seepage	Adequate strength and stability; rapid permeability.	Seasonally high water table; suitable for tile.	(1).
Low				
Medium	Excessive seepage	Surface silt unstable; moderate permeability.	Seasonally high water table; suitable for tile.	Subject to erosion.
High	Excessive seepage when water table is low.	Adequate strength and stability; rapid permeability.	High water table; suitable for open ditches and tile.	(1).
Low	Excessive seepage	Adequate strength and stability; rapid permeability.	Natural drainage adequate	(1).
Low to high				Subject to flooding.
High	Excessive seepage when water table is low.	Moderate strength and stability; rapid permeability.	High water table and flooding; best suited to random ditches.	Subject to flooding.
Low to medium	Excessive seepage	Moderate strength and stability; rapid permeability.	Natural drainage adequate	Subject to flooding.
High	Excessive seepage	Moderate strength and stability; rapid permeability.	High water table and flooding; suitable for open ditches and tile.	Subject to flooding.
High	Excessive seepage when water table is low.	Moderate strength and stability; rapid permeability.	High water table and flooding; best suited to random ditches.	Subject to flooding.
High	Moderate seepage when water table is low.	Moderate strength and stability; rapid permeability.	Permanent high water table and flooding; best suited to random ditches.	Subject to flooding.
High to medium	Excessive seepage	Moderate strength and stability; rapid permeability.	High water table and flooding; suitable for open ditches and tile.	Subject to flooding.
High	Very slow seepage when water table is low.	Very unstable	Permanently high water table; best suited to open ditches.	Subject to flooding.

[2] Excavation of material is difficult because of a high water table. If water can be controlled, the material is considered good to fair.

water table and create a more favorable balance between air and moisture in the soil. Soils that have impeded drainage and are underlain by loose and friable parent material generally are not difficult to drain by conventional tile systems. Soils with a slowly permeable hardpan are somewhat difficult to drain. Open, intercepting ditches are generally more effective for these soils than tile drains.

Drainage of peat and muck is not a common practice in the county, but in small areas, open ditches are generally used. Drainage by tile is more difficult. A tile system may be feasible following open ditching after the organic materials have settled or adjusted to the lowering of the water table. Suitable outlets are generally difficult to find for draining the peat and muck.

Urban Development

Tolland County is 20 miles east of the business district of Hartford, Connecticut, and the county adjoins the "urban core" towns of East Hartford and Manchester. Several towns in Tolland County—Ellington, Tolland, Vernon, Somers, Bolton, Andover, and Hebron—and the city of Rockville are considered outer suburbs within the capitol region planning district (*3*). The vast change in land use in the past decade has now extended into Tolland County. The location and the considerable area of vacant land suitable for development have contributed to the urbanization of many parts of the county. Vernon, Ellington, and Bolton have become the residential areas for many families who are employed within the urban core. Increased urbanization has also begun in Mansfield. This has been influenced by the expansion of the University of Connecticut at Storrs and by the nearby industrial city of Willimantic in Windham County.

Urban development in Tolland County is characterized by expansion of residential areas and of businesses that supply goods and services. For example, in Ellington, Vernon, Bolton, and Mansfield, new housing developments and shopping centers are common.

In this section of the report the information about soils is related specifically to urbanization and can be used by many persons and agencies concerned with urban development. It can be used by those who guide regional planning and by the town planning and zoning commissions that guide local planning. Regional planners are interested in soils from a broad viewpoint. Soil associations, landforms, and topography are their main consideration. The town planning and zoning commissions are interested in potential residential, industrial, and business sites, in lot subdivision, and in selection of school sites. Hence, they require more specific soil information, and they deal directly with soil mapping units. Tax assessors, building and loan officials, and real estate appraisers can also use the information about soils when they determine land values.

The estimates of soil properties that are related to urban use have evolved from field experience and from laboratory tests and field trials. *These estimates are best used as a guide for planning more detailed investigation. They cannot replace on-site investigation of specific tracts of land.*

Those who are choosing a site for a house, a factory, a shopping center, or a school have many factors to consider. They need information about soils to determine construction problems and to estimate costs. Some of the primary factors to consider are excavation of foundations, soil stability, operation of equipment, drainage, and installation of waste-disposal systems that perform satisfactorily within the limits of local sanitary regulations.

The potential homeowner probably considers pleasant surroundings and distance to work of more immediate importance than a septic tank that works or a basement that is constantly dry. To the town planning, zoning, and health officials, however, septic tank performance and natural drainage are important factors to consider in guiding local development and in guarding public health.

Septic tank fields

In areas without sewers, waste is commonly disposed of by a septic tank or cesspool. Many soils have characteristics that prohibit or seriously limit the use of such disposal systems. There are several kinds of disposal systems, and thorough on-site investigation is necessary to determine which is best. The most common system installed is the septic tank system. It consists of three parts: (1) The settling tank that receives waste from the house, (2) a distribution box that distributes liquid effluent evenly into two or three tile lines, and (3) a leaching, or drainage field to dispose of the liquid effluent.

The location of the septic tank and the size of the tank and the drainage field are determined by the size of the house and by the effectiveness of the soil in permitting percolation of effluent. Field percolation tests and high water table measurements are necessary to determine the effectiveness of the soil. An unsuitable percolation rate, a high water table, and flooding cause most septic tank failures, although failures may also be the result of faulty construction and improper use and maintenance.

In current studies at the Connecticut Agricultural Experiment Station, New Haven, soil percolation rates are being measured on different soil types. Although the studies are not complete and cannot be evaluated in full in this survey report, several field observations are worthy of note at this time. The soils that have been examined so far are those with a compact layer (fragipan). The following information is best related to the well-drained Broadbrook and Paxton soils that have a compact layer. The moderately well drained Rainbow and Woodbridge soils that have a compact layer were not directly studied, but the information would also be applicable to them.

The percolation of water through a compact layer is restricted to a varying degree, and water is likely to move laterally over the restricting layer. The rate of lateral flow depends largely upon the slope of the land. In flat areas, the water moves very slowly and often stagnates. On steeper slopes, it moves faster, generally along preferred subsurface channels. Often it seeps out along lower slopes, if the compact layer is close to the surface. The downward movement of water through the compact layer is generally restricted to natural crevasses and structural cracks, which are few in number. Percolation rates within the compact layer seldom exceed one inch per hour. The mean percolation rate is less than 0.1 inch per hour.

The percolation rates in the soil layers above the compact layer are generally greater and exceed 2 inches per hour in 60 percent of the test holes. The tests were performed in cultivated fields only and may vary somewhat from those in forested sites.

Tile lines of septic tank drainage fields placed in soils that have a compact layer are subject to more frequent failure than those placed in soils without such a layer. Because of slow percolation, tile lines placed within a compact layer do not function properly. Tile lines placed above a compact layer may work satisfactorily during the summer, but from late in fall to late in spring, the probability of failure increases if a perched water table is formed. The depth to the perched water table or zone of soil saturation is critical according to the depth to the base of the leaching field. The zone of saturation is more apt to be closer to the surface as the slope of the land decreases. If the water table rises above the tile line and floods the drainage field, a *backup* will occur. This condition may last several hours or even weeks.

As a general rule, if the compact layer is within 30 inches of the surface, the site has severe limitations for septic tank systems; if this layer is below 30 inches and the percolation rates are satisfactory to a depth of 36 inches, the site may permit disposal of septic tank effluent. If a compact layer is present at any site, percolation tests should be conducted and the depth to the water table should be measured.

Percolation tests should be conducted when the soil is at its maximum water content. The early spring months are best, because measurements of the water table can also be made at that time. Percolation rates of some soils vary considerably throughout the year. Percolation rates determined when the soil moisture is low are in many cases considerably higher than those determined early in spring. This may lead to erroneous conclusions regarding the size and design of septic tank systems, especially on soils that are marginal for on-lot waste disposal.

Where possible, the septic tank system should be placed in natural soil. Systems placed in fill material may fail unless sufficient time has passed to allow natural settling. Fill material that contains much silt and clay is less satisfactory than permeable fill from sandy, gravelly till or stratified water-laid deposits. Before the installation of a waste disposal system in poorly and very poorly drained areas, it is necessary to provide fill that is permeable and deep enough after placement to allow drainage of effluent.

The effects of soils on urban development

The soil mapping units of Tolland County have been placed in 14 groups according to their suitability for urban use. The soils in each group have similar limitations for urban development. In table 7 each group is rated according to the limitations of the soils for (1) septic tank effluent disposal, (2) excavation for foundations, (3) operation of construction equipment, and (4) foundation drainage; and soil properties that affect urban development are summarized. The limitations are defined in the following paragraphs.

Septic tank effluent disposal.—The limitations of soils for septic tank effluent disposal are based on (1) soil permeability, (2) depth to a temporary or permanent high water table, (3) depth to bedrock, (4) steepness of slope, (5) periodic flooding, and (6) surface stones and boulders that affect installation.

The degree of limitation is *slight* if no appreciable problems are expected. Soils that have slight limitations are generally level to gently sloping, and the percolation rate is satisfactory. Some soils in this category are underlain by stratified sand and gravel, which may allow contamination of water in nearby wells. Some soils may have a slowly permeable, compact layer below a depth of 30 inches.

The limitation is *moderate* if the soils have a satisfactory percolation rate but are limited by (1) a temporarily high water table early in spring or after a prolonged, heavy rainfall; or (2) slopes of 8 to 15 percent that make layout of septic tank systems difficult, especially where a slowly permeable, compact layer is at a depth below 30 inches.

The limitation is *severe* if on-site effluent disposal systems cannot be used without extensive corrective measures. The soils are severely limited by (1) a slowly permeable, compact layer within a depth of 30 inches; (2) bedrock within a depth of 36 inches; (3) a high water table most of the year; (4) slopes greater than 15 percent; or (5) frequent flooding.

Excavation for foundations.—Soils are limited for excavation mainly by bedrock, large boulders, a high water table, and to some extent, slope gradient.

The degree of limitation is *slight* if there are no appreciable excavation problems. In sandy material, however, deep trenches or foundations may have to be shored up to prevent cave-ins. Bedrock is normally at a depth greater than 10 feet, although a few large boulders or outcrops may occur.

The limitation is moderate if the soils have (1) a temporarily high water table early in the spring or after a prolonged, heavy rainfall; (2) seepage along a slowly permeable, compact layer; (3) bedrock, normally below 5 feet, but at a shallower depth and on the surface in places; or (4) many large boulders.

The limitation is *severe* if the soils are (1) generally less than 20 inches in depth to bedrock, although deeper pockets occur; (2) ponded much of the year and have a perennial high water table that rarely drops below 24 inches from the surface, or (3) on slopes of 15 to 35 percent.

Operation of construction equipment.—Soils are limited for the operation of construction equipment mainly by (1) restrictions to earth-moving equipment; (2) difficulties in secondary road construction and maintenance; and (3) the need for bank stabilization and erosion control on sloping areas. The degree of limitation is *slight* if no appreciable problems are involved, but some erosion control may be necessary to stabilize areas under construction. The soils have (1) slopes that range from 0 to 8 percent, (2) a temporarily high water table in the spring or after a prolonged, heavy rainfall, or (3) a few boulders or bedrock outcrops.

The limitation is *moderate* if the soils have (1) slopes that range from 8 to 15 percent, and bank stabilization

TABLE 7.—*Rating of soils*

Urban group	Map symbols	Estimated degree and
		Septic tank effluent disposal
Group 1: Deep, well-drained to excessively drained soils mostly on slopes of 0 to 8 percent on terraces; underlain by deep sand or stratified sand and gravel.	AbA, AbB; EsA, EsB, EtA, EtB; HdA, HdB, HfA, HfB; HkA, HkC, HmC, JaC; MgA, MgC, MhC; MrA, MrB, MyA, MyB; WvB, WvC.	*Slight;* rapidly permeable substratum may present pollution problems for shallow wells.
Group 2: Deep, well-drained sandy loam to silt loam soils on upland slopes of 0 to 8 percent; underlain by glacial till.	BtB; CaA, CaB, ChB; CsA, CsB, CtB; GaB, GbB; NaA, NaB, NgB.	*Slight;* compact layer may be present at a depth below 30 inches.[2]
Group 3: Deep, well-drained sandy loam to silt loam soils on upland slopes, mostly from 8 to 15 percent; underlain by glacial till.	BvC, CaC, ChC; CsC, CsC2, CtC; GaC, GbC; NaC, NgC.	*Moderate;* slopes of 8 to 15 percent; compact layer may be present at a depth below 30 inches.[2]
Group 4: Deep, well-drained, very stony soils on upland slopes of 3 to 15 percent; underlain by glacial till.	ByC; CrC, GeC	*Moderate;* slopes of 3 to 15 percent; many surface stones and boulders; compact layer may be present at a depth below 30 inches.[2]
Group 5: Deep, moderately well drained sandy to silty soils on slopes of 0 to 8 percent; underlain by glacial till in uplands and by stratified sand and gravel on terraces.	EfA; NrA, NrB; SsA; SvA, SvB, SwA, SwB, SxA; TsA; WeA, WeB, WfB; WgA, WgB.	*Moderate;* seasonally high water table; some ponding on more nearly level areas.
Group 6: Deep, well-drained sandy loam to silt loam soils with a compact layer within a depth of 30 inches; on upland slopes of 0 to 8 percent; underlain by glacial till.	BrA, BrB, BsB; PbA, PbB, PdB; PuA, PuB.	*Severe;* slowly permeable, compact layer within 30 inches of surface.
Group 7: Deep, well-drained, nonstony to very stony soils with a compact layer within a depth of 30 inches; on upland slopes of 3 to 15 percent; underlain by glacial till.	PbC, PdC, PeC	*Severe;* slowly permeable, compact layer within 30 inches of surface; slopes of 3 to 15 percent.
Group 8: Deep, well-drained nonstony to very stony soils, some with a compact layer within a depth of 30 inches; on upland slopes exceeding 15 percent; underlain by glacial till.	ByD; CaD, ChD, CrD; CsD2; GeE; PbD, PdD, PeD.	*Severe;* slopes of 15 to 35 percent; some soils have a slowly permeable layer within 30 inches; others have a compact layer below 30 inches in places.
Group 9: Deep, moderately well drained soils with a compact layer within a depth of 30 inches; on upland slopes of 0 to 8 percent; underlain by glacial till.	BhA, BhB; RaA, RaB, RbB; WxA, WxB, WyA, WyB.	*Severe;* slowly permeable, compact layer within 30 inches of surface; seasonally high water table; some ponding on nearly level areas.
Group 10: Deep, moderately well drained very stony soils, some with a compact layer within a depth of 30 inches; on upland slopes of 0 to 15 percent; underlain by glacial till.	SxB; WzA, WzC	*Severe;* seasonally high water table; some ponding on more nearly level areas; the Woodbridge soils have a slowly permeable, compact layer within 30 inches of surface; many surface stones and boulders.
Group 11: Shallow, somewhat excessively drained, rocky to extremely rocky soils, with many bedrock outcrops, on upland slopes of 0 to 35 percent.	BnC, BnD, BpC, BpD; HoC, HrC, HrE, HxC, HxE; Rk.	*Severe;* bedrock generally within 20 inches of surface.
Group 12: Deep, poorly drained nonstony to very stony soils in nearly level areas along natural drainageways and in depressions; underlain by glacial till in uplands and by stratified, water-laid deposits on terraces.	Lc, Le, Lg; Rc, ; Wd; Wr, Ws.	*Severe;* high water table lasts into early summer; temporary ponding of runoff.

See footnotes at end of table.

for urban development [1]

major kinds of limitations for—

Excavation for foundations	Operation of construction equipment	Foundation drainage
Slight; shoring up deep trenches may be necessary in sandy material.	*Slight to moderate;* slopes of 0 to 15 percent.	*Slight;* low areas bordering flood plains are flooded infrequently during extremely high floods.
Slight; a few surface boulders or bedrock outcrops in places.	*Slight;* slopes of 0 to 8 percent	*Slight;* compact layer may be present at a depth below 30 inches.
Slight; a few surface boulders or bedrock outcrops in places.	*Moderate;* slopes of 8 to 15 percent	*Slight;* compact layer may be present at a depth below 30 inches.
Moderate; many surface stones and boulders; a few bedrock outcrops in places.	*Slight to moderate;* slopes of 3 to 15 percent; many surface stones and boulders.	*Slight;* compact layer may be present at a depth below 30 inches.
Moderate; seasonally high water table; seepage; ponding of surface runoff; a few surface boulders or bedrock outcrops in places; shoring up deep trenches may be necessary in sandy soils.	*Slight;* slopes of 0 to 8 percent; seasonally high water table; some ponding on more nearly level areas.	*Moderate;* seasonally high water table; seepage; some ponding on more nearly level areas (1 to 5 days duration); low areas of the Ellington, Ninigret, Sudbury, and Tisbury soils that border flood plains are flooded infrequently during extremely high floods.
Slight; a few surface boulders or bedrock outcrops in places.	*Slight;* slopes of 0 to 8 percent	*Moderate;* seepage along slowly permeable, compact layers within 30 inches of surface.
Moderate; a few to many surface stones and boulders; some bedrock outcrops in places; slopes of 3 to 15 percent.	*Moderate;* slopes of 3 to 15 percent	*Moderate;* seepage along slowly permeable, compact layer within 30 inches of surface.
Severe; slopes of 15 to 35 percent; many surface stones and boulders; a few bedrock outcrops in places.	*Severe;* slopes of 15 to 35 percent; many surface stones and boulders.	*Slight to moderate;* compact layer within 30 inches in some areas and may be present below 30 inches in others; seepage problems vary with depth to compact layer.
Moderate; seepage along slowly compact layer that is within 30 inches of surface; temporarily high water table; some ponding of surface runoff; a few surface stones and boulders.	*Slight;* slopes of 0 to 8 percent; seasonally high water table; some ponding on more nearly level areas.	*Moderate;* seasonally high water table; some ponding of surface runoff on nearly level areas (1 to 5 days duration); seepage along slowly permeable, compact layer within 30 inches of surface.
Moderate; temporarily high water table; seepage along compact layer within 30 inches of surface; ponding of surface runoff; many surface stones and boulders.	*Slight to moderate;* slopes of 0 to 15 percent; seasonally high water table; some ponding on nearly level areas; many surface stones and boulders.	*Moderate;* seasonally high water table; some ponding of surface runoff on nearly level areas (1 to 5 days duration); seepage along slowly permeable, compact layer within 30 inches of surface in Woodbridge soils.
Severe; bedrock extensive at a shallow depth; many bedrock outcrops.	*Moderate to severe;* slopes of 3 to 35 percent; many bedrock outcrops; bedrock extensive at a shallow depth.	*Moderate;* seepage along bedrock.
Severe; high water table lasts into early summer; temporary ponding of runoff.	*Moderate;* high water table lasts into early summer; temporary ponding of runoff.	*Severe;* high water table lasts into early summer temporary ponding of runoff (may exceed 5 days duration).

TABLE 7.—*Rating of soils for*

Urban group	Map symbols	Estimated degree and
		Septic tank effluent disposal
Group 13: Deep, very poorly drained mineral and organic soils on nearly level areas; underlain by glacial till in uplands and by stratified, water-laid deposits on terraces.	Pk, Pm; Sf; Wp	*Severe;* high water table nearly year round; ponding of runoff.
Group 14: Deep, well drained to very poorly drained soils on flood plains subject to flooding.	Am; Lm; On; Po; Ru; Sa, Sb; Ww.	*Severe;* subject to stream flooding

[1] Borrow and fill land, Made land, and Terrace escarpments have not been assigned to groups because of extreme variability of soil properties.

and erosion control are necessary; (2) many surface stones and boulders; or (3) a high water table that lasts until early in summer.

The limitation is *severe* if the soils have (1) slopes that are greater than 15 percent and require bank stabilization and erosion control that is costly and may not be successful; (2) a high water table that lasts nearly the year round in areas of mineral or organic materials; or (3) many bedrock outcrops and extensive areas where bedrock is at a shallow depth.

Foundation drainage.—Wet basements and poor drainage around foundations are directly related to (1) bedrock or a compact layer of soil; (2) a temporarily or permanently high water table as a result of excessive collection of surface runoff on lower slopes or in depressional areas; or (3) frequent flooding.

The degree of limitation is *slight* if no appreciable problems are involved. Some soils may have a compact layer below a depth of 30 inches, but drainage problems rarely occur with deep structures. Some low areas along streams may be flooded infrequently.

The limitation is *moderate* if there is (1) seepage along a slowly permeable, compact layer within 30 inches of the surface or along bedrock within the excavation depth; (2) a temporarily high water table early in spring or after a prolonged, heavy rainfall.

The limitation is *severe* if there is (1) a high water table that rarely drops below 24 inches from the surface or (2) frequent flooding that inundates basements.

Urban groups of soils

In this subsection the soils are placed in urban groups, the soil properties of each group are briefly described, and the limitations that affect urban development are discussed.

Within the mapping units in each urban group, there may be inclusions of other soils and, therefore, local variations in soil properties that require on-site examination. The significant inclusions are mentioned in the description of each mapping unit in the section "Descriptions of Soils."

Borrow and fill land and Made land have not been placed in the urban groups. These land types vary so much from one location to another that special on-site investigations are necessary to evaluate their usefulness for specific purposes.

URBAN GROUP 1

This group consists of well-drained to excessively drained soils that formed in deep sand and in deposits of sand and gravel. The soils are—

Agawam sandy loam, 0 to 3 percent slopes.
Agawam sandy loam, 3 to 8 percent slopes.
Enfield silt loam, 0 to 3 percent slopes.
Enfield silt loam, 3 to 8 percent slopes.
Enfield silt loam, shallow, 0 to 3 percent slopes.
Enfield silt loam, shallow, 3 to 8 percent slopes.
Hartford fine sandy loam, 0 to 3 percent slopes.
Hartford fine sandy loam, 3 to 8 percent slopes.
Hartford sandy loam, 0 to 3 percent slopes.
Hartford sandy loam, 3 to 8 percent slopes.
Hinckley gravelly sandy loam, 0 to 3 percent slopes.
Hinckley gravelly sandy loam, 3 to 15 percent slopes.
Hinckley gravelly loamy sand, 3 to 15 percent slopes.
Jaffrey gravelly sandy loam and loamy sand, 3 to 15 percent slopes.
Manchester gravelly sandy loam, 0 to 3 percent slopes.
Manchester gravelly sandy loam, 3 to 15 percent slopes.
Manchester gravelly loamy sand, 3 to 15 percent slopes.
Merrimac fine sandy loam, 0 to 3 percent slopes.
Merrimac fine sandy loam, 3 to 8 percent slopes.
Merrimac sandy loam, 0 to 3 percent slopes.
Merrimac sandy loam, 3 to 8 percent slopes.
Windsor loamy sand, 3 to 8 percent slopes.
Windsor loamy sand, 8 to 15 percent slopes.

These soils have few limitations for urban development. Slopes are dominantly less than 8 percent, although some are as much as 15 percent. The Agawam, Enfield, Hartford, and Merrimac soils are suitable for important cash crops grown in the county. Competition for this cropland has increased in the past decade. The Hinckley, Jaffrey, Manchester, and Windsor soils are droughty and somewhat marginal for agriculture.

Septic tank performance in these soils is generally very good. Percolation rates are moderate to rapid in the solum and very rapid in the substratum. Failures are rare and usually not related to soil properties; however, excessive drainage in the substratum may infrequently contaminate domestic wells. Because internal drainage is good, basements are generally dry.

urban development [1]—Continued

major kinds of limitations for—

Excavation for foundations	Operation of construction equipment	Foundation drainage
Severe; high water table nearly year round; ponding of runoff.	*Severe;* high water table nearly year round; ponding of runoff.	*Severe;* high water table nearly year round; ponding of runoff (exceeds 30 days).
Slight to severe; soils range from having no high water table to having nearly year-round high water table; subject to flooding.	*Slight to severe;* soils range from having no high water table to having nearly year-round high water table; subject to flooding.	*Severe;* subject to flooding; soils range from having no high water table to having nearly year-round high water table.

[2] The limitation may be severe if a compact layer occurs below a depth of 30 inches and interferes with flow of effluent.

Slope limitations are moderate on the Hinckley, Jaffrey, Manchester, and Windsor soils, all on slopes of 8 to 15 percent, but the limitations are slight on the other soils. Erosion is not considered a problem on these coarse soils. Lawns, and also shrubs and other plants, sometimes lack moisture in the summer months. Some erosion may occur on Enfield silt loam on slopes greater than 3 percent. Although slope protection is necessary after seeding, lawns are more easily established on Enfield soils because of their high moisture-holding capacity.

Excavation is not limited by bedrock or stoniness. Cobbles and small boulders are common in Hinckley, Jaffrey, and Manchester soils but rarely exceed 3 feet in diameter. Shoring up of deep trenches may be necessary to prevent cave-ins. Flooding is not a significant problem on these soils. Low areas may be flooded infrequently for short periods.

URBAN GROUP 2

This group consists of deep, friable, well-drained soils that formed in glacial till.

Brookfield fine sandy loam, 3 to 8 percent slopes.
Charlton fine sandy loam, 0 to 3 percent slopes.
Charlton fine sandy loam, 3 to 8 percent slopes.
Charlton stony fine sandy loam, 3 to 8 percent slopes.
Cheshire fine sandy loam, 0 to 3 percent slopes.
Cheshire fine sandy loam, 3 to 8 percent slopes.
Cheshire stony fine sandy loam, 3 to 8 percent slopes.
Gloucester sandy loam, 3 to 8 percent slopes.
Gloucester stony sandy loam, 3 to 8 percent slopes.
Narragansett silt loam, 0 to 3 percent slopes.
Narragansett silt loam, 3 to 8 percent slopes.
Narragansett stony silt loam, 3 to 8 percent slopes.

The soils of this group have a surface layer of fine sandy loam or sandy loam, except the Narragansett soils, which have a silt loam surface layer. The substratum is somewhat coarser than the surface layer and is generally firm to very friable gravelly fine sandy loam to gravelly loamy sand or sand. Slopes are less than 8 percent. In some areas these soils have a compact layer that is below a depth of 30 inches.

The percolation rates of substratum materials are generally favorable for septic tank disposal fields. Where there is no compact layer, internal drainage is rapid. If septic tank failure occurs, it is usually during early spring thaws and generally is caused by a compact layer in the soil. Each site should be investigated to detect this layer and to determine the placement of the disposal field.

Excavation limitations are slight. A few large boulders are present in some places, especially in the stony phases. Many areas mapped as nonstony have had surface stones removed, but below the surface, the soils may contain many stones of various sizes. Outcrops of bedrock are not common, but they occur in places. The depth to bedrock varies but generally is more than 10 feet.

Slope limitations are slight. On unprotected slopes, the medium-textured Narragansett silt loam is more likely to erode than the moderately coarse Brookfield, Charlton, Cheshire, and Gloucester soils. Lawns are readily established on all soils except the Gloucester, which tend to be droughty. Removal of surface stones may be a slight problem on the stony phases.

URBAN GROUP 3

The soils of this group are similar to those of group 2, except that they are steeper. The soils are—

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

Permeability is generally adequate for on-lot disposal of waste. A septic tank disposal field is more difficult to establish on these soils than on less sloping soils, and in many places, special design is necessary. If the drainage field is too shallow or there is a compact layer below a depth of 30 inches, effluent may seep to the surface downslope.

Minor internal drainage problems may occur early in spring in areas where there is a compact layer.

Excavation difficulties are slight. Large boulders and bedrock outcrops interfere in places. Slope limitations are moderate, and in disturbed areas, considerable attention is required to control erosion. Lawns are difficult to establish on these slopes, especially on Narragansett silt loam. Many slopes are difficult to stabilize. When turf is established, the soil is often seeded and covered with straw mulch or cloth netting to minimize soil erosion. An area can be stabilized with cut sod in a short time.

URBAN GROUP 4

The very stony phases of Brookfield, Charlton, and Gloucester soils on slopes of less than 15 percent are in this group. The soils are—

- Brookfield very stony fine sandy loam, 3 to 15 percent slopes.
- Charlton very stony fine sandy loam, 3 to 15 percent slopes.
- Gloucester and Charlton very stony soils, 3 to 15 percent slopes.

The many stones on these soils limit their use. The soils have moderate limitations for septic tank drainage fields. They have adequate permeability, but septic tank systems are difficult to install because of the slopes and the stones on the surface. The size of the stones ranges from 10 inches to 10 feet or more.

Excavation of foundations may be difficult if there are bedrock outcrops or many large stones. Surface stones must be removed before lawns can be established.

Slope limitations range from slight to moderate. A lawn is more difficult to establish on the more steeply sloping areas and may require considerable erosion control.

URBAN GROUP 5

This group consists of moderately well drained, moderately coarse textured to medium textured soils formed in glacial till and stratified sand and gravel. They are on slopes of less than 8 percent.

- Ellington fine sandy loam, 0 to 3 percent slopes.
- Ninigret sandy loam, 0 to 3 percent slopes.
- Ninigret sandy loam, 3 to 8 percent slopes.
- Sudbury fine sandy loam, 0 to 6 percent slopes.
- Sutton fine sandy loam, 0 to 3 percent slopes.
- Sutton fine sandy loam, 3 to 8 percent slopes.
- Sutton stony fine sandy loam, 0 to 3 percent slopes.
- Sutton stony fine sandy loam, 3 to 8 percent slopes.
- Sutton very stony fine sandy loam, 0 to 3 percent slopes.
- Tisbury silt loam, 0 to 3 percent slopes.
- Wapping silt loam, 0 to 3 percent slopes.
- Wapping silt loam, 3 to 8 percent slopes.
- Wapping stony silt loam, 3 to 8 percent slopes.
- Watchaug fine sandy loam, 0 to 3 percent slopes.
- Watchaug fine sandy loam, 3 to 8 percent slopes.

These soils have moderate limitations for septic tank disposal systems. The subsoil and substratum are permeable enough for septic tank drainage, but a high water table may occur from late in fall to late in spring and hinder normal operation. In some areas, the Sutton, Wapping, and Watchaug soils have a compact layer at a depth below 30 inches. In these soils malfunctions are sometimes persistent, and there may be some surface seepage. In the Ellington, Ninigret, Sudbury, and Tisbury soils, the fluctuation of the water table is rapid. Septic tank effluent may back up if the water table rises above the tile system. The water table generally rises to within 30 inches of the surface early in spring and late in fall.

Internal drainage problems are common late in fall and in spring. Consequently, basements may get wet when the water table rises.

Excavation difficulties are moderate. Some stony areas have a few large surface boulders or bedrock outcrops. Seepage in foundation holes and trenches may hinder construction. In the Ellington, Ninigret, Sudbury, and Tisbury soils, deep trenches must be shored to prevent slumping and cave-ins.

Slope limitations are slight. Moderate erosion occurs on the silty Tisbury and Wapping soils that are on slopes greater than 3 percent. Newly seeded areas should be protected with cloth or mulch to prevent erosion. Stripped areas should be stabilized by vegetation as soon as possible. Ponding may occur after severe storms, but the water generally disappears quite rapidly. If the soils are frozen, however, they may be ponded for several days during spring thaws.

URBAN GROUP 6

This group consists of well-drained, moderately coarse textured and medium textured soils that have a compact layer at a depth generally less than 30 inches. The soils are—

- Broadbrook silt loam, 0 to 3 percent slopes.
- Broadbrook silt loam, 3 to 8 percent slopes.
- Broadbrook stony silt loam, 3 to 8 percent slopes.
- Paxton fine sandy loam, 0 to 3 percent slopes.
- Paxton fine sandy loam, 3 to 8 percent slopes.
- Paxton stony fine sandy loam, 3 to 8 percent slopes.
- Poquonock sandy loam, 0 to 3 percent slopes.
- Poquonock sandy loam, 3 to 8 percent slopes.

All of these soils have slopes that are less than 8 percent. They are all moderately permeable above the compact layer, except the Poquonock soils, which are rapidly permeable. The compact layer in the substratum is very slowly permeable.

The limitations of these soils for septic tank systems are severe. The success of a septic tank drainage field depends upon its location and depth in relation to the compact layer. If the compact layer is at a shallow depth and the septic tank system, because of minimum depth requirements, must be installed within the compact layer, this slowly permeable layer will not permit satisfactory seepage of effluent. Consequently, surface seepage and backups in the house are common. Increasing the size of the drainage fields sometimes compensates for slow soil permeability, but solids or bacterial residue from the septic tank may clog the small pores of the compact soil. Frequent inspections and cleaning of the tank may be necessary to prevent such failure. If the drainage field becomes clogged, it generally has to be relocated.

Although these soils are well drained, the slowly permeable layer creates moderate internal drainage problems. Restricted drainage usually occurs in the spring. The position of the soil on the slope is important. More problems occur on middle and lower slopes than on upper slopes. Basements may get wet if foundation drainage is not adequate during the spring when the soils are saturated. Sump pumps may be necessary to remove water from the basement.

Excavation difficulties are few. A few large surface boulders and bedrock outcrops occur in some places in these soils. The compact glacial till on which the soils have formed is generally several tens of feet thick.

Slope limitations are few. On slopes greater than 3 percent, the Paxton and Broadbrook soils are more subject to erosion than the Poquonock soils. In many places slope stabilization is necessary during construction. Secondary road construction and maintenance are difficult in some places because of slow internal drainage. Frost heaving may occur if subgrade materials are not adequately drained. Road surfaces formed by oil penetration techniques are subject to frost heaving.

URBAN GROUP 7

The soils of this group are similar to those of group 6 but are steeper, except for some areas of the Paxton very stony fine sandy loam, 3 to 15 percent slopes. The soils are—

- Paxton fine sandy loam, 8 to 15 percent slopes.
- Paxton stony fine sandy loam, 8 to 15 percent slopes.
- Paxton very stony fine sandy loam, 3 to 15 percent slopes.

These soils have severe limitations for use as septic tank drainage fields. The compact layer occurs at a depth of less than 30 inches and is very slowly permeable. Surface seepage of septic tank effluent is common on these steeper slopes. Septic tank systems on these soils are difficult to install and require special design.

Internal drainage problems occur when water moves laterally over the compact layer early in the spring or late in the fall. Drainage problems generally are less severe on upper slopes than on middle or lower slopes. Wet basements are common in the spring.

Excavation difficulty is moderate. Bedrock outcrops or large surface boulders occur in places on the Paxton fine sandy loam and stony fine sandy loam. Many stones and some boulders and bedrock outcrops occur on the very stony phase of the Paxton soils. Seepage may occur in foundation holes and trenches and hinder building operations.

Slope limitations are moderate. Slopes in disturbed areas should be protected by mulch or cloth to prevent erosion. Cut sod may be necessary to stabilize slopes.

Road construction and maintenance are difficult on these slopes. Adequate drainage of road subgrade is necessary to prevent frost heaving. Road surfaces formed by oil penetration techniques are especially subject to heaving.

URBAN GROUP 8

This group consists of the well-drained soils that formed in glacial till and have slopes exceeding 15 percent. The soils are—

- Brookfield very stony fine sandy loam, 15 to 25 percent slopes.
- Charlton fine sandy loam, 15 to 25 percent slopes.
- Charlton stony fine sandy loam, 15 to 25 percent slopes.
- Charlton very stony fine sandy loam, 15 to 25 percent slopes.
- Cheshire fine sandy loam, 15 to 25 percent slopes, eroded.
- Gloucester and Charlton very stony soils, 15 to 35 percent slopes.
- Paxton fine sandy loam, 15 to 25 percent slopes.
- Paxton stony fine sandy loam, 15 to 25 percent slopes.
- Paxton very stony fine sandy loam, 15 to 25 percent slopes.

The nonstony phases of these soils have had surface stones removed for cultivation or pasture. The stony and very stony phases have many surface boulders and a few bedrock outcrops. The Paxton soils are underlain by a compact layer at a depth less than 30 inches, and such a layer may be present at a depth exceeding 30 inches in some areas of the Brookfield, Charlton, and Gloucester soils. These soils are mostly wooded or in pasture and are rarely used for urban development, except for major roadbuilding.

These soils have severe limitations for septic tank systems. The systems are extremely difficult to install because of steep slopes, the presence of a compact layer, or excessive stoniness.

Drainage problems may occur on the Paxton soils, especially in seepage areas along lower slopes. The steep slopes hinder operation of equipment, excavation, and other construction activities.

URBAN GROUP 9

The soils of this group are moderately well drained and have a compact layer at a depth less than 30 inches. Slopes are less than 8 percent. The soils are—

- Birchwood sandy loam, 0 to 3 percent slopes.
- Birchwood sandy loam, 3 to 8 percent slopes.
- Rainbow silt loam, 0 to 3 percent slopes.
- Rainbow silt loam, 3 to 8 percent slopes.
- Rainbow stony silt loam, 0 to 6 percent slopes.
- Woodbridge fine sandy loam, 0 to 3 percent slopes.
- Woodbridge fine sandy loam, 3 to 8 percent slopes.
- Woodbridge stony fine sandy loam, 0 to 3 percent slopes.
- Woodbridge stony fine sandy loam, 3 to 8 percent slopes.

These soils have severe limitations for septic tank drainage fields. The compact layer is slowly permeable, and lateral movement of water over it is slow. A high water table, which develops late in fall and persists through spring or early summer, hinders normal septic tank operation. Surface seepage and backups are common during these periods.

Internal drainage problems are caused by the compact layer. Seepage is common in excavations that intersect the compact layer. Basements are frequently wet.

Excavation is moderately difficult. Bedrock outcrops or large surface boulders occur in some places. Excessive seepage in foundation holes and trenches may hinder building operations.

Slope limitations are slight. Erosion control may be necessary in disturbed areas of the Woodbridge and Rainbow soils on slopes greater than 3 percent. Cloth or mulch may be needed to help establish lawns or slopes.

Road construction and maintenance are difficult. Adequate subsurface drainage must be provided to prevent frost heaving late in winter and early in spring.

These soils are sometimes ponded during intensive rainfall or during spring thaws when they are still frozen.

URBAN GROUP 10

This group consists of the very stony phases of the moderately well drained soils that formed in glacial till. Slopes are less than 15 percent. The soils are—

- Sutton very stony fine sandy loam, 3 to 15 percent slopes.
- Woodbridge very stony fine sandy loam, 0 to 3 percent slopes.
- Woodbridge very stony fine sandy loam, 3 to 15 percent slopes.

The Woodbridge soils have a slowly permeable, compact layer within a depth of 30 inches, but the Sutton soil does not. Some areas of the Sutton soil, however, have a compact layer below a depth of 30 inches.

The soils have severe limitations for septic tank drainage fields. A high water table, usually at a depth of less than 24 inches, may flood the drainage field from late in fall to late in spring and cause backups and surface seepage of effluent. Many surface stones and boulders hinder the installation of drainage fields.

These areas have internal drainage problems. Wet basements are common.

Excavation difficulties, in some places, are caused by bedrock outcrops or large surface boulders. The high water table in the spring often causes seepage into foundation holes and trenches.

Slope limitations are slight to moderate. The Woodbridge soils on slopes greater than 3 percent are likely to erode and should be stabilized. Removal of stones is generally necessary before a lawn can be established.

URBAN GROUP 11

This group consists of Rock land and very rocky and extremely rocky, shallow soils that are generally less than 20 inches in depth to bedrock. They are—

Brimfield very rocky fine sandy loam, 3 to 15 percent slopes.
Brimfield very rocky fine sandy loam, 15 to 25 percent slopes.
Brimfield extremely rocky fine sandy loam, 3 to 15 percent slopes.
Brimfield extremely rocky fine sandy loam, 15 to 25 percent slopes.
Hollis rocky fine sandy loam, 3 to 15 percent slopes.
Hollis very rocky fine sandy loam, 3 to 15 percent slopes.
Hollis very rocky fine sandy loam, 15 to 35 percent slopes.
Hollis extremely rocky fine sandy loam, 3 to 15 percent slopes.
Hollis extremely rocky fine sandy loam, 15 to 35 percent slopes.
Rock land.

Bedrock outcrops occupy 5 to 50 percent of the Brimfield and Hollis soils and more than 50 percent of the Rock land. The slopes generally range from 3 to 35 percent, but they are steeper in places.

These soils are not suitable for extensive urban development. Shallowness severely limits the installation of septic tank systems, but some small areas have scattered inclusions of deeper soil on which dwellings can be built. Only by detailed examination can the location and extent of these patches of deeper soil be determined.

Internal drainage problems are few. Local temporary ponding occurs if water cannot seep through cracks in the rocks. These soils are usually droughty.

Excavation problems are numerous. Blasting is often necessary when foundations are excavated. Well drilling also may be difficult and costly.

Slope limitations are slight to severe. Slopes in excess of 15 percent limit construction. Disturbed areas should be protected at all times, as erosion is severe.

URBAN GROUP 12

This group consists of poorly drained soils formed in glacial till and in stratified, water-laid deposits. The soils are—

Leicester fine sandy loam.
Leicester stony fine sandy loam.
Leicester-Ridgebury-Whitman very stony complex.
Raynham silt loam.
Ridgebury fine sandy loam.
Ridgebury stony fine sandy loam.
Walpole sandy loam.
Wilbraham silt loam.
Wilbraham stony silt loam.

A compact layer occurs at a shallow depth in the Ridgebury and Wilbraham soils and in some places in the Leicester soils. The soils in this group are generally in natural drainageways and depressions.

The water table is 0 to 12 inches from the surface during the spring and lasts until early in summer. It severely limits these soils as sites for septic tank systems. A considerable depth of fill is required if these soils are used in developed areas. Septic tank systems and drainage fields installed in fill may fail because of mechanical difficulties. If the fill settles unevenly, the septic tank and distribution box may tilt, or the tile lines of the drainage field may lose the proper gradient. Insufficient fill depth can result in drainage field flooding. Fill from stratified sand and gravel or from coarse glacial till is satisfactory. Fill that contains much silt and clay should be avoided.

Internal drainage limitations are severe. Wet basements are very common. The Walpole soil has no compact layer and is more easily drained with tile than the other poorly drained soils, but a suitable outlet is required.

Excavation difficulties are compounded by a high water table in all these soils and by large surface boulders and some bedrock outcrops in the stony areas, especially in the Leicester-Ridgebury-Whitman very stony complex.

Ponding is common in low areas that receive considerable runoff from surrounding slopes. These areas are sometimes ponded for several days late in fall and in spring, especially when the soil is frozen.

URBAN GROUP 13

This group consists of organic peat and muck and of very poorly drained soils formed in glacial till and on stratified, water-laid terraces. They are—

Peat and Muck.
Peat and Muck, shallow.
Scarboro fine sandy loam.
Whitman stony fine sandy loam.

These soils and land types are severely limited for septic tank systems. They have a permanently high water table that rarely drops below 18 inches during the dry summer. Water usually stands on the surface during the spring and even at times in the summer. A septic tank system cannot operate under these conditions.

These areas are rarely used as sites for septic tank systems, but when used, they are covered with fill material. The same precautions and probability of failure noted in group 12 apply to this group.

Internal drainage limitations are severe. Wet basements are very common. Because of their instability, peat and muck areas do not provide a suitable base for fill. During site preparation for construction, these organic materials are removed before fill material is added.

Excavation difficulties are severe because of the persistent high water table. Many stones and boulders also present difficulties in the Whitman soil. Surface ponding is extensive and persists for long periods.

URBAN GROUP 14

This group consists of the alluvial soils on the flood plains of major rivers and tributaries. The soils are—

Alluvial land.
Limerick silt loam.
Ondawa sandy loam.
Podunk fine sandy loam.
Rumney fine sandy loam.
Saco fine sandy loam.
Saco silt loam.
Winooski and Hadley silt loams.

These soils have a wide range of texture and drainage. Their use as building sites is limited because they are subject to flooding. They are used mostly for agriculture and recreation, but some areas of these soils can be used more extensively if floods are controlled upstream.

Although septic tanks may work satisfactorily in the well-drained Hadley and Ondawa soils when streams are low, they impose health hazards by polluting the water during periodic flooding.

Excavation difficulties vary from slight to severe and are related to the water table level and flooding. Flooding varies considerably, depending upon the frequency and intensity of rainfall, the capacity of the watershed to store water, and the configuration of the stream channels. Some areas of flood plains are flooded several times each year, and some less frequently.

Descriptions of the Soils

In this section, the soils of Tolland County are described and characteristics that affect their management are discussed. The soil series are described in alphabetical order. Following the description of each soil series are descriptions of the mapping units, or soils, in that series. Each description includes information about the present use of the soil and its suitability for crops.

In each soil description, following the name of the soil there is a symbol in parentheses that identifies the soil on the detailed soil map at the back of this report. At the end of each soil description, the capability unit, woodland suitability group, and urban group in which the soil has been placed are shown in parentheses. The page on which each of these is described is given in the "Guide to Mapping Units" at the back of this report.

A detailed description of a representative profile in each series is given in the section "Formation, Classification, and Morphology of Soils." Many terms used in describing the soils are defined in the Glossary.

Table 8 lists the mapping units and the approximate acreage and proportionate extent of each unit in the county.

TABLE 8.—*Approximate acreage and proportionate extent of the soils*

Soil	Area	Extent
	Acres	*Percent*
Agawam sandy loam, 0 to 3 percent slopes	622	0. 27
Agawam sandy loam, 3 to 8 percent slopes	447	. 15
Alluvial land	1, 737	. 63
Birchwood sandy loam, 0 to 3 percent slopes	160	. 06
Birchwood sandy loam, 3 to 8 percent slopes	222	. 08
Borrow and fill land, coarse materials	432	. 16
Borrow and fill land, loamy materials	605	. 23
Brimfield very rocky fine sandy loam, 3 to 15 percent slopes	3, 424	1. 29
Brimfield very rocky fine sandy loam, 15 to 25 percent slopes	3, 113	1. 17
Brimfield extremely rocky fine sandy loam, 3 to 15 percent slopes	1, 067	. 40
Brimfield extremely rocky fine sandy loam, 15 to 25 percent slopes	1, 615	. 61
Broadbrook silt loam, 0 to 3 percent slopes	80	. 03
Broadbrook silt loam, 3 to 8 percent slopes	318	. 12
Broadbrook stony silt loam, 3 to 8 percent slopes	92	. 03
Brookfield fine sandy loam, 3 to 8 percent slopes	278	. 10
Brookfield stony fine sandy loam, 3 to 15 percent slopes	447	. 17
Brookfield very stony fine sandy loam, 3 to 15 percent slopes	796	. 30
Brookfield very stony fine sandy loam, 15 to 25 percent slopes	470	. 18
Charlton fine sandy loam, 0 to 3 percent slopes	312	. 12
Charlton fine sandy loam, 3 to 8 percent slopes	6, 335	2. 38
Charlton fine sandy loam, 8 to 15 percent slopes	1, 540	. 58
Charlton fine sandy loam, 15 to 25 percent slopes	301	. 11
Charlton stony fine sandy loam, 3 to 8 percent slopes	7, 267	2. 73
Charlton stony fine sandy loam, 8 to 15 percent slopes	2, 334	. 88
Charlton stony fine sandy loam, 15 to 25 percent slopes	541	. 20
Charlton very stony fine sandy loam, 3 to 15 percent slopes	31, 222	11. 73
Charlton very stony fine sandy loam, 15 to 25 percent slopes	5, 912	2. 22
Cheshire fine sandy loam, 0 to 3 percent slopes	170	. 06
Cheshire fine sandy loam, 3 to 8 percent slopes	4, 106	1. 54
Cheshire fine sandy loam, 8 to 15 percent slopes	1, 191	. 45
Cheshire fine sandy loam, 8 to 15 percent slopes, eroded	434	. 16
Cheshire fine sandy loam, 15 to 25 percent slopes, eroded	357	. 13
Cheshire stony fine sandy loam, 3 to 8 percent slopes	704	. 26
Cheshire stony fine sandy loam, 8 to 15 percent slopes	339	. 13
Ellington fine sandy loam, 0 to 3 percent slopes	846	. 32
Enfield silt loam, 0 to 3 percent slopes	345	. 13
Enfield silt loam, 3 to 8 percent slopes	355	. 13
Enfield silt loam, shallow, 0 to 3 percent slopes	521	. 20
Enfield silt loam, shallow, 3 to 8 percent slopes	1, 163	. 44
Gloucester sandy loam, 3 to 8 percent slopes	454	. 17
Gloucester sandy loam, 8 to 15 percent slopes	294	. 11
Gloucester stony sandy loam, 3 to 8 percent slopes	1, 512	. 57
Gloucester stony sandy loam, 8 to 15 percent slopes	539	. 20
Gloucester and Charlton very stony soils, 3 to 15 percent slopes	19, 546	7. 34
Gloucester and Charlton very stony soils, 15 to 35 percent slopes	4, 955	1. 86
Hartford fine sandy loam, 0 to 3 percent slopes	529	. 20
Hartford fine sandy loam, 3 to 8 percent slopes	656	. 25
Hartford sandy loam, 0 to 3 percent slopes	196	. 07
Hartford sandy loam, 3 to 8 percent slopes	349	. 13
Hinckley gravelly sandy loam, 0 to 3 percent slopes	433	. 16

TABLE 8.—*Approximate acreage and proportionate extent of the soils*—Continued

Soil	Area	Extent
	Acres	*Percent*
Hinckley gravelly sandy loam, 3 to 15 percent slopes	7, 466	2. 80
Hinckley gravelly loamy sand, 3 to 15 percent slopes	346	. 13
Hollis rocky fine sandy loam, 3 to 15 percent slopes	753	. 28
Hollis very rocky fine sandy loam, 3 to 15 percent slopes	15, 420	5. 79
Hollis very rocky fine sandy loam, 15 to 35 percent slopes	6, 654	2. 50
Hollis extremely rocky fine sandy loam, 3 to 15 percent slopes	2, 475	. 93
Hollis extremely rocky fine sandy loam, 15 to 35 percent slopes	4, 253	1. 60
Jaffrey gravelly sandy loam and loamy sand, 3 to 15 percent slopes	2, 356	. 88
Leicester fine sandy loam	626	. 24
Leicester stony fine sandy loam	571	. 21
Leicester-Ridgebury-Whitman very stony complex	19, 386	7. 28
Limerick silt loam	293	. 11
Made land	98	. 04
Manchester gravelly sandy loam, 0 to 3 percent slopes	212	. 08
Manchester gravelly sandy loam, 3 to 15 percent slopes	4, 386	1. 65
Manchester gravelly loamy sand, 3 to 15 percent slopes	376	. 14
Merrimac fine sandy loam, 0 to 3 percent slopes	2, 122	. 80
Merrimac fine sandy loam, 3 to 8 percent slopes	1, 424	. 53
Merrimac sandy loam, 0 to 3 percent slopes	273	. 10
Merrimac sandy loam, 3 to 8 percent slopes	1, 011	. 38
Narragansett silt loam, 0 to 3 percent slopes	318	. 12
Narragansett silt loam, 3 to 8 percent slopes	2, 185	. 82
Narragansett silt loam, 8 to 15 percent slopes	291	. 11
Narragansett stony silt loam, 3 to 8 percent slopes	1, 306	. 49
Narragansett stony silt loam, 8 to 15 percent slopes	238	. 09
Ninigret sandy loam, 0 to 3 percent slopes	561	. 21
Ninigret sandy loam, 3 to 8 percent slopes	166	. 06
Ondawa sandy loam	284	. 11
Paxton fine sandy loam, 0 to 3 percent slopes	302	. 11
Paxton fine sandy loam, 3 to 8 percent slopes	4, 353	1. 63
Paxton fine sandy loam, 8 to 15 percent slopes	1, 825	. 69
Paxton fine sandy loam, 15 to 25 percent slopes	387	. 15
Paxton stony fine sandy loam, 3 to 8 percent slopes	2, 143	. 80
Paxton stony fine sandy loam, 8 to 15 percent slopes	855	. 32
Paxton stony fine sandy loam, 15 to 25 percent slopes	342	. 13
Paxton very stony fine sandy loam, 3 to 15 percent slopes	2, 845	1. 07
Paxton very stony fine sandy loam, 15 to 25 percent slopes	2, 625	. 99
Peat and Muck	5, 919	2. 22
Peat and Muck, shallow	2, 317	. 87
Podunk fine sandy loam	528	. 20
Poquonock sandy loam, 0 to 3 percent slopes	91	. 03
Poquonock sandy loam, 3 to 8 percent slopes	260	. 10
Rainbow silt loam, 0 to 3 percent slopes	339	. 13
Rainbow silt loam, 3 to 8 percent slopes	360	. 14
Rainbow stony silt loam, 0 to 6 percent slopes	196	. 07
Raynham silt loam	365	. 14
Ridgebury fine sandy loam	302	. 11
Ridgebury stony fine sandy loam	181	. 07
Rock land	597	. 22
Rumney fine sandy loam	576	. 22
Saco fine sandy loam	272	. 10
Saco silt loam	1, 184	. 44
Scarboro fine sandy loam	860	. 32
Sudbury fine sandy loam, 0 to 6 percent slopes	1, 962	. 74
Sutton fine sandy loam, 0 to 3 percent slopes	667	. 25
Sutton fine sandy loam, 3 to 8 percent slopes	1, 174	. 44
Sutton stony fine sandy loam, 0 to 3 percent slopes	810	. 30
Sutton stony fine sandy loam, 3 to 8 percent slopes	1, 655	. 62
Sutton very stony fine sandy loam, 0 to 3 percent slopes	3, 527	1. 32
Sutton very stony fine sandy loam, 3 to 15 percent slopes	13, 708	5. 15
Terrace escarpments	1, 675	. 63
Tisbury silt loam, 0 to 3 percent slopes	348	. 13
Walpole sandy loam	2, 258	. 85
Wapping silt loam, 0 to 3 percent slopes	433	. 16
Wapping silt loam, 3 to 8 percent slopes	555	. 21
Wapping stony silt loam, 3 to 8 percent slopes	276	. 10
Watchaug fine sandy loam, 0 to 3 percent slopes	277	. 10
Watchaug fine sandy loam, 3 to 8 percent slopes	672	. 25
Whitman stony fine sandy loam	182	. 07
Wilbraham silt loam	461	. 17
Wilbraham stony silt loam	201	. 08
Windsor loamy sand, 3 to 8 percent slopes	230	. 09
Windsor loamy sand, 8 to 15 percent slopes	159	. 06
Winooski and Hadley silt loams	219	. 08
Woodbridge fine sandy loam, 0 to 3 percent slopes	1, 338	. 50
Woodbridge fine sandy loam, 3 to 8 percent slopes	3, 761	1. 41
Woodbridge stony fine sandy loam, 0 to 3 percent slopes	782	. 29
Woodbridge stony fine sandy loam, 3 to 8 percent slopes	1, 847	. 69
Woodbridge very stony fine sandy loam, 0 to 3 percent slopes	2, 104	. 79
Woodbridge very stony fine sandy loam, 3 to 15 percent slopes	6, 829	2. 56
Gravel pits	573	. 22
Total	266, 240	100. 00

Agawam Series

The Agawam series consists of deep, well-drained to somewhat excessively drained soils on deep sand deposits. They are mainly on nearly level to gentle slopes of the high stream terraces.

The Agawam soils are mostly in the Central Lowland part of the county, but small, scattered areas occur in other parts. Most areas are near the moderately well drained Ninigret soils and the Windsor and Merrimac soils. The Agawam soils are finer textured than the Windsor soils and contain less gravel than the Merrimac soils.

In cultivated areas the surface layer is dark-brown, very friable sandy loam. In some areas there is a slightly firm plowsole just beneath the surface layer. The upper subsoil is generally yellowish brown and fades slightly in color with depth. The texture is sandy loam and is normally very friable. The subsoil grades to pale-brown loamy sand or sand at a depth of 20 to 30 inches. Most profiles have little or no gravel to a depth of 3½ to 4 feet.

The texture of the Agawam soils is dominantly sandy loam or fine sandy loam, but a surface layer of very fine sandy loam to a depth of 12 to 14 inches is within the range of the series. In some places there is a small amount of gravel in the profile, and stratified sand and gravel may be present below a depth of 3½ or 4 feet. The depth to the sand or loamy sand substratum ranges from about 18 to 30 inches.

Agawam sandy loam, 0 to 3 percent slopes (AbA).—This soil is mainly sandy loam but includes small areas of fine sandy loam and loamy sand. It warms early in spring and is very easy to work. Crops grown on it are responsive to fertilization. Permeability is generally rapid, the moisture-holding capacity is moderate, and the soil is somewhat droughty. Unless they are irrigated, most crops lack moisture during the summer months.

This soil is more suitable for tobacco, sweet corn, vegetables, and other special crops than for potatoes, silage corn, hay, and pasture. Fertilizer is needed for good yields, but applied nutrients are fairly rapidly leached out. This soil can be used intensively under good management. (Capability unit IIs–1; woodland suitability group 7; urban group 1)

Agawam sandy loam, 3 to 8 percent slopes (AbB).—This soil is undulating or gently sloping but is otherwise much like the soil on slopes of 0 to 3 percent and is used in essentially the same way. In places, simple practices are needed to control runoff and erosion; otherwise, management is the same as for the less sloping soil. (Capability unit IIs–2; woodland suitability group 7; urban group 1)

Alluvial Land (Am)

This land type consists of recent alluvium that varies in texture and drainage. The component soils occur in such an intricate pattern that it is not feasible to map them separately at the scale used. Most areas are cut by old stream channels and are well drained to moderately well drained on the low ridges and poorly to very poorly drained in the low spots. Generally, narrow strips along the streams consist of sandy or sandy and gravelly riverwash. This land type is made up largely of soils of the Ondawa, Podunk, Rumney, and Saco series. All are subject to flooding.

Alluvial land occurs in small, widely separated bodies throughout the county. The total acreage is not large. A large part is in forest or is idle, but scattered areas are in pasture. Most areas in pasture are unimproved but furnish fair grazing in dry seasons. Where it is feasible to improve drainage or straighten stream channels, these soils can be cultivated. (Capability unit IIIw–2; woodland suitability group 4; urban group 14)

Birchwood Series

The soils of the Birchwood series consist of moderately well drained sandy loam and fine sandy loam underlain by a hard layer formed in glacial till. The hard layer, which is at a depth of 24 to 36 inches, is reddish. It is difficult to dig with a spade, and water passes through it very slowly.

The Birchwood soils are in small, scattered, nearly level to gently sloping areas in the northern part of the Central Lowland. The total acreage is small. These soils are near the well-drained Poquonock soils and have developed in the same kind of material as those soils. They are coarser textured above the hard layer than the moderately well drained Rainbow soils.

The surface layer and subsoil are moderately to rapidly permeable, but the hard substratum is slowly to very slowly permeable and restricts internal drainage. As a result, a seasonally high water table occurs above the hard layer.

A representative profile in cultivated areas has a dark grayish-brown, very friable sandy loam plow layer about 8 inches thick. The upper subsoil is yellowish-brown sandy loam, which is very friable unless a plowsole has formed. The lower subsoil is yellowish-brown mottled with strong brown and various grayish colors. Most profiles have some angular rock fragments in the subsoil layers. The hard layer, at a depth of about 24 inches, is yellowish-red gravelly loam or sandy loam with pinkish-gray and brown mottles.

The depth to the hard substratum generally ranges from 24 to 36 inches, but it is greater in places. The texture of the surface soil and subsoil is generally light sandy loam or fine sandy loam to a depth of 12 to 18 inches, where it grades to loamy sand. The amount of small angular rock fragments ranges from practically none to about 15 percent. Included in the mapping are some areas that are not moderately well drained but are in the upper range of somewhat poorly drained.

Birchwood sandy loam, 0 to 3 percent slopes (BhA).—This soil is mainly sandy loam but includes small areas of fine sandy loam. It is easy to work and responds to good management, but it dries out fairly early in spring.

Most of the soil has been cleared. It is used mainly for hay and pasture, but some areas are used for tobacco, potatoes, and other crops. Some drainage is desirable if the soil is used for tobacco and potatoes. If limed and fertilized, however, the soil is fairly well suited to hay and pasture without drainage. Good management is needed to improve and maintain tilth and fertility. (Capability unit IIw–2; woodland suitability group 1; urban group 9)

Birchwood sandy loam, 3 to 8 percent slopes (BhB).—This soil is similar to Birchwood sandy loam, 0 to 3 percent slopes, except for relief, and is used for the same purposes. Runoff is more rapid on this soil, however, and the risk of erosion is greater on unprotected areas. Contour cultivation, graded stripcropping, or other simple practices will control runoff. Diversion terraces may be needed in places. (Capability unit IIwe–2; woodland suitability group 1; urban group 9)

Borrow and Fill Land

This land type consists of areas where the soil has been disturbed in the process of highway construction, urban and industrial developments, and other projects.

Borrow and fill land, coarse materials (Bk).—This mapping unit consists of borrow areas and some cut and fill material over sand and gravel or coarse glacial till. The soil horizons, except for the substratum, have been mostly obliterated. These areas are generally extremely droughty. Some are suitable for housing and industrial development, but each site should be investigated to determine the suitability. This unit has not been assigned a place in the capability classification system. (Woodland suitability group 9)

Borrow and fill land, loamy materials (Bl).—This mapping unit consists of borrow areas and some cut and fill material over loamy materials. The cut and fill areas are associated with housing and industrial developments. The soil horizons, except for the substratum, have been almost obliterated. The borrow areas are variable in permeability and drainage. Their suitability for vegetation and for urban development is also variable. This unit has not been assigned a place in the capability classification system. (Woodland suitability group 9)

Brimfield Series

This series consists of well-drained to somewhat excessively drained soils that are shallow to bedrock. These soils have developed from a thin mantle of glacial till derived principally from brown mica schist that weathers to reddish brown or strong brown, or from residuum of brown mica schist. The underlying bedrock generally also includes gray mica schist, gneiss, and other formations.

The Brimfield soils are principally in the northeastern part of the Eastern Highland. They commonly occur near the deep, reddish Brookfield soils and the shallow Hollis soils, but they differ from the Hollis soils in having a reddish-brown or yellowish-red upper subsoil.

In forested areas the surface soil is a thin layer of very dark grayish-brown fine sandy loam. The subsoil is yellowish-red, very friable, mellow fine sandy loam that contains many angular rock fragments. The subsoil is underlain by bedrock at a depth of about 14 inches.

Fine sandy loam is the dominant texture, but light silt loam and sandy loam are within the range of the Brimfield series. The number of bedrock outcrops ranges from a few to many, and their total area is 5 to 50 percent of the surface. Between the outcrops the soil is a few inches to 20 inches deep but averages 12 to 14 inches. Scattered areas have been cleared of stones and boulders, but most areas have them in addition to bedrock outcrops.

Brimfield very rocky fine sandy loam, 3 to 15 percent slopes (BnC).—Most areas of this soil have many loose stones in addition to outcrops of bedrock on the surface. These limit the use of this soil mainly to forest and unimproved pasture. The soil above bedrock is moderately permeable and has a moderate moisture-holding capacity.

Most of this soil is in forest, but a few small areas are in unimproved pasture or are idle. (Capability unit VIs–3; woodland suitability group 5; urban group 11)

Brimfield very rocky fine sandy loam, 15 to 25 percent slopes (BnD).—Except for steeper slopes, this soil is similar to Brimfield very rocky fine sandy loam, 3 to 15 percent slopes. Although most of this soil is on slopes of 15 to 35 percent, small scattered areas are on narrow slopes of 25 to 35 percent. Nearly the entire acreage is in forest, the use for which this soil is best suited. (Capability unit VIIs–3; woodland suitability group 6; urban group 11)

Brimfield extremely rocky fine sandy loam, 3 to 15 percent slopes (BpC).—This soil has more exposed bedrock and generally more loose stones on the surface than Brimfield very rocky fine sandy loam, 3 to 15 percent slopes. Most of the acreage is in forest. This soil is too rocky and stony for cultivation and is best suited to forestry, unimproved pasture, or wildlife. (Capability unit VIIs–3; woodland suitability group 5; urban group 11)

Brimfield extremely rocky fine sandy loam, 15 to 25 percent slopes (BpD).—This soil is mostly in forest and should be managed for forestry and for wildlife. Although most of it is on slopes of 15 to 25 percent, scattered areas are on narrow slopes of 25 to 35 percent. Use of equipment on this soil is severely limited, and windthrow is a severe hazard. (Capability unit VIIs–3; woodland suitability group 6; urban group 11)

Broadbrook Series

The Broadbrook series consists of well-drained silty soils over a hard, compact layer at a depth of 2 or 3 feet. This hard, reddish layer was derived from glacial till that contained a large proportion of reddish rock fragments.

The Broadbrook soils occur in scattered areas on low-lying, smoothly rounded hills in the Central Lowland section of the county. They are near the moderately well drained Rainbow and the well drained Narragansett and Poquonock soils. The Broadbrook soils differ from the Narragansett soils in having a hard, compact substratum and from the Poquonock soils in having a finer texture.

In cultivated areas the Broadbrook soils have an 8- to 10-inch surface layer of dark-brown, mellow, very friable silt loam. The upper subsoil is yellowish-brown silt loam that contains a few, angular rock fragments. In places a firm plowsole has formed in the upper part; otherwise, this part of the subsoil is very friable. The lower subsoil, slightly paler in color, also is very friable and contains a few, small, angular rock fragments. The lower subsoil is underlain by a layer of hard, yellowish-red gravelly sandy loan at a depth of about 26 inches. This layer is compact and difficult to dig with a spade, but when disturbed, it can be crumbled readily in the hand.

Silt loam is the dominant texture of the soils of the series, although some areas are very fine sandy loam. The depth to the hard, compact layer generally is 20 to 30 inches but is greater in places. The surface layer and subsoil are essentially free of angular rock fragments in some places, but in others the proportion of rocks is as much as 15 to 20 percent.

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

Almost all the acreage is cleared and used for crops, tree fruits, hay, and pasture. This soil is well suited to corn for silage or grain, to cabbage and cauliflower, and to alfalfa and other forage crops for hay and pasture. Alfalfa is subject to some heaving late in winter and in spring. Because this soil dries out rather slowly in spring, it is not well suited to shade tobacco, but outdoor tobacco grows well.

Crops grown on this soil are responsive to fertilization. The soil is suitable for intensive cultivation under management that includes fertilizing and liming according to soil tests and using rotations that maintain good tilth and control erosion. (Capability unit I–2; woodland suitability group 2; urban group 6)

Broadbrook silt loam, 3 to 8 percent slopes (BrB).—This soil differs from Broadbrook silt loam, 0 to 3 percent slopes, mainly in degree of slope. It erodes readily in unprotected areas, and water control is more of a problem than on the less sloping soil. Most of this soil is not eroded, but it includes small, moderately eroded areas.

The soil is used for the same crops as the less sloping soil, but the risk of erosion is greater, and erosion control practices and shorter rotations are desirable. (Capability unit IIe-2; woodland suitability group 2; urban group 6)

Broadbrook stony silt loam, 3 to 8 percent slopes (BsB).—This soil is inextensive. Part of it is in forest, and the rest has been cleared and is used mainly for hay and pasture. Because of the stones, intensive cultivation is difficult with modern machinery, but cleared areas are suitable for hay, improved pasture, and small grain. (Capability unit IVes-2; woodland suitability group 2; urban group 6)

Brookfield Series

The Brookfield series consists of well-drained, reddish soils developed on coarse textured to moderately coarse textured glacial till. The till was derived partly from rusty-brown mica schist that weathers to yellowish red or strong brown.

The Brookfield soils are chiefly in the northeastern part of the Eastern Highland. They are near the shallow Brimfield soils but are deeper than those soils. They are also associated with the well-drained Charlton and Gloucester soils on uplands and the Jaffrey and Merrimac soils on terraces. The Brookfield soils differ from the Charlton soils mainly in color and depth of weathering, and from the Gloucester soils in color and texture.

Brookfield soils are moderately to rapidly permeable and have a moderate moisture-holding capacity.

In cultivated areas the 6- to 8-inch surface layer is dark-brown, very friable fine sandy loam. The upper subsoil is yellowish-red, very friable fine sandy loam that contains some small, angular rock fragments. The lower subsoil, however, is strong-brown or yellowish-brown fine sandy loam or sandy loam that contains many angular rock fragments. At a depth of 24 to 30 inches, it grades to yellowish-brown, very friable gravelly loamy sand that contains many mica flakes.

The surface layer and upper subsoil are generally fine sandy loam, but silt loam and sandy loam are within the range of the series. Below 24 to 30 inches, the material is generally gravelly loamy sand but it is gravelly sandy loam or fine sandy loam in places. Some cleared areas are nearly stone free, but others are very stony.

Brookfield fine sandy loam, 3 to 8 percent slopes (BtB).—This inextensive soil occurs in small, scattered areas. Most of it is on 3 to 8 percent slopes, but it includes a few areas on slopes of 8 to 15 percent.

This soil is used mainly for hay, pasture, and home gardens. Some of it is idle. It dries out early in spring and is suitable for general crops of the area. Fertilizer is necessary for good yields, and lime is necessary for some crops. Contour cultivation, terracing, and other simple practices help to control runoff and erosion except in the areas that are on slopes of more than 8 percent. (Capability unit IIe-1; woodland suitability group 2; urban group 2)

Brookfield stony fine sandy loam, 3 to 15 percent slopes (BvC).—This soil is mostly in forest and unimproved pasture or is idle. About 75 percent of it is on 3 to 8 percent slopes. Scattered areas are used for hay and improved pasture. Because of stones, this soil is difficult to work for row crops, but most of it can be used for hay, improved pasture, tree fruits, and home gardens. (Capability unit IVes-1; woodland suitability group 2; urban group 3)

Brookfield very stony fine sandy loam, 3 to 15 percent slopes (ByC).—This soil is mostly in forest, although some areas have been cleared and are used for pasture or are idle. Stones limit the use of this soil for cultivated crops, and it is therefore best suited to forestry and pasture. Pasture can be improved by applying fertilizer and controlling brush. (Capability unit VIs-1; woodland suitability group 2; urban group 4)

Brookfield very stony fine sandy loam, 15 to 25 percent slopes (ByD).—Most of this soil is in forest—the use to which it is best suited. Small areas have been cleared and are idle or used for unimproved pasture. (Capability unit VIIs-1; woodland suitability group 3; urban group 8)

Charlton Series

The Charlton series consist of deep, well-drained soils formed on very friable to firm glacial till. The till was derived principally from schist, granite, and gneiss.

The Charlton soils are gently undulating or sloping to hilly, and they occur throughout the Eastern Highland section of the county. They commonly are near the moderately well drained Sutton, the poorly drained Leicester, and the very poorly drained Whitman soils.

The Charlton and Paxton soils are similar in texture, color, and mineralogy, but the Paxton soils have a hard, compact layer at a depth of about 2 feet. Small scattered areas of Brookfield soils are included in mapped areas of Charlton soils, especially in stony forested areas in the towns of Mansfield, Willington, Stafford, and Union.

The Charlton soils are moderately permeable and have a high moisture-holding capacity.

In cultivated areas a representative profile has an 8- to 10-inch plow layer of dark-brown, very friable fine sandy loam. The upper subsoil is brown or dark-brown very friable fine sandy loam, which grades to yellowish-brown fine sandy loam in the lower subsoil at a depth of 18 to 20 inches. The surface layer and subsoil contain varying amounts of small, angular rock fragments and some large stones. Below a depth of 24 to 30 inches, the substratum is olive-gray or olive gravelly fine sandy loam or loamy sand. This layer ranges from very friable to firm in place.

Fine sandy loam, stony fine sandy loam and very stony fine sandy loam are the principal soil types, but sandy loam that contains considerable silt and silt loam in the upper 6 to 12 inches is within the range of the series. The material below 20 to 30 inches varies in texture and is very friable to firm in place. Some areas that have been cleared of stone are nearly stone free; others are very stony.

Charlton fine sandy loam, 0 to 3 percent slopes (CaA).—This well-drained soil is very friable and moderately permeable and retains soil moisture and applied nutrients.

It is fairly easy to work, and crops are responsive to fertilization and other good management practices. The acreage is small.

This is one of the most desirable soils for general crops in the Eastern Highland section of the county. It is used principally for grain and silage corn, for alfalfa, and for hay and pasture in support of dairying. Some acreage is used for apple and peach orchards and nursery stock, and for sweet corn, potatoes, and other vegetables.

Fertilizer is essential for high yields of all crops grown on this soil, and lime is essential for some crops. This soil can be cultivated intensively if the management includes rotations that help maintain good tilth. (Capability unit I-1; woodland suitability group 2; urban group 2)

Charlton fine sandy loam, 3 to 8 percent slopes (CaB).—Except for stronger surface relief, this soil is similar to the less sloping soil. Consequently, surface drainage is freer, and unprotected areas are subject to some washing. Most of this soil is not eroded, but it includes small, scattered areas that are moderately eroded.

This soil is used for the same crops as the less sloping soil, but if it is used for clean-tilled crops, simple erosion practices are necessary to control runoff. Good management of this soil includes fertilizing, using proper rotations, and controlling erosion. (Capability unit IIe-1; woodland suitability group 2; urban group 2)

Charlton fine sandy loam, 8 to 15 percent slopes (CaC).—Some areas of this sloping soil are moderately eroded. This soil is suitable for hay, pasture, alfalfa, and apple and peach orchards, and it is used principally for these purposes. Small areas are used for sweet corn, silage corn, vegetables, and other crops. Good management of this soil includes fertilizing and liming, and on clean-tilled areas, intensive practices are required to control runoff and conserve moisture. Crop rotations are necessary to maintain good tilth. (Capability unit IIIe-1; woodland suitability group 2; urban group 3)

Charlton fine sandy loam, 15 to 25 percent slopes (CaD).—This soil occurs in small, scattered areas. Surface runoff is rapid on this strongly sloping soil, and some areas are eroded. Because of the strong slopes and the hazard of erosion, this soil is not suitable for cultivated crops, except in long rotations supported by intensive erosion control practices. It is used mainly for hay and pasture, and some of it is idle. (Capability unit IVe-1; woodland suitability group 3; urban group 8)

Charlton stony fine sandy loam, 3 to 8 percent slopes (ChB).—Most of this soil is on slopes of 3 to 8 percent, but it includes small, scattered areas on slopes of 0 to 3 percent. A large part of this soil is in forest, but some of it is used for hay, pasture, and tree fruits, and some of it is idle. This soil is difficult to work for row crops because of the stones, but most areas can be worked for hay, improved pasture, small grain, tree fruits, and small fruits. If the soil is limed and fertilized, it is well suited to sod crops for hay and pasture. (Capability unit IVes-1, woodland suitability group 2; urban group 2)

Charlton stony fine sandy loam, 8 to 15 percent slopes (ChC).—Runoff is moderate to rapid on this soil, and the need for erosion control on unprotected slopes is greater than on the less sloping stony fine sandy loam. It is used in about the same way as that soil, however, and is suitable for the same crops. (Capability unit IVes-1; woodland suitability group 2; urban group 3)

Charlton stony fine sandy loam, 15 to 25 percent slopes (ChD).—This inextensive soil is largely in forest, but some areas are in unimproved pasture or are idle. Because of the stones, the soil is best suited to these uses. Some areas can be used for pasture and tree fruits. (Capability unit VIes-1; woodland suitability group 3; urban group 8)

Charlton very stony fine sandy loam, 3 to 15 percent slopes (CrC).—Small areas of Brookfield soils were included with this soil in mapping. Most of this soil is in forest, but some areas have been cleared and are used mainly for pasture or are idle. Stones limit the use of this soil for cultivated crops, but some areas can be used for hay, improved pasture, and orchards. This soil is best suited to forestry and pasture. Pastures can be improved by brush control and fertilization. (Capability unit VIs-1; woodland suitability group 2; urban group 4)

Charlton very stony fine sandy loam, 15 to 25 percent slopes (CrD).—This soil is largely in forest and should be managed primarily for forestry, pasture, and wildlife. Small areas have been cleared and are used for unimproved pasture or are idle. (Capability unit VIIs-1; woodland suitability group 3; urban group 8)

Cheshire Series

The Cheshire series consists of deep, well-drained, reddish soils that have formed on glacial till derived principally from reddish rocks.

The Cheshire soils occur in the Central Lowland section of the county on gently sloping to strongly sloping uplands. They are near the well-drained Narragansett soils but have a redder, coarser textured subsoil. They are also near the moderately well drained Watchaug, the poorly drained Wilbraham, and the well drained Hartford soils on terraces.

The Cheshire soils are moderately permeable and have a fairly high moisture-holding capacity.

The surface layer, in cultivated areas, is brown or dark reddish-brown, very friable fine sandy loam. The subsoil is reddish brown or yellowish red, fading slightly with depth. The surface layer and subsoil contain a varying amount of small, angular rock fragments. At a depth of 24 to 30 inches, the lower subsoil grades to dark reddish-brown or red gravelly sandy loam or loamy sand. This layer ranges from very friable to firm in place.

Generally, the surface layer and subsoil are fine sandy loam, but they are sandy loam and very fine sandy loam in places. The content of small, angular rock fragments generally ranges from about 10 to 20 percent, but it is greater than 20 percent in places.

Cheshire fine sandy loam, 0 to 3 percent slopes (CsA).—This inextensive soil occurs in small areas. It is very friable and moderately permeable, except where a plowsole has formed in the upper subsoil.

This soil has a high moisture-holding capacity, and crops grown on it are responsive to management. The soil is well suited to all crops commonly grown in the county. It is used for grain and silage corn, alfalfa, tobacco, potatoes, and other crops, and for hay and pasture, orchards, vegetables, and nursery stock. (Capability unit I-1; woodland suitability group 2; urban group 2)

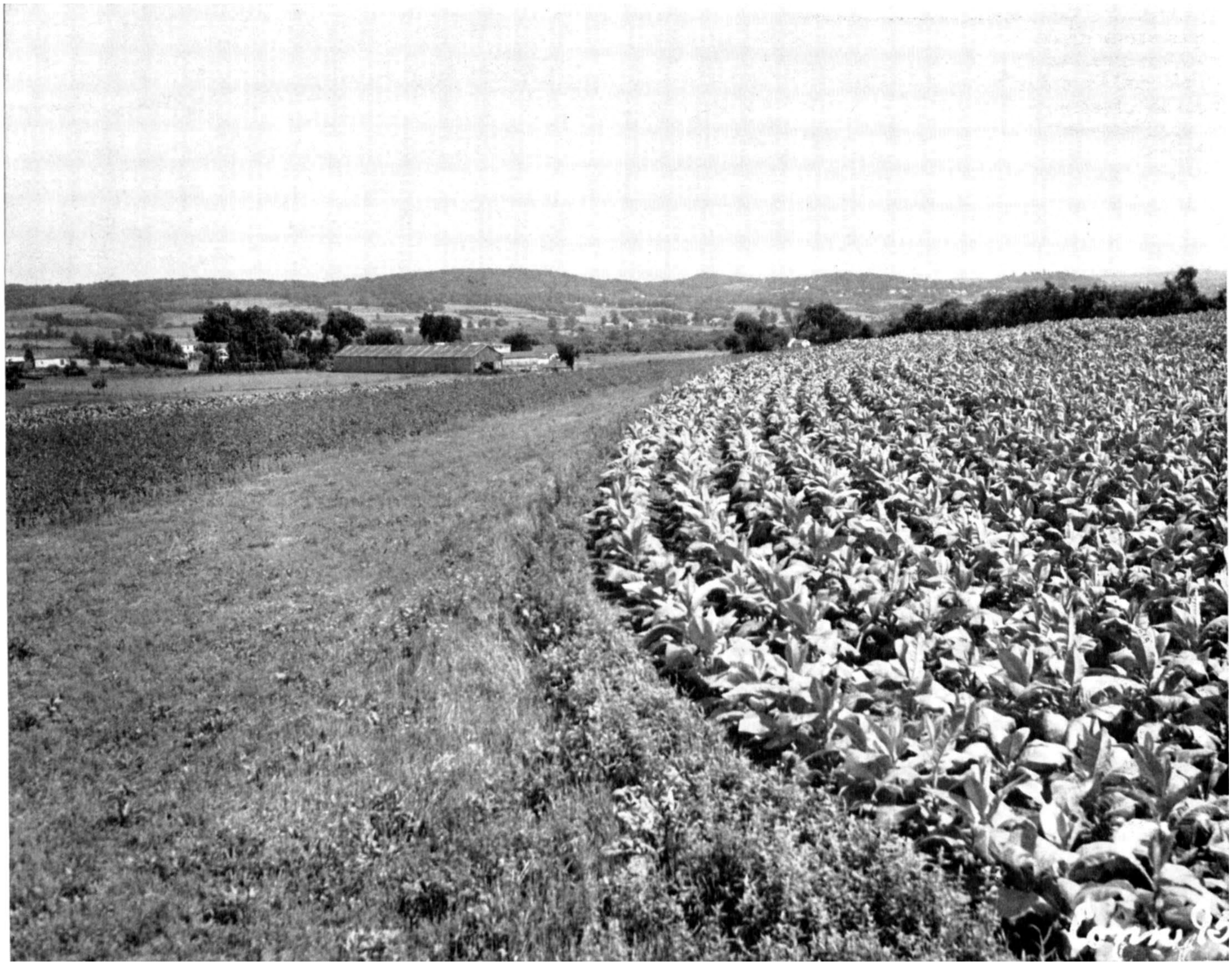

Figure 2.—**Broadleaf tobacco on Cheshire fine sandy loam.**

Cheshire fine sandy loam, 3 to 8 percent slopes (CsB).—Runoff is moderate on this soil, and some small areas that are moderately eroded are included. This soil is used for the same crops as the less sloping soil and is suitable for general crops, including tobacco and potatoes. It can be cultivated intensively if fertility and good tilth are maintained. Fertilizer is essential for high yields, and for some crops lime is also essential. Simple erosion control is necessary on cultivated areas. (Capability unit IIe–1; woodland suitability group 2; urban group 2)

Cheshire fine sandy loam, 8 to 15 percent slopes (CsC).—This sloping soil presents a greater water-control problem than the less sloping soil. Some water is lost by surface runoff, even on protected areas.

This soil is used principally for alfalfa, for hay and pasture, and for tree fruits, and it is suitable for these uses. Small areas are used for cultivated crops, including silage corn, tobacco (fig. 2), and vegetables. Fertilizer is necessary for high yields. If clean-cultivated crops are used in the rotation, erosion control is necessary. Areas used for hay and pasture should be reseeded in strips. (Capability unit IIIe–1; woodland suitability group 2; urban group 3)

Cheshire fine sandy loam, 8 to 15 percent slopes, eroded (CsC2.)—This soil has a thinner solum than Cheshire fine sandy loam, 8 to 15 percent slopes. Erosion ranges from slight to moderate. The surface layer generally contains less organic matter and more small rock fragments than the uneroded soil. This soil includes a few small areas that have a hard, compact layer at a depth of 18 to 20 inches.

This soil is used principally for hay and pasture or is idle, but small areas are used for tobacco and other crops. Because of the shallow solum and the risk of erosion, this soil is best suited to continuous sod crops. Building up fertility and preventing further erosion should be emphasized in managing this soil. (Capability unit IIIe–1; woodland suitability group 2; urban group 3)

Cheshire fine sandy loam, 15 to 25 percent slopes, eroded (CsD2).—This soil occurs in relatively small, narrow strips, and the total acreage is small. Erosion ranges from slight to moderate. Included in mapping are a few small areas on slopes greater than 25 percent.

This soil is suitable for hay, pasture, and orchards. Because of strong slopes and risk of erosion, it can be used for cultivated crops only if these crops are included in long rotations and intensive erosion control is practiced. Areas used for hay and pasture should be limed and fertilized, as indicated by soil tests, and should be reseeded in strips. (Capability unit IVe-1; woodland suitability group 3; urban group 8)

Cheshire stony fine sandy loam, 3 to 8 percent slopes (CtB).—Most of this soil is in forest, but some of it is is used for hay, pasture, tree fruits, and other crops, and some of it is idle. Because of stoniness, the soil is generally not suitable for crops that require intensive cultivation, but it can be used for hay, pasture, tree fruits, and small grain. If limed and fertilized, the soil is well suited to sod crops for hay and pasture. (Capability unit IVes-1; woodland suitability group 2; urban group 2)

Cheshire stony fine sandy loam, 8 to 15 percent slopes (CtC).—The total acreage of this soil is small. Most of it is on slopes of 8 to 15 percent, but it includes scattered areas on slopes of 15 to 25 percent. Runoff is moderate to rapid, and the risk of erosion on unprotected areas is greater than on the less sloping stony soil. This soil is largely in forest, but some acreage is used for hay, pasture, and tree fruits, and some is idle. (Capability unit IVes-1; woodland suitability group 2; urban group 3)

Ellington Series

The Ellington series consists of reddish, moderately well drained soils over stratified sand and gravel derived mainly from reddish rocks.

These soils occur on nearly level terraces in the Central Lowland section of the county. They are near the reddish Hartford and Cheshire soils and the poorly drained Walpole soils. They differ from the moderately well drained Sudbury soils in having redder colors in the subsoil.

A representative profile in a cultivated area has a dark-brown to very dark grayish-brown fine sandy loam plow layer 6 to 10 inches thick. It is very friable and mellow. The subsoil is reddish-brown, very friable fine sandy loam with mottles of pinkish gray and gray below a depth of 18 to 20 inches. Both the surface soil and subsoil contain a small amount of gravel. Below a depth of 24 to 30 inches, the material is reddish-brown coarse sand and gravel with some fine material. This material is mottled with pale brown and various shades of gray. During winter this layer is generally saturated by a high water table.

The depth to mottling ranges from about 12 to 20 inches. The gravel content in the surface layer and subsoil ranges from about 5 to 20 percent by volume.

Ellington fine sandy loam, 0 to 3 percent slopes (EfA).—This soil is rapidly permeable, but a seasonally high water table restricts internal drainage. It dries out rather slowly in spring. Moisture is generally adequate for plants during the growing season.

Without drainage, the soil is suitable for corn, hay, pasture, and late vegetables. Partly drained areas are suitable for tobacco, potatoes, and early vegetables. Fertilization is necessary for high yields, and careful management is needed to maintain fertility and good tilth. (Capability unit IIw-1; woodland suitability group 1; urban group 5)

Enfield Series

The Enfield series consists of silty soils over stratified deposits of sand and gravel. The depth of the silty material varies.

The Enfield soils are on nearly level to gently undulating or sloping terraces, principally in the Central Lowland part of the county. They are near the moderately well drained Tisbury and the well drained Merrimac, Hartford, and Narragansett soils. The Enfield soils are finer textured than the Merrimac and are browner and finer textured than the Hartford. The Enfield soils differ from the Narragansett in that the latter are underlain by glacial till.

In cultivated areas of Enfield soils, the 8- to 10-inch plow layer is dark-brown, mellow, very friable silt loam. The upper subsoil is yellowish-brown or strong-brown, very friable silt loam that grades to brown or pale-brown silt loam in the lower subsoil. Coarse fragments in the surface layer and subsoil vary in amount. At a depth of about 24 inches, the lower subsoil is underlain by loose sand and gravel derived from a variety of rocks.

The texture of the Enfield soils generally is silt loam, but in some places it is very fine sandy loam. The proportion of coarse fragments in the surface layer and subsoil ranges from almost none to about 15 percent. Shallower areas generally have a higher proportion of gravel than deeper areas. The depth of the silty material over sand and gravel is extremely variable. In shallow areas the depth is generally less than 18 inches, and in other areas it ranges from about 18 to 36 inches.

Enfield silt loam, 0 to 3 percent slopes (EsA).—This soil is moderately permeable and has a high moisture-holding capacity. It is easy to work, and crops grown on it are very responsive to good management. Unprotected areas are subject to some erosion even on gentle slopes.

Nearly the entire acreage of this soil is cleared. It is well suited to all crops grown in the county and is one of the most desirable soils for tobacco and potatoes (fig. 3), which are the principal crops. Some acreage is used for grain and silage corn, for alfalfa, vegetables, and nursery stock, and for hay and pasture. This is not a fertile soil, but it has favorable physical characteristics that produce a good response to fertilization and other practices. It is suitable for crops that require intensive cultivation, but practices that maintain fertility and good tilth are required. (Capability unit I-1; woodland suitability group 2; urban group 1)

Enfield silt loam, 3 to 8 percent slopes (EsB).—Use and management of this soil are the same as for Enfield silt loam, 0 to 3 percent slopes, but unprotected slopes erode very readily and more intensive practices are needed. (Capability unit IIe-1; woodland suitability group 2; urban group 1)

Enfield silt loam, shallow, 0 to 3 percent slopes (EtA).—This soil is shallower than Enfield silt loam, 0 to 3 percent slopes, and has a larger percentage of coarse fragments in

***Figure 3.*—Potatoes on Enfield silt loam.**

the surface layer and subsoil. The silty mantle over coarse sand and gravel is generally less than 18 inches thick and ranges from about 8 to 18 inches. In some places the shallow solum is the result of erosion; in others the silty mantle was probably originally thin. This soil is somewhat excessively drained and has a moderate moisture-holding capacity.

This soil is easy to work and warms early in spring. Tobacco, sweet corn, and potatoes are the principal crops, but some acreage is used for alfalfa, silage corn, nursery stock, and hay and pasture. The soil is suitable for general crops grown in the county, including tobacco. If the soil is fertilized properly, moisture is the limiting factor in crop production in most years unless rainfall is supplemented by irrigation. (Capability unit IIs–1; woodland suitability group 2; urban group 1)

Enfield silt loam, shallow, 3 to 8 percent slopes (EtB).—This soil generally has very irregular slopes, and unprotected areas erode very readily. Small areas on slopes of 8 to 15 percent are included with this soil in mapping.

This soil is used mainly for tobacco, potatoes, sweet corn, and vegetables, and for alfalfa and other hay and pasture plants. It is fairly well suited to general crops but is somewhat droughty. Runoff must be controlled more intensively on this soil than on Enfield silt loam, shallow, 0 to 3 percent slopes; otherwise, management is the same. (Capability unit IIs–2; woodland suitability group 2; urban group 1)

Gloucester Series

The Gloucester series consists of somewhat excessively drained soils developed on very friable to slightly firm, coarse glacial till. The till was derived principally from granitic rocks that have imparted to the soils a relatively high content of sand of various sizes.

The Gloucester soils are throughout the Eastern Highland section of the county. They are commonly associated with the well-drained Charlton and Brookfield soils on the uplands and the Hinckley and Merrimac soils on the terraces. The Gloucester soils are coarser than the Charlton and Brookfield soils and differ from the Brookfield soils in color also. The Gloucester soils are near the wet Leicester and Whitman soils.

The Gloucester soils are rapidly permeable and have moderate moisture-holding capacity.

In areas that have been cultivated, the Gloucester soils have a 6- to 8-inch plow layer of brown to dark grayish-brown, very friable sandy loam. The upper subsoil is yellowish-brown or dark yellowish-brown light sandy loam that grades to yellowish-brown or pale-brown loamy sand at a depth of 12 to 14 inches. The lower subsoil grades to light-gray or olive-gray gravelly loamy sand or sand at a depth of 20 to 24 inches. This material is loose to slightly firm in place. Small, angular rock fragments and stones are common in the subsoil layers.

Light sandy loam or loamy sand are the dominant textures in the surface layer and upper subsoil. Fine sandy loam to a depth of 12 to 14 inches, however, is within the range of the series. The amount of coarse, gravel-sized fragments ranges from about 10 to 35 percent in the surface layer and subsoil. Stones are also conspicuous (fig. 4). Some areas that have been cleared of stones are nearly stone free; others are very stony.

Gloucester sandy loam, 3 to 8 percent slopes (GaB).—Small areas on 0 to 3 percent slopes are included with this soil in mapping. This soil is used mainly for hay, pasture, and home gardens. Small areas are used for orchards,

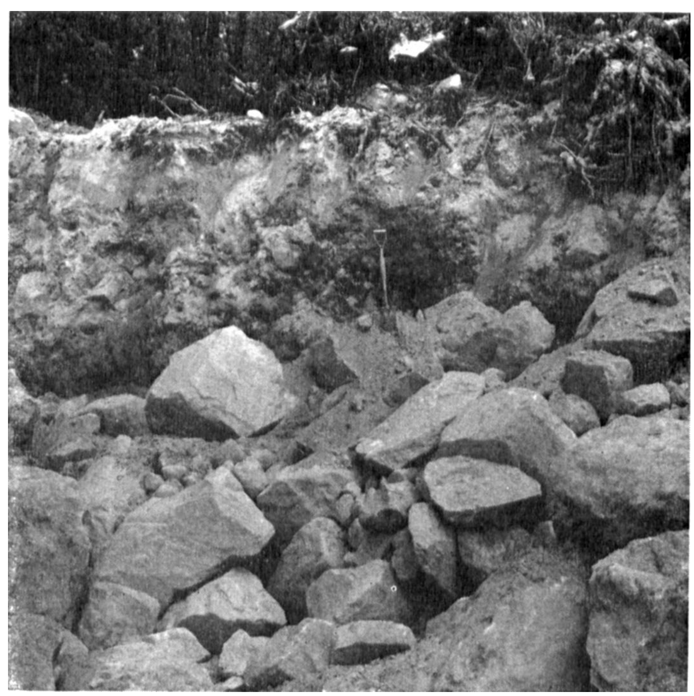

***Figure 4.*—Stones and boulders in a borrow pit in Gloucester very stony soil.**

alfalfa, and other crops, and some areas are idle. The soil is rapidly permeable and somewhat droughty. If fertilized and limed properly, it is suitable for early vegetables and alfalfa. Hayfields and pastures are affected by lack of moisture in most years.

Runoff is not a major problem, but simple practices are necessary to control erosion on unprotected areas. Careful management is required to build up and maintain fertility. (Capability unit IIs–2; woodland suitability group 7; urban group 2)

Gloucester sandy loam, 8 to 15 percent slopes (GaC).—This soil occurs in small areas. A few areas on slopes of 15 to 25 percent are included with this soil. Runoff is more rapid on this soil than on Gloucester sandy loam, 3 to 8 percent slopes.

This soil is used mainly for hay and pasture or is idle. Scattered areas are used for cultivated crops and orchards. The soil is fairly well suited to alfalfa if limed and fertilized properly. Shallow-rooted legumes and grasses are affected by lack of moisture in most years. (Capability unit IIIe–1; woodland suitability group 7; urban group 3)

Gloucester stony sandy loam, 3 to 8 percent slopes (GbB).—This soil is largely in forest. Scattered areas have been cleared and are used mainly for hay, pasture, and tree fruits or are idle. Because of stoniness, the soil is difficult to work for row crops, but most areas can be worked for improved pasture, hay, tree fruits, and small grains. The soil is somewhat droughty, and crops lack moisture in dry seasons. (Capability unit IVes–1; woodland suitability group 7; urban group 2)

Gloucester stony sandy loam, 8 to 15 percent slopes (GbC).—Most of this soil is on slopes of 8 to 15 percent, but it includes small areas on slopes of 15 to 25 percent. It is used for and is suitable for the same crops as Gloucester stony sandy loam, 3 to 8 percent slopes. Runoff is moderate, and unprotected areas are subject to some erosion. (Capability unit IVes–1; woodland suitability group 7; urban group 3)

Gloucester and Charlton very stony soils, 3 to 15 percent slopes (GeC).—The Gloucester soil probably comprises well over 50 percent of the acreage of this mapping unit. Individual areas shown on the map may consist of all Gloucester soil, all Charlton, or a combination of the two. Small areas of Brookfield very stony fine sandy loam are also included in the unit.

These soils are largely in forest. The open areas are used mainly for unimproved pasture or are idle, but some areas are used for hay, improved pasture, and orchards. Because of stoniness, these soils are best suited to forestry and pasture. They are not suited to cultivated crops. The carrying capacity of unimproved pasture could be increased by fertilizing and by controlling brush. (Capability unit VIs–1; woodland suitability group 7; urban group 4)

Gloucester and Charlton very stony soils, 15 to 35 percent slopes (GeE).—In this mapping unit of undifferentiated soils, any one area shown on the map may consist of all Gloucester soil, all Charlton, or a combination of the two. Small areas of Brookfield very stony fine sandy loam are also included. The Gloucester soil makes up well over 50 percent of the total acreage of this unit.

A large part of this mapping unit is in forest. Small, open areas are used for unimproved pasture or are idle. These soils should be managed mainly for forestry, pasture, or wildlife. (Capability unit VIIs–1; woodland suitability group 3; urban group 8)

Hadley Series

The Hadley series consists of well-drained, medium-textured soils on the flood plains of the larger streams. The sediments were derived from schist, gneiss, and other fine-textured rocks. In Tolland County the Hadley soils were mapped only in an undifferentiated unit with Winooski soils. The Hadley soils are also closely associated with the poorly to somewhat poorly drained Limerick soils. They are not so coarse nor well drained as Ondawa soils. The Hadley soils are flooded only occasionally.

A representative Hadley soil in a cultivated field has a plow layer of very dark brown silt loam 8 to 12 inches thick. The subsoil is dark-brown silt loam, but is not distinctly different from the plow layer in either color or texture. Below a depth of 20 inches or so, the soil gradually becomes lighter in color and coarser in texture. Loamy sand or sand and gravel are common below 30 inches. The surface layer and subsoil are very friable, and the soil is easily tilled.

The Hadley soils are moderately to rapidly permeable and have a high moisture-holding capacity. They are ready for farming slightly earlier in spring than the Winooski soils. Flooding is seldom severe or frequent enough to cause significant damage to crops.

Only one Hadley soil was mapped in Tolland County. It is in a unit of undifferentiated Winooski and Hadley silt loams, described under the Winooski series.

Hartford Series

The Hartford series consists of reddish, well-drained to somewhat excessively drained soils that developed on terraces over stratified sand and gravel. The stratified sand and gravel was derived principally from reddish-brown rocks.

The Hartford soils are in nearly level to gently sloping areas in the Central Lowland section of the county. They are commonly near the excessively drained Manchester and the moderately well drained Ellington soils. The Hartford soils differ from the Manchester principally in having a greater depth to sand and gravel. The Hartford and Merrimac soils are similar in texture, but the Hartford are redder.

A representative profile of this series has a dark grayish-brown or dark reddish-brown fine sandy loam surface layer 8 to 10 inches thick. The subsoil is reddish-brown or yellowish-red fine sandy loam. The surface layer and subsoil are very friable and mellow and generally contain some gravel. At a depth of about 2 feet, the subsoil is underlain by reddish loose sand and gravel.

The Hartford soils range from fine sandy loam to sandy loam in the surface layer and subsoil. The depth to loose sand and gravel is generally from 22 to 26 inches, but the range is from 18 to 30 inches. The percentage of gravel in the surface layer and subsoil ranges from 5 to 15 percent in most places.

Hartford fine sandy loam, 0 to 3 percent slopes (HdA).—This soil is in small areas. It is moderately permeable, has a high moisture-holding capacity, and is very easy to work.

This soil is well suited to tobacco, potatoes, alfalfa, early sweet corn, and vegetables, and is fairly well suited to silage corn, hay, and pasture. If fertility and good tilth are maintained, this soil is suitable for intensive cultivation. Control of runoff is not a problem. (Capability unit I–1; woodland suitability group 2; urban group 1)

Hartford fine sandy loam, 3 to 8 percent slopes (HdB).—This soil is easily worked, has a high moisture-holding capacity, and is moderately permeable. It is used for and is suitable for the same crops as Hartford fine sandy loam, 0 to 3 percent slopes. Simple erosion control practices are necessary if row crops are used in the rotations. Otherwise, management is the same. (Capability unit IIe–1; woodland suitability group 2; urban group 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 is responsive to management.

This soil occurs in scattered areas, and the acreage is small. Tobacco and sweet corn are the principal crops grown on it, but some acreage is used for alfalfa, potatoes, vegetables, hay, and pasture. The soil is well suited to shade tobacco, if irrigated. The shortage of moisture limits the yields of crops in most years, unless supplemental irrigation is used. Fertilizer is necessary for good yields, but applied nutrients leach out fairly rapidly. Careful management is required to maintain good tilth. Unprotected areas are subject to some wind erosion in spring and early in summer. (Capability unit IIs–1; woodland suitability group 7; urban group 1)

Hartford sandy loam, 3 to 8 percent slopes (HfB).—Runoff is slow to moderate on this soil. The soil is used for and is suitable for about the same crops as Hartford sandy loam, 0 to 3 percent slopes. Unprotected areas are subject to some wind and water erosion. Simple practices are adequate for the control of runoff. (Capability unit IIs–2; woodland suitability group 7; urban group 1)

Hinckley Series

Soils in the Hinckley series are excessively drained and droughty. They are generally shallow over sand, gravel, and cobbles and are nearly level to irregularly sloping. The sand and gravel deposits are derived principally from granite, gneiss, and schist.

The Hinckley soils are in the narrow valleys, mainly in the Eastern Highland section of the county. They are near the Merrimac soils, which are deeper and less droughty. The Hinckley, Manchester, and Jaffrey soils are similar in texture but different in color.

A representative profile in a cultivated area has a 6-inch plow layer of brown or dark yellowish-brown gravelly sandy loam. The upper subsoil is yellowish-brown gravelly sandy loam to a depth of 10 to 12 inches, and from that depth it grades to gravelly loamy sand or coarse sand and gravel. The substratum is stratified sand, gravel, and cobbles.

Gravelly sandy loam and loamy sand are the principal types, but fine sandy loam to a depth of 6 to 12 inches is within the range of the series. The depth to loose sand and gravel varies but ranges from 8 to 20 inches in most places.

Hinckley gravelly sandy loam, 0 to 3 percent slopes (HkA).—This soil is not quite so droughty as Hinckley gravelly sandy loam, 3 to 15 percent slopes. It is very rapidly permeable and has a low moisture-holding capacity.

This soil is inextensive and occurs in small, widely separated areas. Some areas are used for tobacco, vegetables, and other crops, but a large part of the acreage is idle, is in forest, or is used for pasture. This soil is fairly well suited to alfalfa if limed and fertilized properly. It is poorly suited to general crops or to hay and pasture unless it is irrigated. (Capability unit IIIs–2; woodland suitability group 7; urban group 1)

Hinckley gravelly sandy loam, 3 to 15 percent slopes (HkC).—This droughty soil is very rapidly permeable, has a low moisture-holding capacity, and generally is on very irregular slopes.

A large part of the acreage is in cutover forest or is idle. Small, scattered areas are used for tobacco, vegetables, hay, and pasture. Because of irregular slopes, droughtiness, and the risk of erosion, this soil is poorly suited to general crops and hay and pasture unless it is irrigated. It is fairly well suited to alfalfa. Heavy and frequent applications of fertilizer are essential for good yields, even if the soil is irrigated. Applied nutrients leach out rapidly. Runoff is difficult to control in some areas, as the slopes are too irregular for contour cultivation, terraces, and stripcropping. (Capability unit IIIse–1; woodland suitability group 7; urban group 1)

Hinckley gravelly loamy sand, 3 to 15 percent slopes (HmC).—This soil is sandier than Hinckley gravelly sandy loam. It absorbs water rapidly because it is extremely droughty. Unprotected areas are subject to some water and wind erosion.

This soil is largely in scrubby forest or is idle, but small areas are used for pasture and crops. If limed and fertilized properly, the soil is fairly well suited to alfalfa, but it is poorly suited to general crops, hay, and pasture unless it is irrigated and heavily fertilized. (Capability unit IVse–1; woodland suitability group 7; urban group 1)

Hollis Series

The Hollis series consists of shallow soils over gneiss, schist, and granite bedrock. They have developed from a thin mantle of glacial till and residiuum from the underlying bedrock. These soils have a few to many rock outcrops and a varying amount of loose stones and boulders in most areas. The depth of the soil between the outcrops also varies.

The Hollis soils are common throughout the Eastern Highland, except in the northeast corner of the county. They are near the Charlton, Paxton, and associated soils. They do not have the yellowish-red or reddish-yellow subsoil that is characteristic of the shallow Brimfield soils, nor do they have the same kind of underlying bedrock.

Undisturbed forested areas have a thin, very dark grayish-brown, mellow fine sandy loam surface layer. This layer is underlain by a dark yellowish-brown or yellowish-brown, very friable fine sandy loam subsoil. Stones and small angular rock fragments are common.

The depth to bedrock varies but is generally less than 20 inches.

The texture of the surface layer and subsoil is dominantly fine sandy loam, but loam, very fine sandy loam, and silt loam textures are within the range of the series. Bedrock outcrops occupy about 5 to 50 percent of the surface. The depth of the soil between the outcrops ranges from a few inches to about 20 and averages 12 to 14 inches.

Hollis rocky fine sandy loam, 3 to 15 percent slopes (HoC).—This soil occurs in scattered areas, and its total acreage is small. The soil is generally shallow, and most of the exposed bedrock is flush with the surface. The soil material is moderately to rapidly permeable and has a high moisture-holding capacity, but shallowness limits the moisture reserve for plant roots.

This soil has been cleared and is used mainly for hay and pasture. Although somewhat droughty, it is fairly well suited to these uses. Pasture and hay mixtures can be seeded with little difficulty. (Capability unit VIs–3; woodland suitability group 5; urban group 11)

Hollis very rocky fine sandy loam, 3 to 15 percent slopes (HrC).—Because of exposed bedrock, loose surface stones in places, and shallowness, this soil is generally unsuitable for cultivated crops. It is moderately permeable and has a high moisture-holding capacity.

This soil is mostly in forest and unimproved pasture or is idle. Small areas are used for improved pasture and hay and for apple orchards. Most areas are best suited to forest, unimproved pasture, and wildlife habitats. The areas where bedrock ourcrops are less numerous can be worked for improved pasture, hay, and orchards. (Capability unit VIs–3; woodland suitability group 5; urban group 11)

Hollis very rocky fine sandy loam, 15 to 35 percent slopes (HrE).—Steep slopes, rock outcrops, stones, and droughtiness limit the use of this soil mainly to forest and unimproved pasture. Most of it is in forest, but a small acreage has been cleared and is used principally for unimproved pasture or left idle. A few small areas are in orchards and improved pasture. The soil should be used mainly for forestry and pasture. (Capability unit VIIs–3; woodland suitability group 6; urban group 11)

Hollis extremely rocky fine sandy loam, 3 to 15 percent slopes (HxC).—This soil has more exposed bedrock and generally more loose stones and boulders on the surface than Hollis very rocky fine sandy loam, 3 to 15 percent slopes. It is too rocky and droughty for cultivated crops and should be managed for forestry, unimproved pasture, or wildlife (fig. 5). Small, scattered areas have been cleared and are idle or are used for unimproved pasture. (Capability unit VIIs–3; woodland suitability group 5; urban group 11)

Hollis extremely rocky fine sandy loam, 15 to 35 percent slopes (HxE).—This soil is largely in forest and should be managed for forestry and wildlife. It is droughty, and the extremely rough terrain makes the use of any kind of equipment difficult (Capability unit VIIs–3; woodland suitability group 6; urban group 11)

Jaffrey Series

The soils in the Jaffrey series are excessively drained, shallow, and gravelly. They have formed in stratified

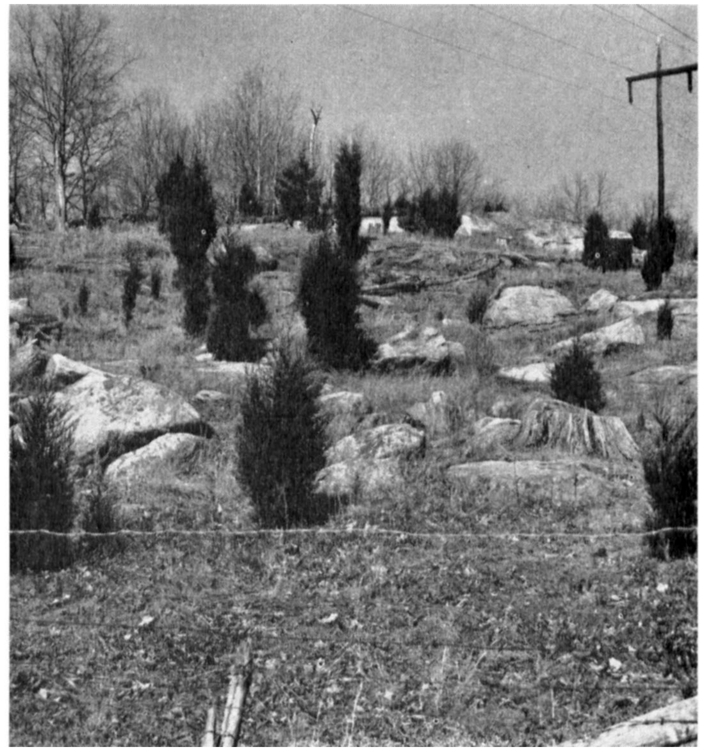

Figure 5.—**Hollis extremely rocky fine sandy loam.**

sand and gravel deposits derived, in part, from brown mica schist that weathers to reddish brown and strong brown.

The Jaffrey soils are near the Brookfield soils, which formed in glacial till, and the shallow Brimfield soils. They are similar to Hinckley soils in texture but have a reddish-brown to yellowish-red upper subsoil.

In forested areas the thin surface layer is very dark grayish-brown sandy loam. The upper subsoil is yellowish-red or reddish-yellow gravelly sandy loam that grades to dark-brown, gravelly loamy sand at a depth of 6 to 8 inches. The lower subsoil overlies stratified sand, gravel, and cobbles at a depth of about 12 to 14 inches. Many of the pebbles and cobbles are coated with dark reddish-brown iron stains.

Gravelly sandy loam and gravelly loamy sand are the principal textures. The depth to loose sand, gravel, and cobbles is variable but is generally less than 18 inches. The proportion of coarse fragments in the surface soil and subsoil ranges from about 20 to 50 percent.

Jaffrey gravelly sandy loam and loamy sand, 3 to 15 percent slopes (JaC).—In this soil proportions of gravelly sandy loam and gravelly loamy sand are probably about half and half. Any one area shown on the map, however, may be all gravelly sandy loam, all gravelly loamy sand, or a mixture of the two. The soil is very rapidly permeable and extremely droughty. It occurs in scattered areas, and the total acreage is small. A large part is in scrubby forest or is idle. Small areas are used for pasture and crops. (Capability unit IVse–1; woodland suitability group 7; urban group 1)

Leicester Series

The Leicester soils are poorly to somewhat poorly drained. They have formed in very friable to firm glacial deposits.

The Leicester soils occur throughout the Eastern Highland section of the county and are nearly level to very gently sloping. They are commonly near the well-drained Charlton, the moderately well drained Sutton, and the very poorly drained Whitman soils. The Leicester soils are also near the poorly drained Ridgebury soils, which differ in having a hard, compact layer at a depth of 18 to 24 inches.

The surface layer of the Leicester soils is very dark-brown to black, very friable and mellow fine sandy loam. The subsoil is mottled, dominantly with gray and grayish brown, but also with yellowish brown, strong brown, and other colors. At a depth of about 2 feet, the lower subsoil grades to sandy loam that is olive gray, finely mottled with brownish gray and strong brown.

The color of the surface layer ranges from very dark grayish brown to black. The texture of the surface layer and subsoil is fine sandy loam or sandy loam in most places. Coarse fragments make up from 10 to 30 percent of the surface layer and subsoil. The quantity of surface stones ranges from practically none in some cleared areas to many in uncleared areas.

Leicester fine sandy loam (Lc).—This soil occurs in small, scattered areas. Most of it is undrained and is used mainly for pasture or is idle. Where the soil is not drained, the water table is within 8 inches of the surface from winter through spring. Permeability is moderate, but water does not move readily through this soil until the high water table has been lowered by artificial drainage. The moisture-holding capacity, after drainage, is moderate. If it is drained, this soil is well suited to adapted legumes and grasses for hay and pasture, and fairly well suited to corn for silage. It can be drained readily with open ditches or tile. Drainage and fertilization are the principal needs. (Capability unit IIIw–1; woodland suitability group 4; urban group 12)

Leicester stony fine sandy loam (Le).—Part of this soil is in forest, and part is cleared. Because of poor drainage and stoniness, most areas are best suited to forest and pasture. Cleared areas are largely in unimproved pasture or are idle. Pastures can be improved by partial drainage, fertilization, and brush control. Unimproved native pastures provide fair grazing during dry periods in the summer. (Capability unit Vws–2; woodland suitability group 4; urban group 12)

Leicester-Ridgebury-Whitman very stony complex (Lg).—This mapping unit is made up of poorly drained Leicester and Ridgebury and very poorly drained Whitman soils. The three soils occur in such an intricate pattern that it was not feasible to map them separately. There is little if any difference in the management required, because all of these soils are wet and very stony.

These soils are nearly level or very gently sloping. Because of stoniness and wetness, they are used mainly for forestry, wildlife habitats, and unimproved pasture. They are mostly in forest, but scattered areas are cleared or partly cleared and used for pasture or are idle. Pastures provide fair grazing of native grasses and legumes during dry periods. Some areas can be improved by applying fertilizer and controlling brush. (Capability unit VIIs–4; woodland suitability group 8; urban group 12)

Limerick Series

The Limerick series consists of poorly drained silty soils on the flood plains. They are in small areas along the larger streams, and they occur with the well drained Hadley, the moderately well drained Winooski, and the very poorly drained Saco soils. The Limerick soils are finer textured than the poorly drained Rumney soils. Most areas are flooded rather frequently, but floods generally occur late in fall or early in spring.

The surface layer is very dark brown to black, mellow and friable silt loam 6 to 10 inches thick. The subsurface layer is dark-brown to grayish-brown silt loam or very fine sandy loam, mottled with yellowish brown to dark reddish brown. These layers are friable to very friable. At a depth of 20 to 36 inches, the material is coarser textured and ranges from loamy sand to mostly sand and gravel.

These soils are dominantly silt loam to a depth of 20 to 36 inches, but they are very fine sandy loam in places.

Limerick silt loam (Lm).—This soil is moderately to rapidly permeable and has a high moisture-holding capacity. Water does not move readily through this soil until the high water table is lowered. Early in spring the soil is generally saturated to the surface unless it has been artificially drained.

This soil is partly in forest and partly cleared. Cleared areas are used mainly for pasture, but small areas are idle. Undrained areas are fair for pasture. Partly drained areas are suitable for hay, pasture, and some cultivated crops. The soil needs lime and fertilizer for good yields. (Capability unit IIIw–2; woodland suitability group 4; urban group 14)

Made Land (Ma)

This land type is made up of filled areas and dumps consisting mainly of trashy material with a varying amount of earthy material. The trashy material includes old brick, plaster, and tin cans. Because of extreme variations in this material, it is not suitable for agriculture and has not been assigned to a capability unit. (Woodland suitability group 9)

Manchester Series

The soils in this series are reddish, droughty, and excessively drained. They have developed on stratified sand, gravel, and cobbles derived principally from reddish rocks.

The Manchester soils are in the Central Lowland section of the county. They are near the Hartford and Ellington soils on the terraces and the Cheshire and Watchaug soils on the uplands. The Manchester soils are similar to the Hinckley and Jaffrey soils in texture but differ from these soils in color and in parent material.

The Manchester soils are rapidly to very rapidly permeable and have a low moisture-holding capacity.

In cultivated fields the 6-inch plow layer is dark reddish-brown, very friable gravelly sandy loam. The

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subsoil is yellowish-red or reddish-yellow gravelly sandy loam or loamy sand in the upper part, but at a depth of 12 to 18 inches, it grades to loose sand, gravel, and cobbles, derived principally from reddish rocks.

Gravelly sandy loam and gravelly loamy sand are the principal types. The depth to loose sand, gravel, and cobbles varies but generally ranges from 8 to 18 inches. The content of coarse fragments in the surface layer and subsoil ranges from about 20 to 40 percent by volume.

Manchester gravelly sandy loam, 0 to 3 percent slopes (MgA).—This soil occurs in small, scattered areas, and the acreage is small. A large part is in scrubby forest or is idle, but small acreages are used for tobacco, other crops, hay, and pasture.

This soil is fairly well suited to alfalfa if limed and fertilized heavily. The soil is droughty and, unless it is irrigated, it is poorly suited to general crops and to hay and pasture. If it is irrigated and heavily fertilized, however, this soil is suitable for tobacco, early sweet corn, and early vegetables. (Capability unit IIIs–2; woodland suitability group 7; urban group 1)

Manchester gravelly sandy loam, 3 to 15 percent slopes (MgC).—This soil is very rapidly permeable and has a low moisture-holding capacity. The surface relief is generally very irregular.

A large part of this soil is in scrubby forest or is idle. Small areas are used for tobacco, alfalfa, sweet corn, and vegetables and for hay and pasture.

Because of droughtiness, low natural fertility, and irregular slopes, this soil is poorly suited to general crops and to hay and pasture unless it is irrigated. It is fairly well suited to alfalfa, but irrigation and large, frequent applications of fertilizer are necessary for high yields. Applied nutrients leach out rapidly. Runoff is difficult to control on some areas, as the slopes are too irregular for contour cultivation, terracing, and stripcropping. (Capability unit IIIse–1; woodland suitability group 7; urban group 1)

Manchester gravelly loamy sand, 3 to 15 percent slopes (MhC).—Both the surface layer and the thin subsoil are loamy sand or gravelly loamy sand. They absorb water very rapidly.

This soil is very droughty and is largely in scrubby forest or is idle, but small areas are used for crops and for hay and pasture. It is poorly suited to general crops, especially corn and shallow-rooted legumes and grasses. If the soil is fertilized heavily and frequently and is irrigated, it can be used for alfalfa, early vegetables, early sweet corn, and tobacco. Unprotected areas are subject to some water and wind erosion. (Capability unit IVse–1; woodland suitability group 7; urban group 1)

Merrimac Series

The soils in the Merrimac series are well drained to somewhat excessively drained. They are nearly level to gently sloping or undulating. These soils overlie stratified sand and gravel on high terraces.

These soils are near the excessively drained Hinckley, the moderately well drained Sudbury, and the poorly drained Walpole soils. The Merrimac soils differ from Agawam soils in having a sandy, gravelly substratum, and they are coarser than the Enfield soils. The Merrimac soils are in scattered areas in the narrow valleys throughout the county.

The 8- to 10-inch plow layer is brown to very dark grayish-brown sandy loam. This layer is very friable and usually contains some gravel. The upper subsoil is dark-brown to yellowish-brown gravelly sandy loam. It is generally very friable, unless a plowsole has formed in the upper part. The lower subsoil, slightly paler in color, is very friable sandy loam or gravelly loamy sand, but at a depth of about 24 inches it grades to loose sand and gravel that contains some cobbles in places. The subsoil layers contain a varying amount of gravel.

Fine sandy loam and sandy loam are the principal types, but gravelly phases also occur. The depth to the sandy, gravelly substratum ranges from about 18 to 30 inches. Coarse fragments in the surface soil and subsoil range from 5 to 30 percent by volume.

Merrimac fine sandy loam, 0 to 3 percent slopes (MrA).—This soil is moderately permeable and has a high moisture-holding capacity. It is very easy to work.

A large part of the soil has been cleared and is used for crops and for hay and pasture. Some of it is in forest and some is idle. Tobacco and potatoes are the principal crops grown on this soil in the Central Lowland section of the county. Some acreage is used for silage corn, other cultivated crops, and hay and pasture. This soil is well suited to tobacco, potatoes, sweet corn, nursery stock, and alfalfa, and it is fairly well suited to other legumes and to grasses for hay and pasture. When fertilized and limed properly, it produces good yields. It can be cultivated intensively with little risk of erosion, if good tilth is maintained. (Capability unit I–1; woodland suitability group 2; urban group 1)

Merrimac fine sandy loam, 3 to 8 percent slopes (MrB).—This soil is used for the same crops as Merrimac fine sandy loam, 0 to 3 percent slopes. It has the same soil properties and requires the same management, but simple practices are needed to control runoff and erosion. (Capability unit IIe–1; woodland suitability group 2; urban group 1)

Merrimac sandy loam, 0 to 3 percent slopes (MyA).—This soil occurs in small, scattered areas, mainly in the Eastern Highland. It is rapidly permeable and has a moderate moisture-holding capacity. The soil is easy to work and can be tilled early in the spring. It is somewhat droughty, however, and in most seasons, crops lack water unless they are irrigated.

This soil is fair for tobacco, alfalfa, and early vegetables but poorly suited to shallow-rooted legumes and grasses and to silage corn. Fair to good yields of most crops are obtained in favorable seasons if the soil is fertilized. Liberal amounts of fertilizer are necessary for high yields, even if the soil is irrigated. Applied nutrients leach out fairly rapidly. Careful management is required to maintain good tilth. Runoff is not a problem, but unprotected areas are subject to some wind erosion in spring. (Capability unit IIs–1; woodland suitability group 7; urban group 1)

Merrimac sandy loam, 3 to 8 percent slopes (MyB).—This soil occurs in small, scattered areas. Most of it is on slopes of 3 to 8 percent, but it includes a small acreage on slopes of 8 to 15 percent. In soil properties, use, and suitability, this soil is essentially the same as Merrimac sandy loam, 0 to 3 percent slopes. The soil absorbs water readily, but unprotected areas are subject to some water and wind erosion. Simple measures will control runoff. (Capability unit IIs–2; woodland suitability group 7; urban group 1)

Narragansett Series

The Narragansett series consists of well-drained, silty soils formed over very friable to firm glacial till. The glacial till is coarse to moderately coarse textured and, in this county, is derived principally from reddish rocks.

The Narragansett soils are mainly in the Central Lowland section of the county. They are near the moderately well drained Wapping soils. The Narragansett and Enfield soils are similar in texture, but the Enfield soils have formed over loose sand and gravel.

The Narragansett soils are moderately permeable and have a high moisture-holding capacity.

A representative profile in cultivated areas has a brown to dark-brown, mellow, very friable silt loam plow layer 8 to 10 inches thick. The subsoil is silt loam that grades from strong brown in the upper part to reddish yellow, yellowish brown, or pale brown at a depth of about 18 inches. The subsoil layers are very friable and mellow, except where a plowsole has formed. At a depth of about 2 feet, the lower subsoil is underlain by glacial till that is reddish-brown gravelly sandy loam.

Silt loam is the dominant texture, but some areas are very fine sandy loam. The silty mantle generally ranges from 18 to 30 inches in thickness, but is thicker in places. The quantity of small, angular rock fragments in the surface layer and subsoil ranges from a few to 20 percent. In places cobbles and rounded stones are common in the subsoil layers. Some areas are stony on the surface. The underlying substratum varies in texture. Also, it is very friable to firm in place.

Narragansett silt loam, 0 to 3 percent slopes (NaA).—This well-drained silty soil is moderately permeable and has a high moisture-holding capacity. It is fairly easy to work, and crops grown on it are responsive to good management.

This soil occurs in small areas. Most of the acreage is cleared and is used principally for tobacco and potatoes. Some of it, however, is used for silage corn, nursery stock, hay, and pasture.

Fertilizer is necessary for high yields. The soil is suitable for intensive cultivation, but careful management is required to maintain good tilth. The risk of erosion generally is not great. The soil absorbs water slowly, however, and under poor management, erodes readily. (Capability unit I–1; woodland suitability group 2; urban group 2)

Narragansett silt loam, 3 to 8 percent slopes (NaB).—This soil has medium runoff and erodes readily in unprotected areas. Although most of this soil is not eroded, it includes small areas that are moderately eroded.

The soil is used for and is suitable for the same crops as Narragansett silt loam, 0 to 3 percent slopes. In cultivated areas contour cultivation, terraces, and waterways are necessary to control runoff on long slopes. Otherwise, management should be the same as for Narragansett silt loam, 0 to 3 percent slopes. (Capability unit IIe–1; woodland suitability group 2; urban group 2)

Narragansett silt loam, 8 to 15 percent slopes (NaC).—The acreage of this soil is small. Runoff is a more serious problem on this soil than on Narragansett silt loam, 3 to 8 percent slopes. Unprotected areas are subject to severe erosion, and scattered areas are moderately eroded, although most of the soil is not eroded.

Some acreage is used for silage corn, tobacco, and potatoes, but most of it is used for hay and pasture. The soil is well suited to alfalfa and other close-growing crops. Cultivated crops should be grown in moderately long rotations supported by rather intensive erosion control practices. (Capability unit IIIe–1; woodland suitability group 2; urban group 3)

Narragansett stony silt loam, 3 to 8 percent slopes (NgB).—Most of this soil is on slopes of 3 to 8 percent, but it includes a few areas on slopes of 0 to 3 percent. The soil is largely in cutover forest. Scattered areas have been cleared and are used principally for pasture and hay. Row crops are difficult to grow because of stones, but the soil can be worked for hay, improved pasture, small grain, and tree fruits. It is well suited to hay and pasture if fertilized and limed. (Capability unit IVes–1; woodland suitability group 2; urban group 2)

Narragansett stony silt loam, 8 to 15 percent slopes (NgC).—This soil has about the same suitability and is used for the same crops as Narragansett stony silt loam, 3 to 8 percent slopes. Surface runoff is moderate to rapid, however, and in unprotected areas, the risk of erosion is greater. (Capability unit IVes–1; woodland suitability group 2; urban group 3)

Ninigret Series

The soils in the Ninigret series are moderately well drained. They have developed on nearly level to gently sloping terraces over deep sands.

The Ninigret soils are mainly in the Central Lowland section. They are near the well-drained Agawam and excessively drained Windsor soils. Like the Agawam, the Ninigret soils have little gravel in the profile above a depth of 3½ to 4 feet. They have less gravel in the surface layer and subsoil than the Sudbury soils and lack the sandy, gravelly substratum of those soils.

In areas that have been cultivated, the 8- to 10-inch plow layer is very dark brown or very dark grayish-brown sandy loam. This layer is very friable. The subsoil is yellowish-brown, very friable sandy loam in the upper part, but at a depth of about 20 inches, this grades to a brown light sandy loam mottled with strong brown and pale brown. Below 24 to 30 inches, the material is mottled loamy sand or sand with some fine gravel.

The soils in the Ninigret series range in texture from sandy loam to very fine sandy loam. Most areas have little or no gravel to a depth of 3½ to 4 feet. In places, however, a small amount of gravel is in the surface layer and subsoil, and stratified sand and gravel may be at a depth below 3½ to 4 feet. The depth to mottling generally ranges from about 14 to 24 inches. Included in the mapping are small areas in the upper range of somewhat poorly drained.

Ninigret sandy loam, 0 to 3 percent slope (NrA).—This soil is mainly sandy loam, but it includes small areas of fine sandy loam and very fine sandy loam. The soil is rapidly permeable, but a seasonally high water table erstricts drainage. The moisture-holding capacity is moderate.

Cleared areas are used principally for potatoes and for hay and pasture, but some acreage is used for tobacco, silage corn, vegetables, and other crops. Without drainage, this soil is generally suitable for silage corn and late vegetables and for hay and pasture. Drained or partly drained areas are suitable for tobacco, potatoes, and general crops, but tobacco and potatoes are subject to some damage in very wet summers.

Fertilizer is necessary for high yields, but applied nutrients leach out fairly rapidly. Management practices that maintain good tilth are needed. (Capability unit IIw-1; woodland suitability group 1; urban group 5)

Ninigret sandy loam, 3 to 8 percent slopes (NrB).—This soil is very inextensive. It has about the same properties, is suitable for the same use, and requires about the same management as Ninigret sandy loam, 0 to 3 percent slopes. In clean-cultivated areas, simple practices are necessary to control runoff and erosion. (Capability unit IIwe-1; woodland suitability group 1; urban group 5)

Ondawa Series

The Ondawa series consists of well-drained soils on flood plains. These soils are subject to flooding from stream overflow.

The Ondawa soils are near the moderately well drained Podunk, the poorly drained Rumney, and the very poorly drained Saco soils.

The surface layer in most places is very dark gray or very dark grayish-brown, very friable sandy loam or fine sandy loam. Below the surface layer, the soil varies in color and generally is a mixture of dark brown, very dark grayish brown, and dark yellowish brown. Below a depth of 20 to 24 inches, the texture is generally loamy sand or loose sand and gravel.

Ondawa sandy loam (On).—This soil is moderately to rapidly permeable and has a moderate moisture-holding capacity. This soil is mainly sandy loam, but small, scattered areas of silt loam are included with it. These silty areas have a higher moisture-holding capacity than the Ondawa sandy loam and are included because of their small acreage. Ondawa sandy loam dries out rapidly in spring and is very easy to work. This soil is suitable for general crops, but cultivated crops are damaged occasionally by flooding late in spring or early in fall. Most of the acreage has been cleared, and some of it is idle. The soil is used mainly for hay, pasture, and silage corn. Some of it is used for sweet corn, vegetables, and other crops. Fertilizer is needed for high yields. (Capability unit IIw-4; woodland suitability group 2; urban group 14)

Paxton Series

The Paxton series consists of well-drained soils that have a hard, compact layer. These soils formed in deep glacial till that was derived principally from gray mica schist, gneiss, and granite.

The Paxton soils commonly occur on smoothly rounded drumlins, or drumloidal hills, in the Eastern Highland. These soils are near the moderately well drained Woodbridge, the poorly drained Ridgebury, and the very poorly drained Whitman soils. Other soils commonly near the Paxton are the Charlton and Hollis. The Paxton soils differ from the Charlton in having a distinct hard layer, generally at a depth of about 2 feet.

A representative profile in a cultivated field has a very dark grayish-brown, friable to very friable fine sandy loam surface layer 8 to 10 inches thick. The subsoil is yellowish brown or dark yellowish brown very friable fine sandy loam in the upper part, but it grades to light olive-brown fine sandy loam at a depth of 16 to 20 inches. Both the surface layer and the subsoil contain some small, angular fragments of rock. The lower subsoil is underlain by an olive-brown hard layer with a few mottles at a depth of about 2 feet. This layer is hard to dig with a spade, and water passes through it slowly, but when disturbed, it crumbles readily in the hand.

The depth to the hard layer is generally 20 to 26 inches, but the range is from 16 to 30 inches. The small, angular rock fragments in the surface layer and subsoil range from about 10 to 30 percent. Surface stoniness ranges from nearly stone free, in areas that have been cleared of stones, to very stony. Small areas that border the Central Lowland are reddish colored in the hard, compact layer because of the reddish rocks in the glacial material. Otherwise, these areas are similar to typical Paxton soils.

Paxton fine sandy loam, 0 to 3 percent slopes (PbA).—This soil occurs in small, scattered areas, and the total acreage is small. In use and suitability for crops, it is about the same as Paxton fine sandy loam, 3 to 8 percent slopes. Control of runoff is not a problem. (Capability unit I-2; woodland suitability group 2; urban group 6)

Paxton fine sandy loam, 3 to 8 percent slopes (PbB).—This soil is moderately permeable above the hard layer and has a high moisture-holding capacity. It warms rather slowly in the spring, because the hard layer at a depth of about 2 feet restricts internal drainage. Crops seldom are seriously affected by lack of moisture during the growing season. Included with this soil are small areas that are moderately eroded.

This soil is well suited to corn for silage, to alfalfa, other legumes, and grasses for hay and pasture, and to apple orchards. It is used principally for these purposes, but some acreage is used for grain corn and other field crops, for vegetables, and for nursery stock. Alfalfa is subject to some heaving, but yields are good if the soil is limed and fertilized properly. Applications of fertilizer, simple erosion control, and rotations that promote good tilth are the major needs of this soil. It is suitable for intensive cultivation if good conservation and other practices are applied. (Capability unit IIe-2; woodland suitability group 2; urban group 6)

Paxton fine sandy loam, 8 to 15 percent slopes (PbC).—Control of runoff is more of a problem on this soil than on Paxton fine sandy loam, 3 to 8 percent slopes. Most of this soil is not eroded, but unprotected slopes erode readily, and scattered areas are moderately eroded.

This soil is used principally for hay and pasture and for orchards, but some of it is used for alfalfa and for silage corn and other cultivated crops. Cultivated crops should be grown in a longer rotation than on Paxton fine sandy loam, 3 to 8 percent slopes, and practices for erosion control should be more intensive. (Capability unit IIIe–2; woodland suitability group 2; urban group 7)

Paxton fine sandy loam, 15 to 25 percent slopes (PbD).—This soil generally occurs in small, narrow strips, and the total acreage is small. Included in the mapping unit are a few small areas on 25 to 35 percent slopes and some small eroded areas.

This soil is suitable for alfalfa, other legumes, and grasses for forage. It is also suitable for orchards. Because of the risk of erosion, it is not suitable for cultivated crops unless they are grown in a long rotation and supported by intensive erosion control practices. Forage crops and pasture should be limed and fertilized to insure a good sod. (Capability unit IVe–2; woodland suitability group 3; urban group 8)

Paxton stony fine sandy loam, 3 to 8 percent slopes (PdB).—This soil is largely in forest, but some of it has been cleared and is used principally for hay and pasture and for orchards. Most areas can be used for these purposes and for small grain. For crops that require intensive cultivation, however, the soil is difficult to work with modern machinery. This soil is well suited to improved pasture. (Capability unit IVes–2; woodland suitability group 2; urban group 6)

Paxton stony fine sandy loam, 8 to 15 percent slopes (PdC).—Control of runoff is more of a problem on this soil than on Paxton stony fine sandy loam, 3 to 8 percent slopes. This soil can be used for hay and improved pasture and for orchards. Stoniness limits its use for cultivated crops. (Capability unit IVes–2; woodland suitability group 2; urban group 7)

Paxton stony fine sandy 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 are idle. The soil can be worked for improved pasture and orchards, but it is best suited to forestry and pasture because of the stones and steep slopes. (Capability unit VIes–2; woodland suitability group 3; urban group 8)

Paxton very stony fine sandy loam, 3 to 15 percent slopes (PeC).—This soil is largely in forest. Some areas have been cleared and are used mainly for unimproved pasture or are idle. Some areas can be worked for improved pasture and for orchards. Pasture can be improved by controlling brush and applying fertilizer. (Capability unit VIs–2; woodland suitability group 2; urban group 7)

Paxton very stony fine sandy loam, 15 to 25 percent slopes (PeD).—This soil is largely in forest. Scattered areas have been cleared and are used for unimproved pasture or are idle. Because of the stones and steep slopes, the soil is best suited to forestry and grazing. (Capability unit VIIs–2; woodland suitability group 3; urban group 8)

Peat and Muck

Peat and Muck is a land type that consists of organic deposits in swamps and bogs. The deposits were derived from sedges, mosses, leaves, roots, woody vegetation, and other organic matter laid down in permanently wet areas. The organic remains are in various stages of decomposition.

Areas of Peat and Muck are scattered throughout the county (fig. 6). They range in size from a few acres to 100 acres.

The organic deposits are generally very dark brown to black to a depth of 12 to 18 inches. In some places the material is well decomposed, and in others it is fairly coarse and fibrous. At a depth below 12 to 18 inches, the material ranges from very dark brown or black to dark grayish brown or dark reddish brown. This material is generally rather coarse and fibrous in the upper part, but it is soft and relatively free of plant fibers in the lower part.

The depth of the deposits ranges from about 18 inches to 25 feet. The reaction ranges from extremely or very strongly acid in the surface layer to medium or slightly acid in the lower layers.

Peat and Muck (Pk).—A few scattered areas have been drained and are used for hay and pasture or are idle. Most of the acreage, however, is in cutover forest. The principal forest species are red maple, elm, white cedar, ash, hemlock, gray birch, and willow. Common shrubs are blueberry, sweet pepperbush, mountain-laurel, and alder. Cinnamonfern and sensitivefern are common. (Capability unit VIw–1; woodland suitability group 8; urban group 13)

Peat and Muck, shallow (Pm).—This soil ranges from about 18 to 36 inches in depth. It occurs in small, scattered areas. A few areas are used for pasture, but most are in cutover forest or are idle. The vegetation is the same as on Peat and Muck. (Capability unit VIw–1; woodland suitability group 8; urban group 13)

Podunk Series

The soils in the Podunk series are moderately well drained. They are in scattered areas on the flood plains of the larger streams along with the Ondawa, Rumney, and Saco soils. The Podunk and Ondawa soils are similar in texture but differ in drainage. Most areas of the Podunk soils are flooded at least once a year, and some more frequently.

A representative profile has a very dark grayish-brown, very friable fine sandy loam surface layer 6 to 8 inches thick. The surface layer is underlain by dark-brown fine sandy loam to a depth of 16 to 20 inches. Below this depth, mottles of dark gray, of reddish brown, and of other colors are common. The material below a depth of about 2 feet varies in texture and color.

Podunk fine sandy loam (Po).—This soil is moderately to rapidly permeable, but a seasonally high water table restricts internal drainage. Some areas are flooded frequently and others occasionally, but the flooding is of short duration and seldom damaging. Included with this soil are a few areas of sandy loam and a few small areas of silt loam.

Part of the acreage is in forest, and some is idle. Cleared areas are used principally for hay and pasture, but scattered areas are used for silage corn, vegetables, and other crops. This 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. Lime, fertilizer, and drainage are needed in places. (Capability unit IIw–5; woodland suitability group 1; urban group 14)

Figure 6.—**Peat and Muck in foreground; Paxton fine sandy loam in background.**

Poquonock Series

The soils in the Poquonock series are well drained to somewhat excessively drained. They formed in sandy material over a hard, compact layer in glacial till. The Poquonock soils are in small areas in the northern part of the Central Lowland.

Poquonock soils are near the moderately well drained Birchwood soils. They differ from the well-drained Broadbrook soils in being coarser textured above the hard layer.

The surface layer in cultivated areas is very dark grayish-brown or dark yellowish-brown light sandy loam. It is very friable. The subsoil is yellowish-brown to strong brown, very friable light sandy loam in the upper part, but it grades to yellowish-brown light sandy loam or loamy sand at a depth of 18 to 20 inches. The subsoil is underlain by a reddish-brown, hard, compact gravelly sandy loam or loam layer at a depth of about 28 inches. This layer is hard to dig with a spade, and water passes through it slowly. The depth to this layer ranges from about 24 to 36 inches.

Poquonock sandy loam, 0 to 3 percent slopes (PuA).—This soil is in small areas, and the total acreage is small. It is rapidly permeable above the hard layer, but this layer prevents rapid internal drainage.

Most of the acreage has been cleared and is used mainly for tobacco and potatoes and for hay and pasture. The soil is easy to work, and crops grown on it are responsive to fertilizer. If well managed, the soil is fairly well suited to general crops. (Capability unit I–2; woodland suitability group 2; urban group 6)

Poquonock sandy loam, 3 to 8 percent slopes (PuB).—This soil differs from Poqunock sandy loam, 0 to 3 percent slopes, in relief. Slopes are mainly 3 to 8 percent, but a few small areas with slopes of 8 to 15 percent are included.

The soil is used for the same crops as Poquonock sandy loam, 0 to 3 percent slopes. The risk of erosion is greater, however, and simple practices are needed to control erosion on clean-cultivated areas. (Capability unit IIe–2; woodland suitability group 2; urban group 6)

Rainbow Series

The Rainbow series consists of moderately well drained, silty soils over a hard, compact layer. The hard layer has formed in glacial till derived from a variety of rocks. In Tolland County the till was derived principally from reddish rocks.

The Rainbow soils are nearly level to gently sloping and occur in the Central Lowland. They are near the well-drained Broadbrook soils. They also are commonly associated with the moderately well drained Wapping soils, but they differ from the Wapping soils in having a hard layer at a depth of about 2 feet. The Rainbow soils are finer textured than the Woodbridge soils.

The surface layer, in cultivated areas, is dark-brown, mellow silt loam 8 to 10 inches thick. The subsoil is dark yellowish-brown, very friable silt loam in the upper part. It grades to yellowish brown or pale brown in the lower part and is mottled at a depth of 16 to 18 inches. The surface layer and the subsoil generally contain some small rock fragments. At a depth of about 2 feet, the lower subsoil is underlain by reddish-brown, hard, compact gravelly sandy loam. The layer has some faint mottles. Water passes through it slowly.

The depth to the hard layer is generally about 24 inches, but the range is from 18 to 36 inches. The small, angular fragments of rock make up 2 to 20 percent of the surface layer and subsoil. The depth to mottling also varies but generally ranges from 12 to 20 inches. Some areas are included that have somewhat poor drainage and are mottled near the surface.

Rainbow silt loam, 0 to 3 percent slopes (RaA).—This soil is in scattered areas, and the total acreage is small. It is moderately permeable above the hard layer, which is slowly permeable and restricts internal drainage. Consequently, the soil dries out rather slowly in spring.

Most of this soil has been cleared. It is used principally for hay and pasture, but some of it is used for tobacco, potatoes, silage corn, and other crops. Without drainage, this soil is suited to hay and pasture, and fairly well suited to silage corn, potatoes, and vegetables. It is not suited to tree fruits, and most of it is poorly suited to tobacco and alfalfa unless it is at least partly drained.

Diversion terraces are desirable in places to divert seepage and runoff from higher areas. Grasses and legumes and cultivated crops should be fertilized and limed as indicated by soil tests. (Capability unit IIw–2; woodland suitability group 1; urban group 9)

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. This soil erodes readily, even on gentle slopes, and control of runoff is necessary on clean-cultivated areas. (Capability unit IIwe–2; woodland suitability group 1; urban group 9)

Rainbow stony silt loam, 0 to 6 percent slopes (RbB).—This soil occurs in small, scattered areas. About 75 percent of it is on slopes of 0 to 3 percent, and the rest is on slopes of 3 to 6 percent. Most of this soil is in forest or is idle. The rest is used principally for hay and pasture. The cultivation of this soil with modern machinery is limited by stones, but most areas can be worked for hay and improved pasture. Grasses and legumes should be fertilized and limed. (Capability unit IVws–2; woodland suitability group 1; urban group 9)

Raynham Series

The Raynham soils are poorly drained and silty. They have formed on nearly level terraces near the poorly drained Walpole soils and the very poorly drained Scarboro soils. They differ from the Walpole soils mainly in being finer textured and in depth to sand and gravel.

A representative profile has a very dark gray, friable silt loam surface layer about 8 inches thick. The subsoil is mottled, dominantly with grayish colors. It is friable to very friable silt loam. Generally below a depth of 24 to 30 inches, the material is somewhat coarser.

Silt loam is the principal type, but some areas are very fine sandy loam. The surface and subsoil horizons are generally free of gravel to a depth of about 30 inches, but a small amount of gravel is present in places. Below 30 inches, strata of gravel are more common.

Raynham silt loam (Rc).—The total area of this soil is about 250 acres. It occurs mainly in the area known as the Ellington Marsh, south of Ellington Center. Small areas are found in other parts of the Central Lowland.

Most of this soil has been cleared and is partly drained by open ditches. Drained areas are used mainly for silage corn and other forage crops, and a few small areas are used for potatoes. Undrained areas are used mainly for pasture or are idle. The soil should be drained, fertilized, and limed if it is to be used intensively. (Capability unit IIIw–1; woodland suitability group 4; urban group 12)

Ridgebury Series

The Ridgebury series consists of poorly drained to somewhat poorly drained soils formed on a hard layer in glacial till. The till was derived principally from schist, granite, and gneiss.

The Ridgebury soils are near the well drained Paxton, the moderately well drained Woodbridge, the very poorly drained Whitman, and the poorly drained Leicester soils. They differ from Leicester in having a prominent hard layer at a depth of 18 to 24 inches.

The 4- to 8-inch surface layer is very dark grayish-brown to black, friable fine sandy loam. The subsoil is olive or olive gray mottled with various shades of yellow, brown, and olive. It is generally friable to very friable fine sandy loam but may be sandy loam in the lower part. Both the surface soil and subsoil contain some small, angular fragments of rock. At a depth of 18 to 20 inches, the lower subsoil is underlain by a gray or olive-gray, hard, compact layer. This layer is mottled with yellow and brown and is gravelly sandy loam or fine sandy loam. It is hard to dig with a spade but crumbles readily in the hand when disturbed.

The depth to the hard layer generally ranges from about 18 to 24 inches but is deeper in places. Surface stoniness varies from practically none on areas that have been cleared of stone, to very stony.

Ridgebury fine sandy loam (0 to 3 percent slopes) (Rd).—This soil occurs in small widely scattered areas in the Eastern Highland. Runoff is slow to very slow, and internal drainage is slow because of the very slowly permeable hard layer at 18 to 24 inches.

Because of poor drainage, this soil is used mainly for hay and pasture. Some acreage is idle. Partly drained areas are suitable for hay and pasture, and some areas can be drained for corn and other crops. Drainage and applications of fertilizer and lime are the major needs. (Capability unit IIIw-1; woodland suitability group 4; urban group 12)

Ridgebury stony fine sandy loam (0 to 3 percent slopes) (Rg).—This soil occurs in small areas. Water moves very slowly through it because of the very slowly permeable hard layer at a depth of 18 to 24 inches. Stones and poor drainage limit the use of this soil mainly to forestry and unimproved pasture. If drained, the soil is suitable for legumes and grasses for hay and pasture. Unimproved pasture furnishes fair grazing during the dry summer months. Pasture can be improved by applying fertilizer and controlling brush. (Capability unit Vws-2; woodland suitability group 4; urban group 12)

Rock Land

Rock land is in areas where exposed bedrock occupies more than 50 percent of the surface. These areas are not suitable for cropland or grazing and have little value for forestry. They provide attractive scenery in places and furnish some shelter and food for wildlife.

Rock land (Rk).—The exposed bedrock consists mainly of schist and gneiss and some granite. Surface relief ranges from gently sloping to steep. (Capability unit VIIIs-1; woodland suitability group 9; urban group 11)

Rumney Series

The Rumney series consists of poorly drained soils of the flood plains. These soils are along the larger streams with the Ondawa, Podunk, and Saco soils. Most areas are flooded frequently, but floods generally occur late in winter or early in spring before crops are planted.

A representative profile has a very dark grayish-brown to black, friable fine sandy loam surface layer 6 to 8 inches thick. The subsurface layers are dominantly gray and olive gray fine sandy loam, mottled with yellowish brown and strong brown. Below a depth of 24 inches, the material is mottled coarse sand that contains some gravel.

The texture of the surface layer is dominantly fine sandy loam, but the range is from fine sandy loam to coarse sandy loam. Below a depth of 18 to 24 inches, the texture varies.

Rumney fine sandy loam (Ru).—This soil is largely in forest or is idle, but some of it is used for pasture and hay. A few small areas are used for cultivated crops. Undrained areas are fair for pasture, and partly drained areas are suitable for hay and pasture and for silage corn. Lime and fertilizer are necessary for good yields. Rather frequent flooding and the lack of suitable outlets make drainage for cultivated crops impractical in many areas. (Capability unit IIIw-2; woodland suitability group 4; urban group 14)

Saco Series

Soils in the Saco series are nearly level and very poorly drained. They occur along streams and rivers and are subject to very frequent flooding. The deposits vary in texture. Saco soils are near Ondawa, Podunk, and other soils of the flood plains.

The surface layer is very dark brown to black sandy loam to silt loam 8 to 14 inches deep. The subsurface layers are dominantly gray and have some mottles. These layers vary in texture. Some areas are underlain by sand and gravel at a depth of 24 to 30 inches.

Saco fine sandy loam (Sa).—This soil is coarser textured than Saco silt loam. The use and suitability are essentially the same, except that Saco fine sandy loam dries somewhat sooner than the Saco silt loam, and grazing livestock are less likely to punch holes in it. (Capability unit VIw-1; woodland suitability group 8; urban group 14)

Saco silt loam (Sb).—Because of very poor drainage and very frequent flooding, this soil is used largely for forestry, unimproved pasture, and wildlife. Some areas are idle. Drainage is not generally practical, because floods are frequent and suitable outlets are lacking. Unimproved pasture furnishes some grazing, especially in dry seasons. (Capability unit VIw-1; woodland suitability group 8: urban group 14)

Scarboro Series

The Scarboro series consists of very poorly drained soils formed over sandy or sandy and gravelly materials on nearly level terraces. The sediments were derived from a variety of rocks, but mainly from granite, gneiss, and schist.

The Scarboro soils are scattered throughout the county. They are near the Merrimac, Agawam, Enfield, and Hartford soils, and they are generally near the very poorly drained Whitman soils on uplands. They are generally coarser textured throughout their profile than the Whitman soils, and they lack the conspicuous stones and boulders that are characteristic of the Whitman soils.

The surface layer is black to very dark brown fine sandy loam or loamy fine sand about 12 inches thick. This layer contains much organic matter and is friable to very friable. The subsurface layers are grayish loamy sand or sand mottled with pale olive or pale brown. Coarse sand and gravel are common below a depth of 20 to 24 inches.

Textures in the A1 or Ap horizons are generally loamy sand to light fine sandy loam or sandy loam. The high content of organic matter makes the surface layer feel silty, even though it is loamy sand or sand. The subsoil texture varies but is usually loamy sand. Some areas are over deep sand and others are over coarse sand and gravel at a depth of 18 to 24 inches.

Scarboro fine sandy loam (Sf).—This is a fairly extensive soil that occurs throughout the county. A large part of it is in forest that consists mainly of red maple, blackgum, elm, alder, and gray birch. Cleared areas are largely in unimproved pasture or are idle, but a few areas have been partly drained and are used for hay. Undrained areas make poor pasture. Partly drained areas support fair pasture if limed and fertilized. Where suitable outlets are available, this soil can be readily drained because of the sandy and gravelly substrata. (Capability unit Vw–1; woodland suitability group 8; urban group 13)

Sudbury Series

The Sudbury series consists of moderately well drained soils formed on terraces over stratified sand and gravel. The sand and gravel were derived principally from gneiss, granite, and schist. These soils are nearly level to gently sloping.

The Sudbury soils are near the well-drained to somewhat excessively drained Merrimac, the poorly drained Walpole, and the very poorly drained Scarboro soils. The Sudbury soils are coarser than the moderately well drained Tisbury soils and differ from the Ninigret soils in having sandy, gravelly substrata at a depth of about 2 feet.

A representative profile in a cultivated area has a fine sandy loam surface layer that is dark brown, friable, and 8 to 10 inches thick. The subsoil is yellowish-brown, very friable fine sandy loam in the upper part; but at a depth of about 18 inches, it grades to gravelly sandy loam that is brown or pale-brown and mottled. The mottles are brownish gray and strong brown. The surface layer and subsoil generally contain some gravel. At a depth of about 26 inches, the lower subsoil is underlain by loose coarse sand and gravel that is dark grayish brown, mottled with strong brown and gray.

Fine sandy loam and sandy loam are the common types. The depth to coarse sand and gravel is generally about 24 inches but ranges from about 18 to 30 inches. The amount of gravel in the surface layer and subsoil ranges from about 3 to 20 percent by volume. Somewhat poorly drained areas are included in mapping.

Sudbury fine sandy loam, 0 to 6 percent slopes (SsA).—This soil is rapidly to moderately permeable, but a seasonally high water table restricts internal drainage. Mottling at about 18 inches indicates that the lower subsoil is waterlogged during wet seasons. This soil is relatively easy to drain, however, because it is underlain by sand and gravel. Small areas on slopes of 3 to 8 percent and some areas of sandy loam are included with this soil in mapping.

Probably more than 50 percent of this soil has been cleared. The soil is used principally for hay and pasture, although some of it is used for tobacco, potatoes, vegetables, and other crops. Without drainage, this soil is generally suitable for hay, pasture, silage corn, and late vegetables. Drained or partly drained areas are fairly well suited to tobacco, potatoes, and other crops, but tobacco and potatoes, even in drained areas, are subject to damage in very wet seasons. Good tilth should be maintained, and for some crops, fertilizer and drainage are necessary. (Capability unit IIw–1; woodland suitability group 1; urban group 5)

Sutton Series

The Sutton series consists of moderately well drained soils formed on glacial till. The till was derived principally from schist, gneiss, and granite and is very friable to firm.

The Sutton soils are scattered throughout the Eastern Highland. They are near the well drained Charlton, the poorly drained Leicester, and the very poorly drained Whitman soils. The Sutton soils are commonly associated with the moderately well drained Woodbridge soil, which has a prominent hard layer at a depth of 18 to 30 inches. The Sutton soils differ from the Sudbury soils in having formed on glacial till rather than over stratified sand and gravel, in having a narrower range of texture, and in having stones on the surface and in the profile.

In cultivated areas the 6- to 8-inch surface layer is very dark gray or very dark grayish-brown, friable fine sandy loam. The subsoil is yellowish-brown, very friable fine sandy loam in the upper part, but the color grades to a light olive brown, mottled with pale brown and strong brown, at a depth of 16 to 18 inches. The surface layer and subsoil contain some small, angular rock fragments. At a depth of about 24 inches, the lower subsoil is gray fine sandy loam mottled with yellowish brown and strong brown. This layer is very friable to firm in place.

Fine sandy loam is the dominant texture in the surface layer and subsoil, but below a depth of 24 to 30 inches, the material varies from loamy sand to fine sandy loam. Stones and weathered rock fragments are common throughout the profile. The degree of surface stoniness ranges from practically stone free, in some areas that have been cleared of stone, to very stony. The depth to distinct mottling ranges from about 12 to 24 inches.

Sutton fine sandy loam, 0 to 3 percent slopes (SvA).—This soil is moderately permeable, but a seasonally high water table restricts internal drainage. It dries out rather slowly in spring but more rapidly than a comparable soil that has a hard, slowly permeable layer at a depth of about 2 feet.

A large part of the acreage has been cleared and is used principally for hay and pasture and for some silage corn in support of dairying. Some acreage is used for corn, vegetables, alfalfa, small fruits, and other crops. Undrained areas are generally well suited to adapted legumes and grasses, late vegetables, and small fruits and are fairly well suited to silage corn.

Drainage is necessary for alfalfa, tree fruits, and early vegetables. Terraces are desirable in places to divert seepage and runoff from higher areas. Fertilizer, drainage in places, and rotations that will maintain good tilth are the major needs of this soil. (Capability unit IIw–1; woodland suitability group 1; urban group 5)

Sutton fine sandy loam, 3 to 8 percent slopes (SvB).—This soil has freer surface drainage than Sutton fine sandy loam, 0 to 3 percent slopes. Slopes are mainly 3 to 8 percent, but a few small areas on slopes of 8 to 15 percent are included in mapping.

This soil is used principally for hay and pasture in support of dairying. Small acres are used for silage corn, vegetables, and other crops. Simple practices to control erosion are necessary on clean-cultivated areas. Otherwise, management should be the same as for Sutton fine sandy loam, 0 to 3 percent slopes. (Capability unit IIwe–1; woodland suitability group 1; urban group 5)

Sutton stony fine sandy loam, 0 to 3 percent slopes (SwA).—This soil is largely in cutover forest, but some acreage has been cleared and is used mainly for hay and pasture. Stones make the cultivation of row crops difficult, but most areas can be worked for improved pasture, hay, small grain, and small fruits. The soil should be drained for tree fruits, but it is generally suitable for small fruits and adapted legumes and grasses without drainage. (Capability unit IVws–1; woodland suitability group 1; urban group 5)

Sutton stony fine sandy loam, 3 to 8 percent slopes (SwB).—Surface drainage is moderate, and simple erosion control is necessary in unprotected areas. In use and suitability, this soil is about the same as Sutton stony fine sandy loam, 0 to 3 percent slopes. (Capability unit IVws–1; woodland suitability group 1; urban group 5)

Sutton very stony fine sandy loam, 0 to 3 percent slopes (SxA).—Because of stoniness, this soil is not suitable for cultivated crops. It is largely in forest and should be managed for forestry, grazing, and wildlife. Scattered areas have been cleared and are used mainly for unimproved pasture or are idle. Some areas can be worked for improved pasture and are used for this purpose. (Capability unit Vs–1; woodland suitability group 1; urban group 5)

Sutton very stony fine sandy loam, 3 to 15 percent slopes (SxB).—This soil has about the same use and suitability as Sutton very stony fine sandy loam, 0 to 3 percent slopes. (Capability unit VIs–1; woodland suitability group 1; urban group 10)

Terrace Escarpments (Tg)

Terrace escarpments consist of sandy or sandy and gravelly material on slopes steeper than 15 percent. This land type occurs on terrace breaks, along drainageways, in highly dissected areas, and on kames and eskers. The slopes are generally short and range from about 100 to several hundred feet in width. The texture of the surface layer generally ranges from gravelly sandy loam to gravelly loamy sand and sand.

The principal soil series that make up Terrace escarpments are the Hinckley, Merrimac, Hartford, Manchester, and Jaffrey.

This land type is largely in forest, the purpose for which it is best suited because of steep slopes and droughtiness. Most of the cleared acreage is idle, but some is used for pasture. It is poorly suited to hay, pasture, and crops. (Capability unit VIe–1; woodland suitability group 3)

Tisbury Series

The Tisbury series consists of moderately well drained silty soils that formed over stratified sand and gravel. In Tolland County the sand and gravel are principally from reddish rocks.

The Tisbury soils are nearly level to gently sloping and occur in the Central Lowland. They are near the well-drained Enfield soils. They are finer textured than the moderately well drained Sudbury soils.

In cultivated areas the 8- to 10-inch plow layer is very dark grayish-brown to dark-brown silt loam. It is mellow and very friable. The subsoil is brown to yellowish-brown, very friable silt loam in the upper part, but at a depth of about 18 inches the color grades to pale brown that is finely mottled. The surface layer and subsoil generally contain some gravel. The lower subsoil is underlain by reddish, loose sand and gravel at a depth of about 2 feet.

The surface layer and subsoil generally are silt loam but are very fine sandy loam in some areas. The depth to sand and gravel ranges from about 22 to 30 inches. The percentage of gravel in the surface layer and subsoil ranges from 2 to 15 percent by volume. Included in the mapping are small areas in the upper range of somewhat poorly drained.

Tisbury silt loam, 0 to 3 percent slopes (TsA).—This soil is moderately permeable and has a high moisture-holding capacity. A seasonally high water table restricts internal drainage, however. The lower subsoil is waterlogged in wet seasons, and compared with some well drained soils, it dries out somewhat slowly in spring. This soil is relatively easy to drain, is easy to work, and is responsive to good management.

The acreage of this soil is small. Most of it has been cleared and is used principally for silage corn and for hay and pasture. Some acreage is used for tobacco, potatoes, and other crops. Without drainage, this soil is generally suitable for silage corn, late vegetables, and hay and pasture. Drainage is beneficial for tobacco and potatoes. Land preparation and planting of cultivated crops are delayed in spring, but crops seldom lack moisture during the growing season. Drainage is necessary for some crops. Fertilizer and rotations that maintain good tilth are the major needs of this soil. (Capability unit IIw–1; woodland suitability group 1; urban group 5)

Walpole Series

The soils in this series are poorly drained to somewhat poorly drained. They have formed on nearly level terraces over sandy or sandy and gravelly deposits. The water table is near the surface in winter and early in spring.

The Walpole soils are scattered throughout the county. They are near the well drained Merrimac, the moderately well drained Sudbury, and the very poorly drained Scarboro soils. The Walpole and the poorly drained Leicester soils are somewhat similar, but the Leicester soils have formed over glacial till and are conspicuously stony.

A representative profile has a very dark-brown, friable sandy loam surface layer. The subsoil is grayish brown or olive gray mottled with yellowish brown, strong brown, and other colors. It is sandy loam and is friable to very friable. At a depth of about 18 to 24 inches, the lower subsoil grades to mottled, loose sand and gravel, loamy sand, or sand.

The Walpole soils generally have a sandy loam or fine sandy loam texture in the surface layer and upper subsoil, but the range of the series includes silt loam. The quantity of coarse fragments in the surface layer and subsoil ranges from practically none to about 30 percent. In the process of removing trees and spreading soil in drained areas, the soil profiles have been disturbed in places to a depth of 18 to 20 inches.

Walpole sandy loam (Wd).—This soil is dominantly sandy loam but includes areas of fine sandy loam. Runoff is slow to very slow, and internal drainage is slow because of a seasonally high water table.

A large part of this soil is in forest, and some of it is idle. A large part of the cleared acreage is used for hay and pasture. Small areas are drained or partly drained and used for silage corn, potatoes, vegetables, and other crops. Undrained areas are best suited to hay and pasture. Partially drained areas are suitable for silage corn and late vegetables. The soil is not suitable for alfalfa and tree fruits.

Drainage, fertilizer, and lime are the major needs of this soil. It is relatively easy to drain because of the sandy, gravelly substrata. (Capability unit IIIw–1; woodland suitability group 4; urban group 12)

Wapping Series

The Wapping series consists of moderately well drained silty soils over glacial till. The till is very friable to firm in place and was derived mainly from reddish rocks.

These soils are near the well-drained Narragansett and Cheshire soils in the Central Lowland. The Wapping soils are coarser than the moderately well drained Watchaug soils and are not so red.

In a cultivated area, a representative profile has a dark-brown, mellow and friable silt loam plow layer 8 to 10 inches thick. The upper subsoil is brown silt loam that is very friable, unless a plowsole has developed just underneath the surface layer. The color of the subsoil grades to brown mottled with yellowish brown and pale brown at a depth of about 18 inches. The surface layer and subsoil contain some angular fragments of rock. The lower subsoil grades to reddish-brown gravelly sandy loam or fine sandy loam at a depth of 24 to 30 inches. This layer is friable to slightly firm in place.

The depth of the silty material over gravelly glacial till generally ranges from about 20 to 30 inches. The quantity of small, angular fragments of rock in the surface layer and subsoil varies from about 2 to 20 percent. In places nonstony areas have a few stones on the surface.

Wapping silt loam, 0 to 3 percent slopes (WeA).—This soil is moderately permeable, but a seasonally high water table restricts internal drainage. Runoff is generally slow, and the soil dries out somewhat slowly in spring.

Most of this soil has been cleared and is used for hay and pasture, but some of it is used for tobacco, potatoes, silage corn, and other crops. Undrained areas are suitable for silage corn, late vegetables, small fruits, and adapted legumes and grasses. Partly drained areas are suitable for potatoes and alfalfa.

Fertilizer, drainage in places, and rotations that maintain good tilth are the major needs of this soil. Diversion ditches for intercepting runoff from higher areas are desirable in places. (Capability unit IIw–1; woodland suitability group 1; urban group 5)

Wapping silt loam, 3 to 8 percent slopes (WeB).—Controlling water on this soil is a moderate problem. Otherwise, the soil is similar to Wapping silt loam, 0 to 3 percent slopes. This soil absorbs water rather slowly and erodes readily, even on gentle slopes. In use and suitability, it is the same as Wapping silt loam, 0 to 3 percent slopes, and requires about the same management, but simple practices that control erosion are needed if this soil is used for clean-cultivated crops. (Capability unit IIwe–1; woodland suitability group 1; urban group 5)

Wapping stony silt loam, 3 to 8 percent slopes (WfB).—This stony soil is inextensive. Most of it is on slopes of 3 to 8 percent, but it includes small areas on slopes of 0 to 3 percent. Part of the acreage is in forest, and part is cleared and used for pasture and hay. The soil can be worked for hay, improved pasture, and small fruits, but intensive cultivation is difficult. The soil should be drained for tree fruits, but it is generally suitable for hay and pasture without drainage. Simple practices are necessary to control erosion in unprotected areas. (Capability unit IVws–1; woodland suitability 1; urban group 5)

Watchaug Series

The Watchaug series consists of reddish, moderately well drained soils formed on glacial till. The till was derived principally from reddish rocks.

The Watchaug soils are near the well-drained Cheshire soils in the Central Lowland. They commonly occur near the moderately well drained Wapping soils, from which they differ in color and texture.

A representative profile in a cultivated area has a dark reddish-gray, friable fine sandy loam surface layer. The subsoil layers are reddish-brown, friable to very friable fine sandy loam, faintly mottled in the lower part. The lower subsoil grades to yellowish-red gravelly loamy sand or sandy loam at a depth of 24 to 30 inches. It is very friable to slightly firm in place. The quantity of angular rock fragments generally ranges from about 10 to 15 percent by volume in the surface layer and subsoil.

Fine sandy loam is the principal type, but sandy loam is within the range of the series. The surface layer is silt loam in places. The underlying glacial till ranges from gravelly loamy sand to gravelly fine sandy loam. It is very friabe to firm in places.

Watchaug fine sandy loam, 0 to 3 percent slopes (WgA).—This soil occurs in scattered areas. It is moderately permeable, but a seasonally high water table restricts drainage. It has a high moisture-holding capacity. Runoff is slow to medium.

Most of the acreage has been cleared and is used for hay and pasture and for silage corn, tobacco, potatoes, and other crops. Undrained areas are well suited to adapted legumes and grasses, to silage corn, and to late vegetables. Partly drained areas are suitable for potatoes, tobacco, and alfalfa. Fertilization, drainage in places, and rotations that maintain good tilth are the major needs. Diversion ditches that intercept runoff from higher areas are desirable in places. (Capability unit IIw–1; woodland suitability group 1; urban group 5)

Watchaug fine sandy loam, 3 to 8 percent slopes (WgB).—Runoff is moderate on this soil. Otherwise, it is similar to Watchaug fine sandy loam, 0 to 3 percent slopes. It is used for and suitable for the same crops and requires the same management, except that simple practices are needed to control erosion on clean-cultivated areas. (Capability unit IIwe–1; woodland suitability group 1; urban group 5)

Whitman Series

The Whitman series consists of very poorly drained soils that formed over glacial till.

They occupy low, wet areas in the uplands throughout the Eastern Highland. The Whitman soils are near the Charlton, Paxton, Gloucester, and associated soils. The Whitman soils generally have a finer texture than the very poorly drained Scarboro soils of the terraces and are conspicuously stony and bouldery.

Their surface layer is very dark brown to black fine sandy loam 8 to 12 inches thick. The subsoil or subsurface layers are gray, dark gray, or olive gray that is finely mottled with yellowish brown, strong brown, pale brown, and other colors. The texture of these layers is stony and gravelly sandy loam or fine sandy loam.

These soils contain much organic matter. Their dominant textures are sandy loam and fine sandy loam, but the range is from loamy sand to silt loam. The Whitman soils are generally conspicuously stony, except in scattered areas where most of the surface stones have been removed.

Whitman stony fine sandy loam (Wp).—This soil occurs in small, widely scattered areas. Most areas are stony, but most of the surface stones have been removed from a few small areas. The soil is largely in forest or is idle. Small areas have been cleared and are used for unimproved pasture. Partly drained areas support fair pasture. (Capability unit Vws–1; woodland suitability group 8; urban group 13)

Wilbraham Series

The soils in the Wilbraham series are poorly to somewhat poorly drained. They have formed on a hard layer in glacial till that was derived principally from reddish-brown rocks. The Wilbraham soils are in small areas in the Central Lowland.

They are near the well drained Cheshire, Broadbrook, and Poquonock soils and the moderately well drained Wapping and Birchwood soils. The Wilbraham soils are finer textured than the poorly drained Ridgebury soils and are redder, especially in the hard layer at a depth of 18 to 24 inches.

The 4- to 8-inch surface layer is very dark grayish-brown to black, friable silt loam. The upper subsoil is grayish brown mottled with yellowish brown and reddish brown. In places the lower subsoil is reddish brown mottled with grayish brown. The subsoil layers are generally friable silt loam but may be very fine sandy loam or fine sandy loam in places. At a depth of 18 to 24 inches, the lower subsoil is underlain by a reddish-brown, hard, compact layer. This layer has a few mottles and is generally gravelly sandy loam. It is hard to dig with a spade but crumbles readily in the hand when disturbed.

The depth to the hard, compact layer ranges from about 18 to 24 inches in most places. The intensity and kind of mottling vary considerably in the subsoil layer. Small rock fragments of gravel size are common throughout the profiles and range in quantity from about 10 to 30 percent. The quantity of surface stones ranges from practically none to stony.

Wilbraham silt loam (Wr).—This soil is in small areas. Included with this soil are areas that are less reddish in the subsoil than is typical of Wilbraham soils. Also, included are some areas that do not have the hard, compact layer. The substratum is friable to firm.

Runoff is slow to very slow, and internal drainage is slow. Undrained, cleared areas are used mainly for hay and pasture or are idle. Small areas are drained and used for corn, tobacco, potatoes, and other cultivated crops. Drainage, fertilizer, and lime are needed for this soil. (Capability unit IIIw–1; woodland suitability group 4; urban group 12)

Wilbraham stony silt loam (Ws).—This soil occurs in small, widely scattered areas. Because of stones and poor drainage, it is largely in forest or is idle. Some areas are used for pasture. If this soil is drained, it is suitable for legumes and grasses for hay and pasture. Unimproved pasture furnishes fair grazing during summer. Pasture can be improved by fertilizing and by controlling brush. (Capability unit Vws–2; woodland suitability group 4; urban group 12)

Windsor Series

Soils in the Windsor series are excessively drained loamy sand and sand. They occur in scattered areas on undulating to sloping terraces, mainly in the Central Lowland. The Windsor soils are near the Hinckley and Agawam soils. They lack the gravel that is characteristic of the Hinckley soils and are coarser textured than the Agawam soils.

In areas that have been cultivated, the 6- to 8-inch surface layer is dark yellowish-brown loamy sand. The subsoil is yellowish brown loamy sand in the upper part and grades to brown loamy sand or sand. Below 24 to 30 inches, the material is pale-brown or light brownish-gray sand.

Some profiles have little or no gravel in the subsoil and substratum. Small areas are reddish in the upper subsoil because of the influence of reddish rocks.

Windsor loamy sand, 3 to 8 percent slopes (WvB).—This soil occurs in small areas. It is very rapidly permeable and has a low moisture-holding capacity. It warms very early in spring, however, and crops grown on it are responsive to fertilizer when the moisture supply is adequate. Most of the soil is in scrubby forest or is idle. Scattered areas are used for crops and for hay and pasture. (Capability unit IVse–1; woodland suitability group 7; urban group 1)

Windsor loamy sand, 8 to 15 percent slopes (WvC).—This soil is inextensive and extremely droughty. Unprotected areas are subject to wind and water erosion. Nearly all of this soil is in forest or is idle. It is poorly suited to crops and pasture. (Capability unit IVse–1; woodland suitability group 7; urban group 1)

Winooski Series

The soils in the Winooski series are moderately well drained and silty. They are in scattered areas with Hadley and Limerick soils on the flood plains of the larger streams. The Winooski soils are finer textured than the moderately well drained Podunk soils. Most areas are flooded at least once a year, and some more often.

The surface layer is very dark grayish-brown to very dark brown, mellow and friable silt loam 6 to 10 inches thick. Underlying the surface layer is dark-brown to dark grayish-brown, friable silt loam. This material grades to mottled silt loam or very fine sandy loam at a depth of 12 to 24 inches. At a depth between 20 and 36 inches, the soil is coarser textured and ranges from loamy sand to mostly sand and gravel.

In Tolland County the Winooski soils have been mapped only with the Hadley soils in an undifferentiated unit.

Winooski and Hadley silt loams (0 to 3 percent slopes) (Ww).—This mapping unit includes about 100 acres of Winooski silt loam and about 50 acres of Hadley silt loam. Hadley soils are described under the Hadley series.

These soils occur in small, widely scattered areas. Most of the acreage has been cleared and is used for hay and pasture and for corn and vegetables. Winooski soils are suited to hay and pasture and are fairly well suited to corn and late vegetables. Hadley soils are well suited to general crops. Cultivated crops on these soils are damaged occasionally by floods. (Capability unit IIw–5; woodland suitability group 1; urban group 14)

Woodbridge Series

The Woodbridge series consists of moderately well drained soils that have formed over glacial till deposits derived mainly from schist and gneiss. The soils have a hard, compact layer at a depth of 20 to 30 inches. This layer is difficult to dig with a spade, but it crumbles readily in the hand when disturbed.

Woodbridge soils are near the Paxton and Ridgebury soils and are scattered throughout the Eastern Highland. They commonly occur in nearly level areas on the crest of hills or on slightly concave lower slopes that receive runoff and seepage from higher areas.

A representative profile in a cultivated area has a surface layer of very dark grayish-brown, friable fine sandy loam about 8 inches thick. The upper subsoil is dark yellowish-brown, friable to very friable fine sandy loam that contains some small angular fragments of rock. At a depth of 16 to 18 inches, the subsoil grades to yellowish-brown fine sandy loam mottled with grayish brown and strong brown. At 18 to 24 inches the lower subsoil is underlain by a hard, compact layer that is olive gray mottled with strong brown and yellowish brown. This compact layer is sandy loam or fine sandy loam. Water passes through it slowly.

Fine sandy loam and stony fine sandy loam are the common types, but very fine sandy loam and light silt loam are within the range of the series. The quantity of angular rock fragments in the surface layer and subsoil ranges from about 10 to 30 percent. The quantity of surface stones ranges from practically none, in some areas that have been cleared of stone, to very many. The depth to the hard layer generally is 20 to 24 inches, but the range is from 16 to 30 inches. In small areas, the hard substratum has a reddish color derived from the reddish rocks of the Central Lowland.

Woodbridge fine sandy loam, 0 to 3 percent slopes (WxA).—This soil is moderately permeable above the hard layer, which is at a depth of 20 to 30 inches. This layer and a seasonally perched water table restrict internal drainage. The soil dries out rather slowly in spring and stays wet for several days after heavy rains in summer.

A large part of this soil has been cleared and is used principally for hay and pasture (fig. 7). Some of it is planted to corn for grain and silage, and some is used for vegetables and for small fruits. Without drainage, this soil is suitable for hay and pasture and small fruits and is fairly well suited to silage corn and late vegetables. Unless this soil is at least partly drained, it is poorly suited to tree fruits, alfalfa, and early vegetables.

Terraces are desirable in places to divert seepage and runoff from higher areas. Fertilizer and lime are necessary to obtain high yields of hay, pasture, and cultivated crops. (Capability unit IIw–2; woodland suitability group 1; urban group 9)

Woodbridge fine sandy loam, 3 to 8 percent slopes (WxB).—This soil has freer surface drainage than Woodbridge fine sandy loam, 0 to 3 percent slopes. Scattered areas on slopes of 8 to 15 percent are included. This soil has essentially the same use and suitability as the soil on 0 to 3 percent slopes. Clean-cultivated areas should be protected by simple practices that control runoff and erosion. (Capability unit IIwe–2; woodland suitability group 1; urban group 9)

Woodbridge stony fine sandy loam, 0 to 3 percent slopes (WyA).—Most of this soil is in cutover forest. Some of it is idle, and some has been cleared. The cleared areas are used mainly for hay and pasture, but small areas are used for cultivated crops and tree fruits.

Because of stones, this soil is not suitable for crops that require intensive cultivation, but it can be worked for hay, improved pasture, small grain, and tree fruits or small fruits. The soil should be drained for tree fruits, but it is generally suitable for hay and pasture without drainage. Legumes and grasses need lime and fertilizer. (Capability unit IVws–2; woodland suitability group 1; urban group 9)

Woodbridge stony fine sandy loam, 3 to 8 percent slopes (WyB).—This soil has better surface drainage than Woodbridge stony fine sandy loam, 0 to 3 percent slopes, but it has essentially the same use and suitability. Most areas have slopes of 3 to 8 percent, but a few areas with slopes of 8 to 15 percent are included. (Capability unit IVws–2; woodland suitability group 1; urban group 9)

Woodbridge very stony fine sandy loam, 0 to 3 percent slopes (WzA).—This soil is not extensive. It is largely in forest. Scattered areas have been cleared and are used mainly for unimproved pasture or are idle (fig. 8). The soil is too stony for cultivated crops, but some areas can be worked for improved pasture. This soil is best suited to forest, pasture, and wildlife. (Capability unit Vs–1; woodland suitability group 1; urban group 10)

Figure 7.—**Improved pasture on Woodbridge fine sandy loam.**

Woodbridge very stony fine sandy loam, 3 to 15 percent slopes (WzC).—This soil has freer surface drainage than Woodbridge very stony fine sandy loam, 0 to 3 percent slopes. The use and suitability are essentially the same. (Capability unit VIs–2; woodland suitability group 1; urban group 10)

Formation, Classification, and Morphology of Soils

The factors that have affected the formation and composition of the soils in Tolland County are discussed in this section. The soil series are classified by order and great soil groups, and a representative profile of each soil series is described. The physical and chemical properties of four selected soil profiles are given at the end of this section.

Formation of Soils

Soil is formed by weathering and other processes that act on the parent material. At any given point, the characteristics of the soil depend on (1) the physical and mineralogical composition of the parent material; (2) the climate under which the parent material has accumulated and has existed since accumulation; (3) the plant and animal life in and on the soil; (4) physiography and drainage; and (5) the length of time the forces of soil development have acted on the parent material. The relative importance of each of these factors differs from place to place and, in some cases, one factor may dominate in the formation of a soil.

Soil-forming factors

Soil formation begins with physical weathering. Large pieces of rock are broken into smaller pieces by frost action, by differential expansion of minerals, by exfoliation, by action of water, ice, and wind, and by the influence of plants and animals. Chemical weathering occurs through the processes of hydrolysis, hydration, oxidation, solution, carbonation, and related processes.

The differences among soils in Tolland County can be attributed mainly to parent material, physiography and drainage, and time. The influence of the other soil-forming factors—climate and living organisms—has been fairly uniform throughout the county, and therefore these factors do not account for important differences among the soils. The kinds of rocks that are in glacial drift and the waterborne and windborne material deposited during the glacial recession and in the postglacial period have provided the parent materials from which soils have formed. Soils that have different topography differ mainly because of drainage. Soils in alluvial sediments have been affected less than many of the others by soil-forming processes.

Climate.—The climate of Tolland County is a cool, humid, modified oceanic type. Winters are long and moderately cool; summers are short and mild. The average annual precipitation of 46.2 inches is fairly evenly distributed throughout the year. Detailed information on climate is given in the section "General Nature of the County."

The influences of climate on soil formation are physical, chemical, and biological. Climate influences the formation of soils by its effect on the rate of weathering and decomposition of minerals. The amount of water percolating through the soil alters its chemical composition over a long period of time. The leaching of soluble chemical constituents, which have been produced by weathering, depends largely on the amount of rainfall.

Temperature also has an important effect on soil formation. Greater biological activity, hence more rapid destruction of organic material, occurs as the mean average temperature increases. Mineralization of organic matter in Tolland County progresses at a fairly rapid rate because the average temperature is 47.9° F.

Frost action in the soil tends to affect the structural properties and thereby increases seasonal aggregation within the frost area. This affects the percolation rate and the leaching potential of the soil.

Plant and animal life.—Plants, micro-organisms, earthworms, ants, rodents, and other forms of life that live on and in the soil are active in soil-forming processes. The changes they bring about depend mainly on the kinds of life processes peculiar to each. Vegetation furnishes organic material that living organisms, such as bacteria and fungi, break down into simpler compounds. Small animals, insects, worms, and roots may make the soil more permeable to water by making channels in it. Animals also cause mixing of the soil materials. The kinds of plants and animals are determined by climate, physical and chemical characteristics of the soils, activities of man, and other factors. The importance of ants to Brown Podzolic soil genesis in New England is discussed by Lyford (*21*).

Figure 8.—**Unimproved pasture on Woodbridge very stony fine sandy loam.**

On the well drained and 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 the native vegetation were associated mainly with the 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 on woodland.

Parent material.—The parent material of the soils in the county consists of (1) glacial drift deposited during the Late Wisconsin glaciation, (2) contemporary or past glacial wind deposits, and (3) recent alluvial sediments. The depth, texture, color, permeability, and other soil characteristics reflect the influence of parent material.

Most of the county is in the Eastern Highland geologic and physiographic region of the State, but the northeast corner is in the Central Lowland geologic and physiographic region. Geologic formation in the Eastern Highland consist mainly of crystalline gneiss and schist (*8, 25*). These formations have provided most of the parent material for the soils in the area. The ice carried the glacial debris over short distances; therefore, the mantle of glacial till is closely related to the underlying gneiss, schist, and granite bedrock. The till varies in texture from gravelly sand or loamy sand to gravelly loam. The thickness of the mantle of glacial till ranges from none, where bedrock is exposed, to more than 10 feet. When the glacier receded, the melting ice produced large amounts of water, which carried gravel, sand, and silt and deposited them as stratified drift in the narrow valleys. The glacial drift in this area is acid.

The Central Lowland section, in the northeast corner of the county, is underlain by reddish sedimentary Triassic rocks (*8*, *25*). These rocks range from coarse-grained conglomerate to siltstone or shale. These formations have furnished much of the parent material for the reddish soils in this area that overlie unstratified or stratified drift. The soils in windblown or waterlain deposits also show in their substratum, if not in their solum, the influence of the reddish rocks. In some places the glacial till in this area is slightly acid to mildly alkaline at a depth of 8 to 15 feet but all the soils are very strongly acid to medium acid.

Physiography and drainage.—The Eastern Highland rises abruptly from the Central Lowland. The area consists mainly of till plains and drumlins or drumloidal hills dissected by narrow valleys of stratified drift that border narrow flood plains along the larger streams. Relief is generally moderate and ranges from gently sloping or undulating to hilly. The hilly areas have some narrow steep slopes.

Elevations range from about 200 feet above sea level along the Natchaug River in the southeast corner of the county to about 1,300 feet on the crest of the highest hills in the northern part. Drainage is mainly to the south, southeast, and southwest through the Mt. Hope, Willimantic, and Hop Rivers and their tributaries.

The Central Lowland is an area of nearly level terraces and low-lying, smoothly rounded glacial hills in the northeast corner of the county. Surface relief ranges from nearly level to sloping. Elevations above sea level range from about 200 feet in some of the valleys to 450 feet on the crest of the highest hills. Drainage is mainly to the south, west, and north through the Scantic and Hockanum Rivers, Broad Brook, and their tributaries.

Time.—The last of the Wisconsin glaciers retreated from the area probably between 10,000 and 15,000 years ago. Consequently, the soils are young and, except in color, the horizons are generally weakly expressed. Differences in time have not been responsible for the differences in the kind and distinctness of horizons among soils of the uplands. These differences have been caused mainly by varying combinations of parent material, relief, and living organisms.

There is little evidence of movement of silicate clay in the profiles. Movement of silt is evident, as indicated by silt films in fragipans and silt caps on rock fragments in the lower B and C horizons.

Classification of Soils

The system of soil classification used in the United States consists of six categories—the order, suborder, great soil group, family, series, and type. The suborder and family categories have never been fully developed. The soils are first grouped into the lower categories of soil types and series, then into great soil groups, and in turn, into orders. The orders are zonal, intrazonal, and azonal. In Tolland County the orders and the great soil groups in them are as follows: Zonal order—Brown Podzolic soils; intrazonal order—Low-Humic Gley soils, Humic Gley soils, and Bog soils; azonal order—Alluvial soils.

In this section the five great soil groups in the county are briefly discussed and the soil series in each are listed. The classification of the soil series according to great soil group and natural drainage is shown in table 9. Parent material, topography, drainage, and time have been the dominant factors in the development of soils in all of these great soil groups. All poorly and very poorly drained soils are in the Low-Humic Gley, Humic Gley, and Bog groups because the influence of drainage outweighs the influence of the other soil-forming factors, including parent material.

Brown Podzolic soils

Of the five great soil groups in Tolland County, the Brown Podzolic soils (*19*, *20*) are most nearly zonal, as they reflect rather strongly 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 underlain by a very dark grayish-brown A1 horizon that ranges from ½ inch to about 2½ inches in thickness. In places the A1 horizon is underlain by a thin A2 horizon, or bleicherde, that is barely visible, or it may be as much as one-half 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 that are leached from the organic mat combine chemically with the aluminum and iron that are 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 horizon is generally fairly uniform in texture, but in some soils it is coarser with depth.

The Brown Podzolic soils have developed from a variety of materials that consist of (1) acid glacial drift; (2) a silty mantle and moderately coarse to coarse, water-deposited or windblown sediments over a nonconforming fragipan horizon; (3) a silty mantle over a nonconforming, coarse C horizon; and (4) moderately coarse to coarse textured, water-deposited material over coarse sand and gravel or sand.

The moderately coarse *Charlton* and *Paxton* soils and the associated, moderately well drained *Sutton* and *Woodbridge* soils are the principal Brown Podzolic soils that have developed on glacial till in the Eastern Highland section. The Charlton and Paxton soils are somewhat similar in texture and lithology. The Charlton soils, however, have developed on friable to firm glacial till, and the Paxton soils have a fragipan. The physical, chemical, and mineralogical properties of Paxton fine sandy loam are described by Tamura (*31*).

The *Gloucester* and *Brookfield* and the shallow *Hollis* and *Brimfield* soils are the less extensive Brown Podzolic soils in this area. The Gloucester soils have developed

Table 9.—*The soil series classified according to great soil groups and natural drainage*

[The great soil groups are designated as follows: (A) Alluvial soils; (BP) Brown Podzolic soils; (LHG) Low-Humic Gley soils; (HG) Humic Gley soils; and (B) Bog Soils]

Topographic position and parent material	Excessively drained	Somewhat excessively drained	Well drained	Moderately well drained	Poorly drained to somewhat poorly drained	Very poorly drained
Uplands—						
Moderately coarse to coarse textured glacial till, mainly from schist and gneiss.	----------	Hollis [1] (BP).	Charlton (BP).	Sutton (BP)	Leicester (LHG).	Whitman (HG).
Coarse-textured glacial till, mainly from granitic rocks.	----------	Gloucester (BP).	----------	----------	----------	----------
Glacial till that has a large proportion of brown mica schist.	----------	Brimfield [1] (BP).	Brookfield (BP).	----------	----------	----------
Glacial till derived mainly from schist and gneiss; contains a fragipan.	----------	----------	Paxton (BP)	Woodbridge (BP).	Ridgebury (LHG).	Whitman (HG).
Glacial till derived mainly from reddish, Triassic, sedimentary rocks.	----------	----------	Cheshire (BP).	Watchaug (BP).	Wilbraham (LHG).	----------
Silty mantle over a fragipan developed in moderately coarse textured glacial till.	----------	----------	Broadbrook (BP).	Rainbow (BP)	----------	----------
Silty mantle over coarse to moderately coarse textured glacial till.	----------	----------	Narragansett (BP).	Wapping (BP)	----------	----------
Coarse to moderately coarse textured, water-lain or windblown sediments over a fragipan in glacial till derived principally from reddish Triassic rocks.	----------	----------	Poquonock [2] (BP).	Birchwood (BP).	----------	----------
Terraces—						
Moderately coarse and coarse textured soils over stratified sand and gravel, mainly from crystalline rocks.	Hinckley (BP).	Merrimac [3] (BP).	Merrimac [3] (BP).	Sudbury (BP).	Walpole (LHG).	Scarboro (HG).
Moderately coarse and coarse textured soils over deep sands.	Windsor (BP).	Agawam [3] (BP).	Agawam [3] (BP).	Ninigret (BP).	----------	----------
Moderately coarse and coarse textured soils over sand and gravel that contains a large proportion of brown mica schist.	Jaffrey (BP)	----------	----------	----------	----------	----------
Moderately coarse and coarse textured soils over sand and gravel, mainly from reddish Triassic rocks.	Manchester (BP).	Hartford [3] (BP).	Hartford [3] (BP).	Ellington (BP)	----------	----------
A silty mantle over stratified sand and gravel from various rocks.	----------	----------	Enfield (BP)	Tisbury (BP)	----------	----------
Deep, medium-textured soil	----------	----------	----------	----------	Raynham (LHG).	----------
Flood plains—						
Moderately coarse textured, acid alluvium.	----------	----------	Ondawa (A)	Podunk (A)	Rumney (LHG).	Saco (HG)
Medium-textured, acid alluvium	----------	----------	Hadley (A)	Winooski (A)	Limerick (LHG).	----------
Organic deposits—						
Plants in various stages of decomposition	----------	----------	----------	----------	----------	Peat and Muck (B). Peat and Muck, shallow (B).

[1] Shallow soils over bedrock. Developed from a thin mantle of glacial till and residuum from the underlying bedrock. Ranges from well drained to somewhat excessively drained.

[2] Mostly well drained but ranges from well drained to somewhat excessively drained.

[3] In two drainage classes because of range in texture and moisture-holding capacity.

over coarse-textured glacial till that contains much quartz, and these soils are coarse textured to moderately coarse textured in the solum. The Brookfield soils are similar to the Charlton in texture but are reddish in the upper B horizon because they have been influenced by a large proportion of brown, micaceous schist in the parent material.

The *Cheshire* soils and associated moderately well drained *Watchaug* soils are reddish. They have developed on the uplands in the Central Lowland, on glacial till derived principally from reddish-brown Triassic rocks.

The *Broadbrook*, *Narragansett*, and associated *Rainbow* and *Wapping* soils have developed in a silty mantle over glacial till of different lithology. The Broadbrook and Rainbow soils have formed over a fragipan in glacial till derived principally from Triassic rocks. The Narragansett and Wapping soils have developed over friable to firm glacial till derived principally from Triassic rocks. The *Poquonock* and *Birchwood* soils have developed from coarse to moderately coarse textured, water-deposited or windblown sediments over a fragipan in glacial till derived principally from reddish Triassic rocks. These soils occur principally in the Central Lowland.

Soils of the *Enfield* and *Tisbury* series have developed in a silty mantle over stratified sand and gravel from Triassic sedimentary rocks and crystalline rocks. These soils occur in the Central Lowland and Eastern Highland. Some physical, chemical, and mineralogical properties of the Narragansett and Enfield soils in the Central Lowland are described by Ritchie, Tamura, and others (*24*, *32*).

The soils of the *Hinckley*, *Jaffrey*, *Merrimac*, and *Sudbury* series have developed over stratified sand and gravel derived principally from crystalline rocks. Some of the physical, chemical, and mineralogical properties of Merrimac fine sandy loam are described by Tamura (*31*); by Swanson, Shearin, and Bourbeau (*30*); and by Bourbeau and Swanson (*2*). The gravel content, depth, and other characteristics of the Hinckley and Merrimac soils are described by Swanson and Ritchie (*29*). Soils of the *Manchester*, *Hartford*, and *Ellington* series are moderately coarse textured and coarse textured and are over sand and gravel derived mainly from reddish-brown Triassic rocks. Soils of the *Windsor*, *Agawam*, and *Ninigret* series are moderately coarse textured and coarse textured and are over deep sands.

Low-Humic Gley soils

The Low-Humic Gley great soil group (*33*) consists of poorly drained to somewhat poorly drained soils. They have a very dark grayish-brown to very dark brown surface layer and a mottled subsurface layer. Organic matter is incorporated in the dark A1 or Ap horizon and does not accumulate on the surface. The water table in these soils is at or near the surface during winter and early in spring. Consequently, the soils are deficient in oxygen. Water-soluble products of plant decomposition move down through the profile and cause solution, reduction, and removal of ferric compounds. The change in ferric compounds results in gray and strongly contrasting mottled horizons under the dark surface horizon.

The *Leicester*, *Limerick*, *Raynham*, *Ridgebury*, *Rumney*, *Wilbraham*, and *Walpole* soils are representative of this great soil group.

Humic Gley soils

The Humic Gley great soil group includes very poorly drained soils (*33*). They are characterized by a moderately thick, dark-colored surface horizon that contains much organic matter and is underlain by gleyed horizons. Water stands on the surface in most areas from late in fall until late in spring. Organic matter decomposes slowly and accumulates on the surface in places. The upper subsurface layer is dominantly gray and has a few prominent mottles in old root channels. Mottling increases in the lower subsurface horizon.

The *Whitman*, *Saco*, and *Scarboro* are the only soil series in this great soil group in Tolland County.

Bog soils

This great soil group consists of organic remains in various stages of decomposition. Bog soils have developed in wet depressions. Water-tolerant plants grow in these depressions, and dead plants sink to the bottom and decay slowly. In this manner organic plant material accumulates. Organic deposits in this county are classified as *Peat* and *Muck*.

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 soil series in this group are the *Hadley*, *Ondawa*, *Podunk*, and *Winooski*.

Morphology of Soils

In this subsection the morphology of each soil series is described. Each description contains (1) a discussion of the drainage, parent material, and associated soils, (2) a technical profile description, and (3) the range of characteristics within the series. In these descriptions the Munsell color notations are for moist soil. Dry soils are normally one or two units lighter in value.

AGAWAM SERIES

The Agawam series consists of well drained to somewhat excessively drained Brown Podzolic soils that developed on deep sand deposits, principally on stream terraces. The parent material was derived principally from schist, granite, and gneiss and from some reddish-brown Triassic rocks in the Connecticut River valley.

The Agawam soils are members of the catena (drainage sequence) that includes the moderately well drained Ninigret soils. The associated poorly drained and very poorly drained soils are the Walpole and Scarboro. The Agawam soils occur with soils of the Merrimac, Enfield, and Windsor series. They lack the sand and gravel substratum of the Merrimac soils and generally have fewer coarse fragments in the solum. The Agawam soils are coarser textured than the Enfield and lack the sand and gravel substratum of those soils. The Agawam soils are finer textured than the Windsor soils.

Profile of Agawam sandy loam, 0 to 3 percent slopes, in a cultivated field in Somers:

Ap—0 to 9 inches, dark-brown (10YR 3/3) sandy loam; weak, medium, granular structure in the upper few inches; very friable; abrupt, smooth boundary.
B21—9 to 20 inches, yellowish-brown (10YR 5/6) sandy loam; breaks into soft subangular clods when disturbed; very friable; clear, smooth boundary.
B22—20 to 26 inches, brown (10YR 5/3) sandy loam; breaks into soft subangular clods when disturbed; very friable; clear, smooth boundary.
C1—26 to 36 inches, grayish-brown (2.5Y 5/2) loamy sand; loose.
C2—36 to 60 inches, pale-brown (10YR 6/3) loamy sand with a few pebbles from crystalline and Triassic rocks.

The texture is dominantly sandy loam and fine sandy loam, but very fine sandy loam to a depth of 12 to 14 inches is within the range of the series. The soils have been influenced by eolian deposits in places. Normally, the solum and substratum are essentially free of coarse fragments to a depth of 3½ to 4 feet, but the proportion of coarse fragments can be as much as 10 percent within the range of the series. Stratified sand and gravel may occur at a depth below 42 inches. The depth to the C horizon ranges from about 18 to 30 inches.

The Ap horizon generally has a hue of 10YR with a value and chroma of 3 to 4. The B21 horizon commonly has a hue of 10YR and in a few places, 7.5YR, with a value of 4 to 5 and chroma of 4 to 6, and the lower B horizon has a hue of 10YR or 2.5Y.

BIRCHWOOD SERIES

The Birchwood series consists of moderately well drained Brown Podzolic soils that developed in moderately coarse to coarse, waterlain or windblown material over a fragipan in glacial till. The fragipan developed in Late Wisconsin till derived principally from reddish-brown Triassic sandstone, shale, and conglomerate that contains some basalt in places.

The Birchwood series is the moderately well drained member of the catena that includes the well drained Poquonock series. These are the only two members of the catena recognized at present. The Birchwood soils occur with the Broadbrook and associated Rainbow and Watchaug soils. The Birchwood soils differ from the moderately well drained Rainbow soils in being coarser above the fragipan, and from the Watchaug soils in color and texture. The horizons above the fragipan are very similar to the A and B horizons of the moderately well drained Sudbury soils, which are on terraces and are underlain by stratified sand and gravel. The Birchwood soils are not extensive, and they are not important agriculturally, except locally.

A profile of Birchwood sandy loam on a slope of 2 percent in a cultivated field, about 2 miles southwest of North Somers in the town of Somers:

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) sandy loam; very weak, medium to coarse, granular structure; very friable; 15 to 20 percent coarse skeleton; abrupt, smooth boundary.

B21—8 to 18 inches, yellowish-brown (10YR 5/6) sandy loam; breaks into soft subangular blocky clods when disturbed; very friable; 10 percent coarse skeleton; clear, wavy boundary.

B22—18 to 24 inches, yellowish-brown (10YR 5/4) loamy sand mottled with grayish brown (10YR 5/2) and strong brown (10YR 5/8); mottles are common, fine, and distinct; breaks into medium subangular blocky clods that are very friable; 15 percent coarse skeleton; clear, wavy boundary.

IICx—24 to 36 inches, yellowish-red (5YR 4/6–4/8) gravelly loam with a few reddish-gray (5YR 5/2) and brown (10YR 5/2) mottles; weak, coarse, platy structure; very firm in place but crushes easily when disturbed; silt films are present on some rock fragments and in some pores.

The texture to a depth of 12 to 18 inches is dominantly light fine sandy loam or light sandy loam, but loamy sand is within the range of the series. Between the first 12 or 18 inches and the fragipan, the texture is generally loamy sand or sand. The depth to the fragipan generally ranges from 24 to 36 inches, but it is more in places. In the horizons above the fragipan, the proportion of coarse skeleton, generally of angular rock fragments, varies from none to about 15 percent.

Drainage is from moderately good to the upper range of somewhat poor. Therefore, the depth to mottling and the intensity of mottling vary. The Ap horizon is generally very dark grayish brown (10YR 3/2), but the range includes a chroma of 2 to 3 and a value of 3 to 4 in the same hue. The upper B horizon has hues of 10YR and 7.5YR with a chroma of 4 to 8 and a value of 4 or 5. The fragipan generally has a hue of 5YR or 2.5YR, with a chroma of 3 to 8 and a value of 4 to 5 in the matrix.

BRIMFIELD SERIES

The Brimfield series consists of well-drained to somewhat excessively drained, shallow Brown Podzolic soils. These soils developed in a thin mantle of glacial till derived principally from brown mica schist that weathers to reddish brown or strong brown, or from residuum of brown mica schist. The underlying bedrock generally includes gray mica schist, gneiss, and other formations, in addition to the rusty-brown mica schist, sometimes referred to as pyritiferous mica schist.

The Brimfield soils commonly occur near the deep, reddish Brookfield soils and the shallow Hollis soils. The Brimfield soils differ from the Hollis in having a reddish-brown or yellowish-red B21 horizon.

A profile of Brimfield very rocky fine sandy loam on a slope of 3 to 8 percent in a forested area about 2 miles east of Stafford Springs:

O1—2 inches to 1 inch, raw leaves and twigs.

O2—1 inch to 0, partly decomposed and well decomposed litter.

A1—0 to 1 inch, very dark grayish-brown (10YR 3/2) fine sandy loam; well matted with roots; weak, fine, granular structure; very friable; abrupt, smooth boundary.

B21—1 to 8 inches, yellowish-red (5YR 4/6) fine sandy loam; breaks into soft subangular blocky clods that are very friable; 15 to 20 percent coarse skeleton; clear, wavy boundary.

B22—8 to 14 inches, yellowish-red (5YR 5/6) gravelly fine sandy loam; breaks into soft subangular blocky clods that are very friable.

R—14 inches +, reddish-brown mica schist bedrock.

Fine sandy loam is the dominant texture, but light silt loam and sandy loam are within the range of the series. Bedrock exposures range from a few to many and occupy from about 5 to 50 percent of the surface. Areas where bedrock exposures occupy more than 50 percent of the surface are generally classified as Rock land. Scattered areas have been cleared of stones and boulders, but most areas have a varying amount of stones and boulders in addition to bedrock exposures. The depth of the soil between the exposures ranges from a few inches to about 20 inches and averages 12 to 14 inches.

In the B21 horizon, a hue of 5YR, with a value of 3 to 5 and a chroma of 4 to 8, that fades with depth, is considered modal for the series. In deeper areas the lower B horizon generally has a hue of 7.5YR with a value of 4 to 5 and a chroma of 4 to 8.

BROADBROOK SERIES

The Broadbrook series consists of well-drained Brown Podzolic soils that developed in a silty mantle over a fragipan that is at a depth of 2 to 3 feet. The fragipan has developed in Late Wisconsin till. In the Central Lowland of Connecticut and Massachusetts, the till was derived principally from reddish-brown Triassic rocks with a varying amount of basalt. The definition of the series, however, is not restrictive as to the lithology of the till underlying the silty mantle.

The Broadbrook and the moderately well drained Rainbow series are the only members of the catena recognized at present. The Broadbrook soils commonly occur in association with Poquonock, Narragansett, and Enfield soils. They differ from the Poquonock soils in texture of the horizon above the fragipan, and from the Narragansett and Enfield soils in the character of the underlying material. Narragansett soils are underlain by very friable to firm, moderately coarse to coarse till, and Enfield soils are underlain by stratified sand and gravel. The texture of the fragipan in the Broadbrook soils is generally gravelly loam or silt loam but is gravelly sandy loam in places. These soils are fairly extensive and important locally in the Central Lowland of Connecticut, but the total acreage in southern New England is probably not very large.

A profile of Broadbrook silt loam on a slope of about 4 percent in a cultivated field on the Osborn Prison Farm about 1 mile east of the main buildings:

Ap—0 to 10 inches, dark-brown (10YR 3/3) silt loam; weak, medium, granular structure; friable to very friable; 2 to 3 percent coarse skeleton; abrupt, smooth boundary.

B21—10 to 18 inches, yellowish-brown (10YR 5/6) silt loam; very weak, coarse, subangular blocky structure; very friable; 2 to 3 percent coarse skeleton; clear, wavy boundary.

B22—18 to 24 inches, pale-brown (10YR 6/3) silt loam; breaks into soft subangular blocky clods that are very friable; 5 percent coarse skeleton; clear, wavy boundary.

IIC1—24 to 26 inches, yellowish-red (5YR 5/6) gravelly sandy loam; very friable.

IIC2x—26 to 36 inches, yellowish-red (5YR 4/6) gravelly sandy loam with streaks of reddish brown (5YR 5/3); weak, coarse, platy structure; very firm.

Silt loam is the dominant texture, but very fine sandy loam is within the range of the series. The principal variations are in the thickness of the silty mantle and the amount of small rock fragments and stones in the surface and subsurface layers. The silty mantle is generally 20 to 30 inches thick, but the range is from about 14 inches in some eroded areas to about 40 inches in small areas or pockets. The contact between the silty mantle and the fragipan is sharp in some places. In others there is a 4- to 6-inch transition layer of reddish-brown (5YR 5/3) gravelly sandy loam. Some areas are nearly free of small rock fragments and stones. In the eroded areas, the content of small angular rock fragments is 20 percent or more.

Very dark grayish brown (10YR 3/2) and dark brown (10YR 3/3) are the principal colors in the Ap horizon. Colors in the B2 horizon are generally of 7.5YR and 10YR hues, with a chroma of 3 to 8 and a value of 4 to 5. The strongest color is just beneath the Ap or A1 horizon, and it fades with depth.

BROOKFIELD SERIES

The Brookfield series is comprised of reddish, well-drained Brown Podzolic soils developed on coarse to moderately coarse Late Wisconsin till. The till was derived in part from rusty-brown mica schist that weathers to yellowish red or strong brown.

The Brookfield soils commonly occur near the shallow Brimfield soils. They differ in depth from the Brimfield soils, which have a relatively thin solum over bedrock and in many places lack a C horizon. The Brookfield soils also occur in association with the well-drained Charlton and Gloucester soils of the uplands and the Jaffrey and Merrimac soils of the terraces. Brookfield soils differ from Charlton soils mainly in color and depth of weathering, and from the Gloucester soils in color and texture. The difference in color between the Brookfield soils and the Charlton and Gloucester is rather striking when the soils are wet. The Brookfield soils are not very extensive or important agriculturally.

A profile of Brookfield stony fine sandy loam on a slope of 5 to 6 percent in a forested area in the town of Union, near the south end of Buckley Pond:

O1—2 inches to 1 inch, raw leaf litter.

O2—1 inch to 0, partly decomposed and well decomposed leaf litter.

A1—0 to 1 inch, very dark grayish-brown (10YR 3/2) fine sandy loam; weak, medium, granular structure; very friable; abrupt, smooth boundary.

B21—1 to 14 inches, yellowish-red (5YR 4/6) gravelly fine sandy loam; breaks into soft subangular blocky clods that are very friable; coarse skeleton consists of angular rock fragments; gradual, wavy boundary.

B22—14 to 26 inches, strong-brown (7.5YR 5/8) gravelly fine sandy loam, but close to sandy loam; breaks into soft subangular blocky clods that are very friable; gradual, wavy boundary.

C—26 to 40 inches, yellowish-brown (10YR 5/6), highly micaceous gravelly loamy sand; loose to very friable.

Fine sandy loam is the dominant texture, but to a depth of 10 to 14 inches, silt loam and sandy loam are within the range of the series. The texture below 24 to 30 inches is generally gravelly loamy sand but ranges from gravelly fine loam to gravelly loamy sand. A hue of 5YR, with a value of 4 to 5 and a chroma of 3 to 8, is considered modal for the B21 horizon. The B22 horizon generally has colors of strong brown (10YR 5/8 to 7.5YR 5/8).

Below a depth of 24 to 30 inches the hues are generally 10YR, 2.5Y, and 7.5YR, with a chroma of 4 to 8 and a value of 4 to 5, and in places there are pockets and streaks of grayer colors. In cultivated fields the Ap horizon is generally very dark grayish brown (10YR 3/2) or dark brown (10YR 3/3). Brookfield soils seem to be weathered more deeply than the associated Charlton soils and are generally uniformly colored throughout the solum and substratum, although the color fades with depth. Most areas of Brookfield soils are very stony to extremely stony, but surface stones have been removed from some areas.

CHARLTON SERIES

The Charlton series consists of well-drained Brown Podzolic soils that have a moderately coarse textured solum developed on Late Wisconsin glacial till. The till was derived principally from mica schist with phyllite in some places, and from gneiss and granite. The proportion of materials from schist and granite varies, but schistose materials are generally dominant.

The catenary associates of the Charlton soils are the moderately well drained Sutton, the poorly drained Leicester, and the very poorly drained Whitman soils. The Charlton soils are commonly associated with the shallow

Hollis, Paxton, and Brookfield soils, which developed on glacial till, and with the Hinckley and Merrimac soils, which developed on stratified drift. The Charlton and Paxton soils are similar in texture, color, and mineralogy but differ in that the Paxton soils have a distinct fragipan. The Charlton soils vary in texture and consistence below a depth of 24 to 30 inches. The Charlton soils are finer textured than the Gloucester. The Charlton series is centered on soils with a fine sandy loam B horizon that generally contains more than 30 percent silt. The Gloucester series is centered on soils with a light sandy loam to loamy sand B horizon that contains less than 25 percent silt (generally less than 20 percent). The Brookfield soils are reddish in the upper B horizon because they developed on till that contains a fairly large proportion of brown, weathered schist. Narragansett soils developed from a silty mantle over very friable to firm glacial till.

A profile of Charlton fine sandy loam on a slope of 4 to 5 percent in an idle area in the town of Mansfield, about 1 mile south of the University of Connecticut on South Eagleville Road:

Ap—0 to 8 inches, dark-brown (10YR 3/3) fine sandy loam; weak, coarse, granular structure; very friable; 10 to 15 percent coarse skeleton; abrupt, smooth boundary.

B21—8 to 20 inches, dark-brown (7.5YR 4/4) fine sandy loam grading to strong brown (7.5YR 5/6) with depth; breaks into soft subangular blocky clods when disturbed; very friable; 15 to 20 percent coarse skeleton; clear, wavy boundary.

B22—20 to 30 inches, yellowish-brown (10YR 5/4) fine sandy loam; breaks into soft subangular blocky clods when disturbed; very friable; 15 to 20 percent coarse skeleton; clear, wavy boundary.

C—30 to 48 inches, olive-gray (5Y 5/2), olive (5Y 5/3), and light olive-brown (2.5Y 5/4) gravelly fine sandy loam or loamy sand; friable to very friable, with thin lenses of slightly firm material; many soft fragments of schist and gneiss are in this horizon; light olive-brown color around the same weathered fragments of mica schist.

Fine sandy loam and stony to very stony fine sandy loam are the principal types. The texture in the upper 18 to 24 inches is dominantly fine sandy loam that contains more than 30 percent silt, but the range of the series includes sandy loam (except coarse sandy loam) and light loam or silt loam in the upper 6 to 10 inches. Characteristics within the upper 24 to 30 inches differentiate the series. Below this depth, texture and consistence vary considerably. Soils that have a fine sandy loam solum over very friable to slightly firm loamy sand were formerly included in the Gloucester series but are now within the range of the Charlton series. In some areas where the texture of the underlying material is dominantly friable to firm gravelly sandy loam or fine sandy loam, this material actually consists of thin strata of very friable gravelly loamy sand between or interbedded with strata of firm gravelly sandy loam or fine sandy loam. In places the firm material below a depth of 30 inches is a fragipan. In such cases there is a leached, discontinuous, coarser layer above the firm layer. A coarse skeleton of gravel-size fragments make up about 10 to 30 percent of the solum. Stones and fragments of weathered schist are common throughout the profile. Surface stoniness ranges from nearly nonstony, in some cleared areas, to extremely stony.

The Ap and A1 horizon are generally very dark grayish brown (10YR 3/2). The upper B horizon has a hue of 10YR or 7.5YR that fades with depth to a hue of 2.5Y or 10YR in the lower B horizon. The value generally ranges from 4 to 6, and the chroma from 4 to 8. Hues of 2.5Y and 5Y are dominant in the C horizon.

CHESHIRE SERIES

The Cheshire series consists of reddish, well-drained Brown Podzolic soils that developed in deep glacial till of Late Wisconsin age. The till was derived mainly from Triassic sandstone and conglomerate and a varying amount of basalt and other rocks. The texture ranges from gravelly sandy loam to loamy sand.

In the Cheshire catena are the moderately well drained Watchaug soils. The associated wet soils are the Wilbraham and Whitman. The Cheshire soils are commonly near the Narragansett soils of the uplands and the reddish Hartford and Manchester soils, which are on terraces over stratified sand and gravel. The Cheshire soils have a redder solum than the Narragansett soils, which developed in a silty mantle.

A profile of Cheshire fine sandy loam on a slope of 5 to 6 percent in a forested area 1¼ miles north of Vernon Center in the town of Vernon.

O2—1 inch to 0, partly decomposed litter.

A1—0 to 2 inches, dark-brown (10YR 4/3) fine sandy loam; weak, fine, granular structure; very friable; abrupt, smooth boundary.

B21—2 to 16 inches, reddish-brown (5YR 4/4) fine sandy loam; weak, medium, granular structure; very friable; 10 percent coarse skeleton; clear, wavy boundary.

B22—16 to 24 inches, reddish-brown (5YR 5/4) fine sandy loam; breaks into soft subangular clods that are very friable; 10 to 15 percent coarse skeleton; clear, wavy boundary.

C—24 to 48 inches, red (2.5YR 4/4) gravelly sandy loam; fairly loose, with some firmness that crushes easily; the gravel consists of small, angular rock fragments.

The texture is dominantly fine sandy loam, but in the upper part of the solum, sandy loam and light silt loam are within the range of the series. Some areas show some eolian influence, and the boundaries between the Cheshire and Narragansett soils are not distinct in places. The proportion of coarse, angular rock fragments generally ranges from about 10 to 30 percent in the solum, but the percentage is greater than 30 in places. The texture and consistence in the C horizon vary. The texture ranges from gravelly sandy loam or fine sandy loam to gravelly loamy sand, and the consistence, from very friable to firm. The firm or weak fragipan is generally thin and discontinuous and may occur just beneath the solum or at a depth of 3 to 4 feet. This stratum has a weak, platy structure to massive. It is easy to remove, and it crushes very easily when disturbed.

Normally the B horizon has a hue of 5YR, and in a few places, 2.5YR, with a value of 4 to 5 and a chroma of 4 to 8 that fades slightly with depth. The C horizon has the same hues as the B horizon, with a value of 3 to 5 and a chroma of 3 to 8.

ELLINGTON SERIES

The Ellington series consists of reddish, moderately well drained Brown Podzolic soils that developed on nearly level terraces over stratified sand and gravel.

The sand and gravel are mainly from reddish-brown Triassic sandstone, shale, and conglomerate and a varying amount of basalt and crystalline rocks.

The Ellington series is the moderately well drained member of the catena that includes the well-drained to somewhat excessively drained Hartford and the excessively drained Manchester series. Associated with the Ellington are the poorly drained Walpole, the very poorly drained Scarboro, and the moderately well drained Sudbury soils. The Ellington soils differ from the Sudbury mainly in color and lithology. The Sudbury soils formed on stratified sand and gravel derived principally from crystalline rocks and lack the reddish color of the Ellington soils.

A profile of Ellington fine sandy loam about one-fourth mile east of Ellington Town Hall, Ellington.

Ap—0 to 10 inches, dark-brown (7.5YR 4/2) fine sandy loam; weak, medium, granular structure in the upper few inches; weak, coarse, platy structure in the lower part because of the composition of the underlying material; friable; about 10 percent coarse skeleton; abrupt, smooth boundary.

B21—10 to 20 inches, reddish-brown (5YR 4/4) fine sandy loam; breaks into soft subangular clods; very friable; about 10 percent coarse skeleton; clear, wavy boundary.

B22—20 to 26 inches, light reddish-brown (5YR 6/4) sandy loam with a few distinct mottles of pinkish gray (5YR 5/2) and reddish brown (5YR 4/4); massive; very friable; 15 percent coarse skeleton.

Cg—26 to 40 inches; reddish-brown (5YR 4/4) coarse sand and gravel; mottled with pale brown (10YR 6/3) and dark reddish brown (5YR 3/3); includes some finer material; sand and gravel is principally from Triassic rocks and from some quartz and gneiss.

The texture is dominantly firm sandy loam but ranges from sandy loam to silt loam. The depth to mottling ranges from about 12 to 20 inches. The proportion of coarse fragments in the solum ranges from about 5 to 20 percent. The Ap horizon has hues of 10YR to 5YR, with a value of 3 to 4 and a chroma of 2 to 3. The upper B horizon normally has a hue of 5YR with a value of 4 to 5 and a chroma of 3 to 6.

ENFIELD SERIES

The Enfield series consists of well-drained Brown Podzolic soils that developed in a silty mantle over stratified sand and gravel. In the Central Lowland of Connecticut the sand and gravel were derived principally from reddish-brown Triassic rocks. Outside the Central Lowland, the sand and gravel were derived largely from crystalline rocks.

The Enfield soils are in the same catena as the moderately well drained Tisbury soils. Other soils commonly associated with Enfield are the Narragansett, Merrimac, and Hartford. The Enfield soils differ from the Narragansett in that the latter is underlain by friable to firm glacial till. The Merrimac soils are coarser in the solum than the Enfield soils, and the Hartford soils are coarser and are reddish colored.

A profile of Enfield silt loam in a cultivated field about 1½ miles northwest of Ellington Center, south of Muddy Brook Road:

Ap—0 to 8 inches, dark-brown (10YR 3/3) silt loam; very weak, medium, granular structure in the upper 4 inches; very friable; 3 percent coarse skeleton; abrupt, smooth boundary.

B21—8 to 18 inches, yellowish-brown (10YR 5/6) silt loam; weak, coarse, platy structure in the upper 6 inches because of traffic compaction; friable to very friable; 5 percent coarse skeleton; clear, wavy boundary.

B22—18 to 22 inches, brown (10YR 5/3) silt loam; breaks into soft subangular clods when disturbed; very friable; 10 to 15 percent coarse skeleton; clear, wavy boundary.

IIC—22 to 40 inches, reddish-brown (5YR 5/4) sand and gravel derived mainly from Triassic sandstone and conglomerate; loose.

Silt loam, with a fairly large percentage of coarse silt, is dominant, but very fine sandy loam is within the range of the series. The thickness of the silty mantle is generally 20 to 26 inches but ranges from about 12 to 30 inches. Where the thickness of the silty mantle is more than 24 inches, brownish-gray (2.5Y 6/2) streaks or pockets are present in places just above the sand and gravel. The proportion of coarse fragments in the solum ranges from practically none to as much as 10 to 15 percent. These fragments generally increase with increasing depth, and a thin mantle generally has a higher percentage of coarse fragments than a thick mantle. Coarse fragments in the solum are probably the result of tree throw, frost action, and burrowing animals.

The Ap horizon generally has a hue of 10YR, with a value of 3 to 4 and a chroma of 2 to 3. The upper B horizon has hues of 10YR and 7.5YR, with a value of 4 to 5 and a chroma of 3 to 8. Colors fade with depth.

GLOUCESTER SERIES

The Gloucester series consists of somewhat excessively drained Brown Podzolic soils that developed on very friable to slightly firm, coarse-textured Late Wisconsin glacial till. The till was derived principally from granite rocks that have imparted to the soils a relatively high content of sand of various sizes.

The Gloucester soils are commonly associated with the well-drained Charlton and Brookfield soils, which developed on glacial till, and with the Hinckley and Merrimac soils, which developed on stratified sand and gravel. The Gloucester soils are coarser textured than the Charlton and Brookfield soils. The Gloucester series is centered on soils that have a light sandy loam to loamy sand B horizon. The Gloucester soils also differ from Brookfield in color. The Brookfield soils are yellowish red in parts of the solum. The wet soils associated with the Gloucester are the Leicester and Whitman.

A profile of Gloucester stony sandy loam in a fresh road cut 1.1 miles northeast of the junction of Merrow and Anthony roads in the town of Tolland:

Ap—0 to 6 inches, dark grayish-brown (10YR 4/2) sandy loam, but close to loamy sand; very weak, coarse, granular structure; very friable; about 15 percent coarse skeleton; abrupt, smooth boundary.

B21—6 to 12 inches, dark yellowish-brown (10YR 4/4) light sandy loam; breaks into very soft subangular clods that are very friable; 15 to 20 percent coarse skeleton; clear, wavy boundary.

[4] The Enfield soils in Tolland County closely resemble the Hartland soil of other areas to a depth of about 2 feet. Further study might result in the combination of the two series in other areas.

B22—12 to 19 inches, yellowish-brown (10YR 5/6) loamy sand or loamy fine sand; massive; very friable; 15 to 20 percent coarse skeleton; clear, wavy boundary.
B23—19 to 23 inches, yellowish-brown (10YR 5/4) loamy sand; very friable to loose; about 20 percent coarse skeleton; clear, wavy boundary.
C1—23 to 43 inches, light-gray (10YR 7/1) and olive-gray (5Y 5/2) gravelly loamy coarse sand or coarse sand with a few streaks of olive brown (2.5Y 4/4) in root channels; slightly firm in place when dry, but very friable to loose when moist; some stone fragments are capped with silt; clear and wavy boundary.
C2—43 to 60 inches, olive-gray (5Y 5/2) gravelly coarse sand with lenses of olive-gray (5Y 4/2) loamy fine sand or fine sandy loam; the lenses are slightly firm to firm in place and have a weak, coarse, platy structure; clear sand grains are common between plates; silt caps on many rock fragments; pockets or streaks of light olive brown (2.5Y 5/4) are present in old root channels.

Loamy sand and light sandy loam are the dominant textures. Fine sandy loam to a depth of 12 to 14 inches over loamy sand is within the range of the series. The Gloucester soils are conspicuously stony and bouldery throughout the profile. Surface stoniness ranges from nearly nonstony, in areas cleared of stones, to extremely stony. The proportion of coarse fragments of gravel size in the solum generally ranges from about 15 to 35 percent, but is as much as 50 to 60 percent in places. The C horizon, to a depth of at least 3½ or 4 feet, is gravelly loamy sand or sand with thin lenses of slightly firm, finer textured material. In places a firm horizon is below a depth of 3½ or 4 feet. Yellow streaks, probably of material from the B horizon, are common along root channels in the C horizon.

The Ap and A1 horizons have a hue of 10YR with a value of 2 to 3. The B horizon has a hue of 10YR or 7.5YR in the upper part, and this grades to 10YR or 2.5Y in the lower part. The value ranges from 4 to 6 and the chroma from 3 to 8. The C horizon commonly has a hue of 10YR, 2.5Y, or 5Y.

HADLEY SERIES

The Hadley series consists of medium-textured, well-drained alluvial soils in recently deposited sediments. The sediments were derived from schist, gneiss, and other fine-textured rocks.

Hadley soils commonly occur in a catena with the moderately well drained Winooski, the poorly drained Limerick, and the very poorly drained Saco soils. The Hadley soils differ from the well-drained Ondawa soils, which are also in alluvial sediments, principally in being finer textured. The Ondawa soils have a fine sandy loam or sandy loam texture. Associated with the Hadley soils on glaciofluvial terraces are the well-drained Enfield, Agawam, and Merrimac soils.

A profile of Hadley silt loam in a cultivated area about one-half mile east of Andover in the town of Andover:

Ap—0 to 12 inches, very dark brown (10YR 2/2) and very dark grayish-brown (10YR 3/2) silt loam; very weak, medium and coarse, granular structure; very friable; abrupt, smooth boundary; 8 to 12 inches thick.
C1—12 to 22 inches, dark-brown (10YR 3/3) silt loam with streaks and pockets of very dark grayish brown (10YR 3/2); breaks into soft subangular clods that crush easily to very weak, medium, granular structure; very friable; clear, wavy boundary; 6 to 10 inches thick.
C2—22 to 28 inches, dark grayish-brown (10YR 4/2) very fine sandy loam; massive, breaks into very soft subangular clods when disturbed; very friable; clear, wavy boundary; 4 to 8 inches thick.
C3—28 to 40 inches, light brownish-gray (2.5Y 6/2) loamy fine sand that contains a few pieces of fine gravel; loose.

Silt loam is the dominant texture, but some areas are very fine sandy loam. The depth to loamy sand, sand, sand and gravel, or other coarse material varies but generally ranges from 20 to 36 inches.

The A horizon is generally very dark grayish brown (10YR 3/2) to very dark brown (10YR 2/2). The upper C horizon generally has a hue of 10YR or 2.5Y, with a value of 3 to 5 and a chroma of 2 to 3.

Areas that have not been limed range from very strongly acid to medium acid.

HARTFORD SERIES

The Hartford series consists of reddish, well-drained to somewhat excessively drained, moderately coarse textured Brown Podzolic soils that developed on glaciofluvial terraces over stratified sand and gravel. The stratified drift was derived principally from reddish-brown Triassic sandstone and conglomerate that contains a varying amount of basalt and of coarser crystalline rocks.

The Hartford soils are closely associated with the excessively drained Manchester and the moderately well drained Ellington soils of the same catena, and with the Cheshire soils, which developed on glacial till. The Hartford soils differ from the Manchester principally in depth to sand and gravel. The Hartford and Merrimac soils are similar in texture but differ in color; the Merrimac soils have a hue of 7.5YR or yellower in the B horizon.

A profile of Hartford sandy loam on a slope of 0 to 2 percent in a cultivated field, 2 miles southwest of Cogsmeil School in the town of Ellington:

Ap—0 to 10 inches, very dark grayish-brown (10YR 3/2) fine sandy loam; very weak, medium, granular structure in the upper 6 inches; very friable; about 15 percent coarse skeleton; abrupt, smooth boundary.
B21—10 to 23 inches, reddish-brown (5YR 4/4) fine sandy loam that fades slightly in color with depth; breaks into soft subangular clods that are very friable; about 10 percent coarse skeleton; clear, wavy boundary.
IIC—23 to 36 inches, reddish-brown (5YR 5/4) coarse sand and gravel derived principally from Triassic sandstone and conglomerate that contains some quartz and gneiss; loose.

The texture in the solum ranges from coarse sandy loam to fine sandy loam. The depth to sand and gravel generally is 22 to 26 inches, but the range is from about 14 to 30 inches. The proportion of coarse fragments in the solum generally ranges from about 5 to 15 percent, but is more than 20 percent in places.

The Ap and A1 horizons have a hue of 5YR to 10YR, with a value of 3 to 4 and a chroma of 2 to 4. Normally, the B horizon has a hue of 5YR and, in places, a hue of 2.5YR, with a value of 4 to 5 and a chroma of 3 to 8. Color fades slightly with depth in the B horizon.

HINCKLEY SERIES

The Hinckley series consists of excessively drained Brown Podzolic soils that developed on stratified sandy, gravelly, and cobbly glaciofluvium of Late Wisconsin age. The glaciofluvium was derived principally from granite, gneiss, and schist. The Hinckley soils are extensive but are of limited agricultural importance.

The less well drained soils that occur with the Hinckley are the moderately well drained Sudbury, the poorly to somewhat poorly drained Walpole, and the very poorly drained Scarboro soils. The Hinckley soils are closely associated with the Merrimac soils, which also developed on glaciofluvium, with the Windsor and Agawam soils, which developed on deep sands, and with the Charlton, Paxton, and Gloucester soils, which developed on glacial till. The Hinckley soils differ from the Merrimac in having a thinner and, in places, a coarser textured solum. The Windsor soils developed in deep sands and, unlike the Hinckley soils, lack gravel in the solum and substratum. The Agawam soils are finer textured than the Hinckley soils and coarse material is lacking in the substratum or is at a greater depth than in the Hinckley soils. The Gloucester soils differ from the Hinckley in having a somewhat thicker solum and in having many stones throughout the profile. Also, they are underlain by friable to firm stony till, whereas the Hinckley soils are underlain by loose, distinctly stratified material. The Hinckley soils are similar to the Jaffrey and Manchester soils in texture but differ in lithology or color. The Jaffrey soils have a higher proportion of brown mica schist that weathers to a hue of 5YR, and the hue of the B horizon is 5YR or redder.

A profile of Hinckley gravelly sandy loam on a slope of 5 to 6 percent in a gravel pit about 0.7 of a mile southwest of West Stafford:

Ap—0 to 6 inches, dark yellowish-brown (10YR 3/4) gravelly sandy loam; weak, coarse, granular structure; very friable; abrupt, smooth boundary.
B21—6 to 12 inches, yellowish-brown (10YR 5/4) gravelly sandy loam; very weak, fine, granular structure; very friable; about 30 percent coarse skeleton; gradual, wavy boundary.
B22—12 to 16 inches, pale-brown (10YR 6/3) gravelly loamy sand; loose; gradual, wavy boundary.
C—16 to 42 inches, sand and gravel and a few cobbles, derived principally from gneiss, granite, and schist; color ranges from dark grayish brown (10YR 4/2) to light gray (10YR 7/2), and some gravel has strong-brown (7.5YR 5/6) iron stains; loose.

Gravelly sandy loam and loamy sand are the main textures, but fine sandy loam or gravelly fine sandy loam is within the range of the series. The depth of gravelly sandy loam or fine sandy loam over gravelly loamy sand is generally 6 to 12 inches. The materials below the B horizon are sand and water-rounded gravel and cobbles that are distinctly stratified below a depth of 24 to 48 inches. The depth to the C horizon varies, but ranges from about 10 to 24 inches. Gravel and cobbles constitute 10 to 50 percent of the volume of the solum and as much as 90 percent of the C horizon.

The Ap horizon has a hue of 10YR, a value of 2 to 4, and a chroma of 2 to 3; it is typically very dark grayish brown (10YR 3/2). The A1 horizon is very similar to the Ap, except that the value and chroma are generally one unit lower. The B horizon normally has a hue of 7.5YR or 10YR, a value of 3 to 5, and a chroma of 4 to 8 in the upper part and a somewhat paler color in the lower part. The C horizon has a hue of 10YR or 2.5Y, a value of 4 to 8, and a chroma of 2 to 4. In places, however, the gravel and sand in parts of the C horizon are coated or stained and are yellowish brown or strong brown.

HOLLIS SERIES

The Hollis series consists of Brown Podzolic soils that are moderately coarse to medium-textured, somewhat excessively drained, and shallow. They have developed from a thin mantle of Late Wisconsin till derived principally from schistose and granitoid rocks or residuum from the underlying bedrock, which consists principally of schist and gneiss.

Hollis soils are commonly associated with Charlton and other soils of the Charlton catena, with Brimfield soils, and to some extent, with Paxton and Gloucester soils. The Hollis soils do not have the yellowish-red or reddish-yellow B21 horizon of the shallow Brimfield soils.

A profile of Hollis rocky fine sandy loam in a forested area about 2.4 miles southeast of Vernon Center in the town of Vernon:

O1—3 to 1½ inches, raw leaf litter consisting mainly of deciduous leaves and small twigs.
O2—1½ inches to 0, partly decomposed and well decomposed leaf litter matted with fine roots.
A1—0 to 2 inches, very dark grayish-brown (10YR 3/2) fine sandy loam that grades to dark brown (10YR 3/3) in the lower part; clean sand grains are common in the upper part; very weak, fine, granular structure; very friable; abrupt, smooth boundary.
B21—2 to 10 inches, dark yellowish-brown (10YR 4/4) fine sandy loam; massive; breaks into soft, medium subangular clods that are very friable; about 15 percent coarse skeleton consisting of angular rock fragments; clear, wavy boundary.
B22—10 to 16 inches, yellowish-brown (10YR 5/4) gravelly fine sandy loam; massive; breaks into soft, medium subangular clods that are very friable; 25 to 30 percent coarse skeleton consisting of angular rock fragments.
R—16 inches +, slightly weathered mica schist bedrock.

Fine sandy loam is the dominant texture, but light loam or silt loam and very fine sandy loam are within the range of the series. The number of bedrock exposures ranges from a few to many, and the proportion of the surface occupied by these exposures ranges from about 5 to 50 percent. Areas that have exposures of bedrock on more than 50 percent of the surface are classified as Rock land. Most areas are stony and rocky. Scattered areas that have been used or are being used for hay, pasture, and crops have been cleared or partly cleared of stones and boulders. The depth of the soil between the bedrock exposures varies. It ranges from a few inches to about 22 inches and averages probably 12 to 14 inches. In areas where bedrock is at a depth less than 14 to 16 inches, there is little or no evidence of a C horizon.

The color of the B2 horizon ranges from hues of 7.5YR to 10YR, with a value of 4 to 5 and a chroma of 4 to 8.

JAFFREY SERIES

The Jaffrey series consists of excessively drained, shallow and gravelly Brown Podzolic soils that developed on stratified sand and gravel in which there are some cobbles and stones. The sand and gravel deposits were derived from schistose and granite rocks that contain a large proportion of brown mica schist that weathers to reddish brown and strong brown.

Jaffrey soils are near the Brookfield soils, which developed on glacial till that contains a large proportion of brown mica schist. They are also near the shallow Brimfield soils. Jaffrey soils are similar to Hinckley soils in texture but have a reddish-brown to yellowish-red upper B horizon. Jaffrey soils differ from the Manchester soils principally in source of parent material.

A profile of Jaffrey gravelly sandy loam on a slope of 3 to 8 percent in a forested area about 1.7 miles east of West Willington Center:

O1—3 inches to 1 inch, raw leaves and other litter.
O2—1 inch to 0, partly decomposed and well decomposed litter; very strongly acid.
A1—0 to 1 inch, very dark grayish-brown (10YR 3/2) sandy loam; weak, medium, granular structure; very friable; very strongly to strongly acid; clear, smooth boundary.
B21—1 to 7 inches, yellowish-red (5YR 4/6) gravelly sandy loam; massive, breaks into very soft subangular clods when disturbed; very friable; about 25 percent coarse skeleton; very strongly acid; clear, wavy boundary.
B22—7 to 11 inches, dark-brown (7.5YR 4/4) gravelly sandy loam or loamy sand; about 50 percent coarse skeleton; loose to very friable; strongly to very strongly acid; clear, wavy boundary.
C—11 to 72 inches, stratified sand, gravel, and cobbles with very little fines; the color of the sand and fine gravel ranges from strong brown (7.5YR 5/8) to yellowish brown (10YR 5/6); the quantity of dark reddish-brown (5YR 3/2 to 3/3) mica schist gravel and cobbles ranges from about 20 to 40 percent; many of the quartz, gneiss, and gray schist pebbles and cobbles are partly coated with iron stains; very strongly acid.

A profile of Jaffrey gravelly loamy sand is shown in figure 9.

Gravelly sandy loam and gravelly loamy sand are the principal types, but the texture of the A and B horizons ranges from gravelly sandy loam or fine sandy loam to gravelly loamy sand. The depth to coarse sand and gravel is generally less than 18 inches, but the depth ranges in most places from 6 to 12 inches. The quantity of coarse fragments in the A and B horizons ranges from about 20 to 50 percent. In the B21 horizon the series is centered on a hue of 5YR, with a chroma of 3 to 8 and a value of 4 to 5. The lower B horizon generally has a hue of 7.5YR. The content of brown mica schist that weathers to reddish brown or dark brown is variable; therefore, the boundaries between Jaffrey and Hinckley soils are arbitrary in many places. In some areas that have been cultivated, the reddish B21 horizon has probably been mixed with the Ap horizon.

LEICESTER SERIES

The Leicester series consists of poorly to somewhat poorly drained Low-Humic Gley soils that developed on very friable to firm Late Wisconsin till. The till was derived principally from schist, gneiss, and granite.

The Leicester series is the poorly drained member of the catena that includes the well drained Charlton, the moderately well drained Sutton, and the very poorly drained Whitman series. Leicester soils that are near the Gloucester soils are generally somewhat coarser tex-

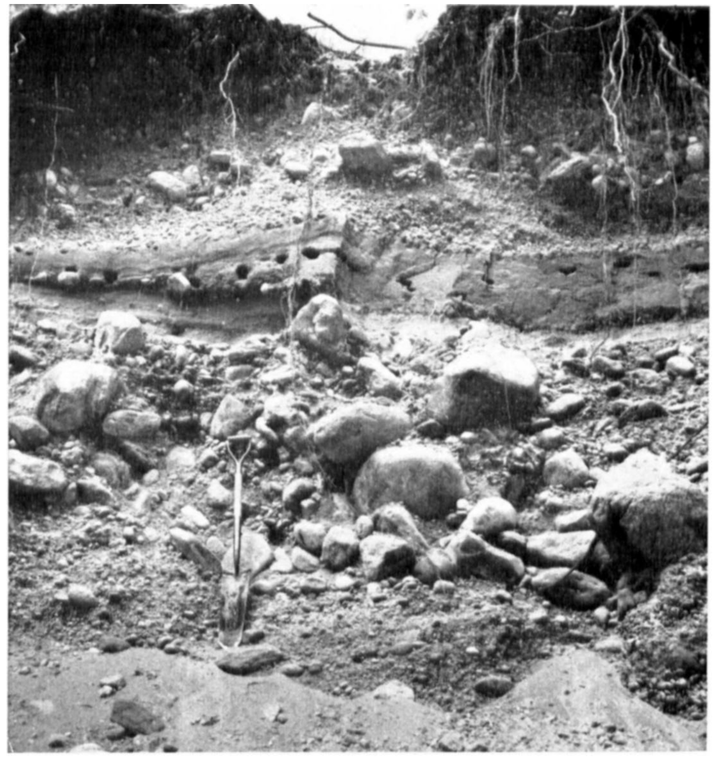

Figure 9.—**Profile of Jaffrey gravelly loamy sand.**

tured than those that are closely associated with the Charlton and Sutton soils. The Leicester and the poorly drained Ridgebury soils are similar in the solum. The Ridgebury soils, however, have a prominent fragipan at a depth of 18 to 24 inches, whereas the Leicester soils vary in texture and consistence below a depth of 30 inches.

A profile of Leicester fine sandy loam in a recently cleared hayfield about 2 miles southeast of Tolland Center in the town of Tolland, near the junction of Merrow and Anthony Roads:

Ap—0 to 6 inches, black (10YR 2/1) fine sandy loam; very weak, medium, granular structure; very friable; about 10 percent coarse skeleton; abrupt, smooth boundary.
A2g—6 to 12 inches, grayish-brown (2.5Y 5/2) sandy loam mottled with light brownish gray (10YR 6/2) and yellowish brown (10YR 5/6); massive, with some indication of platiness; mottles are few, fine, and distinct; very friable; about 10 percent coarse skeleton; clear, wavy, boundary.
B2g—12 to 24 inches, grayish-brown (2.5Y 5/2) and gray (5Y 6/1) fine sandy loam mottled with yellowish brown (10YR 5/6), strong brown (7.5YR 5/8), and yellowish red (5YR 4/6); mottles are many, fine to medium, and prominent; massive but breaks into coarse subangular clods; friable; 15 to 20 percent coarse skeleton; clear, wavy boundary.
Cg—24 to 42 inches, olive-gray (5Y 5/2) gravelly loamy sand mottled with light brownish gray (10YR 6/2) and strong brown (7.5YR 5/8); massive; very friable, with thin lenses of firm material.

The texture is dominantly fine sandy loam, but the range is from sandy loam to light loam or silt loam in the upper part of the solum. Below a depth of about 30 inches, the texture and consistence are variable. At this depth, the texture is generally gravelly and ranges from loamy sand to sandy loam or fine sandy loam. Consistence generally ranges from very friable to firm, but very firm, weak, platy strata are present in places. Surface stoniness ranges from nearly nonstony, in some cleared areas, to extremely stony. A coarse skeleton of gravel-size fragments generally makes up about 10 to 30 percent of the solum.

The Ap or A1 horizon is generally of 10YR hue, with a value of 1 to 3 and a chroma of 1 to 2. The matrix of the A2g and B2g horizons generally ranges in hue from 10YR to 5Y, with a value of 4 to 6 and a chroma of 1 to 2.

LIMERICK SERIES

The Limerick series consists of medium-textured Low Humic Gley soils formed in alluvial sediments. The sediments were derived mainly from schist and gneiss.

Limerick soils commonly occur in a catena with well drained Hadley, moderately well drained Winooski, and very poorly drained Saco soils. They are associated with Enfield, Merrimac, and other soils that formed on glaciofluvial deposits. Limerick soils have a silt loam or very fine sandy loam profile, compared with the fine sandy loam and sandy loam profile of the poorly drained Rumney soils, which also formed in alluvial sediments.

A profile of Limerick silt loam in a pasture about 2 miles south of Ellington Center in the town of Ellington:

Ap—0 to 8 inches, very dark brown (10YR 2/2) silt loam with many, fine, dark reddish-brown (5YR 3/2) streaks along root channels; massive, but tends to break into very coarse plates as a result of compaction; friable; many fine roots; abrupt, smooth boundary.

C1g—8 to 15 inches, dark-brown (10YR 4/2) silt loam with many, fine, dark reddish-brown (5YR 3/3) mottles and a few, fine, gray (10YR 5/1) mottles; very weak, medium, subangular blocky structure; friable; roots common; clear, wavy boundary.

C2g—15 to 22 inches, same as overlying horizon, except that it contains thin lenses and pockets that are very dark grayish brown (10YR 3/2); many dead roots and a few live ones; abrupt, smooth boundary.

C3g—22 to 26 inches, very dark brown (10YR 2/2) silt loam with a few fine streaks of dark reddish brown (5YR 3/3); massive; friable; many dead grass roots; abrupt, smooth boundary; this kind of horizon is common but varies in depth and is not present everywhere.

C4g—26 to 30 inches, light brownish-gray (2.5Y 6/2) very fine sandy loam finely mottled with pale brown (10YR 6/3) and strong brown (7.5YR 5/6); massive; very friable; clear, wavy boundary.

IICg—30 to 40 inches, dark grayish-brown (10YR 4/2) loamy sand with a few yellowish-brown (10YR 5/6) mottles; many gray (10YR 6/1) sand grains; about 15 percent fine gravel; loose.

Silt loam is the dominant texture, but very fine sandy loam is within the range of the series. The depth to coarse material consisting of loamy sand, sand, or sand and gravel varies, but it is generally between 20 and 36 inches.

The A horizon is generally a hue of 10YR, with a value of 2 to 3 and a chroma of 1 to 2. The matrix color in the upper C horizon ranges in hue from 10YR to 5Y, with a value of 3 to 5 and a chroma of 1 to 3. This horizon has distinct to prominent mottles.

The reaction ranges from very strongly acid to medium acid in areas that have not been limed.

MANCHESTER SERIES

The Manchester series consists of reddish, excessively drained Brown Podzolic soils that developed on stratified sand, gravel, and cobbles of Late Wisconsin age. The stratified drift was derived principally from reddish-brown Triassic sandstone, conglomerate, and arkose.

These are shallow, gravelly soils, generally near the reddish Hartford and Ellington soils, which developed on stratified drift, and the Cheshire and Watchaug soils, which developed on glacial till. Manchester soils are similar to Hinckley and Jaffrey in texture but differ from them in color and parent material. The Hinckley soils are brownish in the solum. The Jaffrey soils are reddish in the B2 horizon because they developed from materials that contain a large proportion of brown mica schist, which weathers to reddish colors.

A profile of Manchester gravelly sandy loam on slopes of 8 to 10 percent, in a reforested area 1.8 miles southwest of Somers, off Egypt Road in the town of Somers:

Ap—0 to 6 inches, dark reddish-brown (5YR 3/3) gravelly sandy loam; weak, medium, granular structure; very friable; abrupt, smooth boundary.

B2—6 to 12 inches, dark reddish-brown (5YR 3/4) gravelly sandy loam; very friable; gradual, wavy boundary.

IIC—12 to 48 inches, reddish-brown (5YR 5/4) stratified sand and gravel derived mainly from Triassic sandstone, conglomerate, shale, and some quartz and gneiss; loose.

Gravelly sandy loam and gravelly loamy sand are the main textures, but gravelly fine sandy loam and gravelly silt loam are within the range of the series. The depth to coarse sand and gravel varies; it ranges from about 6 to 18 inches. Commonly, the proportion of coarse skeleton in the solum ranges from 15 to 40 percent, and in the substratum it is as much as 90 percent.

The AP and A1 horizons have a hue of 5YR, with a value of 3 to 4 and a chroma of 2 to 4. The B horizon normally has a hue of 5YR and in a few places, 2.5YR, with a value of 4 to 5 and a chroma of 3 to 8.

MERRIMAC SERIES

The Merrimac series consists of well-drained to somewhat excessively drained Brown Podzolic soils that developed on sandy, gravelly, and cobbly stratified drift. The drift was derived principally from granite, gneiss, and schist, but in the Central Lowland the drift was influenced considerably by reddish-brown Triassic rocks.

Other series in the same catena are the excessively drained Hinckley, the moderately well drained Sudbury, the poorly to somewhat poorly drained Walpole, and the very poorly drained Scarboro. The Merrimac soils have a thicker solum than the Hinckley soils and generally less gravel. They differ from the Agawam soils in having a sandy, gravelly C horizon. The Merrimac and Hartford soils are similar in texture, but the Hartford soils developed on reddish-brown Triassic materials and have a reddish profile. The Merrimac soils differ from the Enfield in having a coarse-textured solum; the Enfield soils developed from a silty mantle over stratified sand and gravel.

A profile of Merrimac sandy loam on a slope of 2 to 3 percent, in a hayfield about three-quarters of a mile southeast of West Stafford in the town of Stafford:

Ap—0 to 10 inches, very dark grayish-brown (10YR 3/2) sandy loam; very weak, coarse, granular structure; very friable; 10 to 15 percent coarse skeleton; abrupt, smooth boundary.

B21—10 to 19 inches, dark-brown (7.5YR 4/4) sandy loam; breaks into soft subangular clods when disturbed; very friable; 15 percent coarse skeleton; clear, wavy boundary.

B22—19 to 23 inches, yellowish-brown (10YR 5/4) sandy loam; breaks into soft subangular blocky clods when disturbed; very friable; 15 percent coarse skeleton; clear boundary.

B23—23 to 26 inches, light olive-brown (2.5Y 5/4) gravelly loamy sand; loose to very friable; clear, wavy boundary.

IIC—26 to 44 inches, grayish-brown (10YR 5/2) and dark grayish-brown (10YR 4/2) sand, gravel, and cobbles; few, dark reddish-gray (5YR 5/2) pebbles from Triassic rocks; loose.

Fine sandy loam and sandy loam are the main textures, but gravelly phases of these also occur. The depth to the sandy gravelly IIC horizon ranges from about 18 to 30 inches. The lower 4 to 6 inches of the B horizon is generally gravelly sandy loam or gravelly loamy sand. The proportion of coarse skeleton in the solum ranges from about 5 to 30 percent, and in the C horizon, from about 30 to 70 percent.

The Ap horizon generally has a hue of 10YR with a value of 3 to 4 and a chroma of 2 to 3. The B horizon commonly has a hue of 10YR or 7.5YR in the upper part and 10YR in the lower part, and the color fades with increasing depth. The value ranges from 4 to 6, and the chroma, from 3 to 8. The C horizon usually has a hue of 10YR, with a value of 5 to 7 and a chroma of 2 to 3.

NARRAGANSETT SERIES

The Narragansett series consists of well-drained Brown-Podzolic soils that developed in a silty mantle over firm to very friable glacial till of Late Wisconsin age. In the Central Lowland, the till was derived principally from reddish-brown Triassic rocks, but in other areas it was derived from crystalline rocks.

The Narragansett soils are in the same catena with the Wapping soils, which are moderately well drained. The Narragansett soils are commonly near the Broadbrook and Cheshire soils, which developed on glacial till, and the Enfield soils, which developed on stratified drift. The Narragansett, Broadbrook, and Enfield soils are similar in the solum but the Broadbrook soils developed on a fragipan in glacial till and the Enfield developed on stratified sand and gravel. The Cheshire soils are reddish and coarser in the solum than the Narragansett.

Profile of Narragansett silt loam on a slope of 5 to 6 percent in a forested area along Green Road 2.3 miles northwest of Ellington Center:

O2—2 inches to 0, partly decomposed and well-decomposed litter.

A1—0 to 4 inches, dark yellowish-brown (10YR 4/4) silt loam; very weak, medium, granular structure; very friable; abrupt, smooth boundary.

B21—4 to 18 inches, strong-brown (7.5YR 5/6) silt loam; breaks into soft subangular blocky clods that are very friable; about 5 percent coarse skeleton; clear, wavy boundary.

B22—18 to 26 inches, reddish-yellow (7.5YR 6/6) silt loam; breaks into soft subangular clods that are very friable; 10 percent coarse skeleton; clear, wavy boundary.

IIC—26 to 36 inches, reddish-brown (5YR 4/4) gravelly sandy loam derived principally from reddish-brown Triassic rocks; very friable to slightly firm.

Silt loam is the dominant texture, but very fine sandy loam is within the range of the series. The thickness of the silty mantle, except in eroded areas, generally ranges from about 18 to 30 inches but is 36 to 40 inches in places. Most areas were probably originally stony, and in areas that are nonstony most or all of the surface stones have been removed. The quantity of small, angular, coarse fragments of rocks in the solum ranges from a few to as much as 15 to 20 percent. Generally the percentage increases with depth, and shallow areas have a higher percentage than deep ones. In places, cobbles and small rounded stones are common in the subsurface layers. Coarse fragments in the solum were presumably mixed with the silt by frost action, tree throw, or burrowing animals. The consistence of the underlying material ranges from firm to very friable or loose. The firm layer, in most places, appears to be a discontinuous, weak fragipan that crushes very easily when disturbed.

The Ap and A1 horizons have a hue of 10YR, with a value of 3 to 4 and a chroma of 2 to 4. The upper B horizon has a hue of 7.5YR or 10YR, and the lower B horizon, a hue of 10YR or 7.5YR, or occasionally of 2.5Y. The value generally ranges from 4 to 5, and the chroma from 4 to 8. The underlying material varies in color.

NINIGRET SERIES

The Ninigret series consists of moderately well drained to somewhat poorly drained Brown Podzolic soils that developed on glaciofluvial or stream terraces. They are moderately coarse textured soils with little or no gravel within a depth of 3½ to 4 feet. They were derived largely from sediments of schist, gneiss, and granite and some reddish brown Triassic rocks in the Central Lowland.

The Ninigret series is the moderately well drained member of the catena that includes the well drained Agawam series. The less well-drained soils that occur with the Ninigret are the poorly to somewhat poorly drained Walpole and the very poorly drained Scarboro soils. The Ninigret series is centered on soils that contain much fine and medium sand. They contain little clay. The Ninigret soils resemble the Tisbury and Sudbury. The Tisbury, however, are centered on soils that contain much silt and very fine sand. The Sudbury soils have some gravel in the B horizon and are underlain at a depth of 20 to 30 inches by stratified sand and gravel.

A profile of Ninigret sandy loam on a slope of about 2 percent, in a cultivated field about 1.6 miles northeast of Somersville:

Ap—0 to 10 inches, very dark brown (10YR 2/2) sandy loam; very weak, medium, granular structure; very friable; abrupt, smooth boundary.

B21—10 to 22 inches, yellowish-brown (10YR 5/4) sandy loam; weak, coarse, blocky structure as a result of traffic compaction in the upper part; very friable; clear, wavy boundary.

B22—22 to 29 inches, brown (10YR 5/3) light sandy loam mottled with strong brown (7.5YR 5/6) and very pale brown (10YR 7/3); breaks into soft subangular clods that are very friable; clear, wavy boundary.

Cg—29 to 40 inches, light brownish-gray (2.5Y 6/2) loamy sand mottled with pale brown (10YR 6/3) and dark grayish brown (10YR 4/2); contains lenses of coarse sand and fine gravel; very friable.

The dominant textures are sandy loam and fine sandy loam. Very fine sandy loam to a depth of 12 to 19 inches is within the range of the series. In places the soils have been influenced by eolian deposits or by water deposits of very fine sand. These areas have a very fine sandy loam texture in the A and the upper B horizon. The texture of the B horizon below a depth of about 14 inches is fine sandy loam, sandy loam, or loamy fine sand. The depth to the C horizon ranges from 24 to 40 inches but average 30 inches, and the texture in this horizon is loamy fine sand, loamy sand, fine sand, or medium sand, with lenses of finer material in places. Stratified sand and gravel may occur at a depth below 42 inches. The solum and the C horizon are generally free of gravel, but as much as 10 percent of coarse material is allowed. Soils with a higher content of coarse fragments are in the Sudbury series. Drainage ranges from moderately good to the upper range of somewhat poor.

Unplowed, wooded areas have a 1- to 3-inch layer of leaves and partly decomposed litter, underlain by a very dark grayish-brown (10YR 3/2) A1 horizon. The B21 horizon has hues of 7.5YR or 10YR, with a value of 4 to 5 and a chroma of 4 to 8. The matrix color in the B22 horizon commonly is slightly paler and is one or two units lower in chroma or higher in value than the color in the upper B horizon. The depth to mottling ranges from 14 to 20 inches. The degree of mottling may vary considerably within a profile and also from place to place, but mottles are distinct or prominent in the lower B horizon. The strong-colored mottles range from yellowish brown (10YR 5/6 and 5/8) to yellowish red (5YR 4/8).

ONDAWA SERIES

The Ondawa series consists of well-drained Alluvial soils derived from sediments of gneiss, granite, schist, and other rocks. This series is in a catena with the moderately well drained Podunk, the poorly drained Rumney, and the very poorly drained Saco series. The Ondawa soils are commonly near soils of the Hinckley, Agawam, Merrimac, Gloucester, and Charlton series. The Ondawa soils are coarser textured than the Hadley, which are also in alluvial sediments.

Profile of Ondawa sandy loam in an idle field about 0.6 of a mile northeast of Flanders School in the town of Coventry.

Ap—0 to 8 inches, very dark gray (10YR 3/1) to very dark grayish-brown (10YR 3/2) sandy loam or fine sandy loam; weak, coarse, granular structure; very friable; abrupt, smooth boundary.

C1—8 to 18 inches, dark-brown (10YR 3/3) sandy loam with streaks of dark grayish brown (10YR 4/2); massive but breaks into soft subangular clods when disturbed; very friable; abrupt, wavy boundary.

C2—18 to 22 inches, black (10YR 2/1) fine sandy loam; massive; very friable; abrupt, wavy boundary.

C3—22 to 32 inches, dark yellowish-brown (10YR 3/4) loamy fine sand; massive; very friable.

C4—32 to 42 inches, dark-brown (10YR 4/3) and very dark grayish-brown (10YR 3/2) coarse sand and gravel; loose.

The texture of the surface soil and upper subsurface soil ranges from fine sandy loam to coarse sandy loam. Below a depth of 18 to 20 inches, the texture is variable and ranges from fine sandy loam to sand or sand and gravel. Mica flakes are common.

The Ap and A1 horizons are generally very dark grayish brown (10YR 3/2). The C horizon varies in color, and an old buried surface horizon of very dark grayish brown to black is common. In places on low knolls or ridges in flood plains, the profile of Ondawa soils approaches that of Brown Podzolic soils. Here, the color of the soil below the Ap or A1 horizon ranges from dark yellowish brown (10YR 4/4) to yellowish brown (10YR 5/4 to 5/6) and fades with depth.

PAXTON SERIES

The Paxton series consists of well-drained Brown Podzolic soils that have a fragipan and developed in deep glacial till of Late Wisconsin age. The till was derived principally from gray mica schist, gneiss, and granite, and, in places, an appreciable amount of brown mica schist.

The Paxton series is the well-drained member of the catena that includes the moderately well drained Woodbridge, the poorly drained Ridgebury, and the very poorly drained Whitman series. Other soils that occur with the Paxton are the Charlton and Gloucester. The Paxton soils differ from the Charlton in having a distinct fragipan, generally at a depth of 18 to 30 inches. The Charlton soils vary in texture and consistence below a depth of 24 to 30 inches. The Gloucester soils are coarser textured throughout and lack a fragipan.

A profile of Paxton fine sandy loam on a slope of about 2 percent of the agronomy plots of the Agricultural Experiment Station at Storrs:

Ap—0 to 9 inches, very dark grayish-brown (10YR 3/2) fine sandy loam; weak, coarse, granular structure; friable; 15 to 20 percent coarse skeleton; abrupt, smooth boundary.

B21—9 to 18 inches, dark yellowish-brown (10YR 4/4) fine sandy loam; very weak, medium, subangular blocky structure; friable to very friable; 15 to 20 percent coarse skeleton; clear, wavy boundary.

B22—18 to 24 inches, light olive-brown (2.5Y 5/4) fine sandy loam; very weak, medium, subangular blocky structure; very friable; 15 to 20 percent coarse skeleton; clear, wavy boundary.

Cx—24 to 36 inches, grayish-brown (2.5Y 5/2) gravelly sandy loam or fine sandy loam with fine mottling of olive brown (2.5Y 4/4) and dark grayish brown (2.5Y 4/2); weak, coarse, platy structure; very firm in places, but crushes easily when disturbed.

The dominant textures are fine sandy loam, stony fine sandy loam, and very stony fine sandy loam. Some areas of gravelly fine sandy loam are included. Sandy loam that contains much silt and light loam or silt loam is within the range of the series. The depth to the fragipan is generally 20 to 26 inches, but the range is from about 16 to 30 inches or more. The texture of the fragipan generally is gravelly sandy loam or fine sandy loam. In places a few low-contrast mottles are present just above the fragipan. Also, a thin, discontinuous A′2 horizon is present in places just above the fragipan, and it has a texture of gravelly sandy loam or loamy sand.

The Ap horizon has a hue of 10YR, with a value of 3 to 4 and a chroma of 2 to 4. The hue in the upper B horizon is generally 10YR, but in places this is 7.5YR and grades to 2.5Y or, in places, 10YR in the lower B horizon. The value ranges from 4 to 5, and the chroma from 3 to 8. In the fragipan the hue is generally 2.5Y or 5Y in the matrix and in the low-contrast mottles.

PEAT AND MUCK

Peat and Muck are bog soils that consist of organic deposits in various stages of decomposition. They are in low, very poorly drained positions where the water table is at or near the surface most of the time. The organic deposits were derived from sedges, cattails, mosses, leaves, roots, and woody vegetation laid down in permanent bodies of water. The muck is more highly decomposed than the peat. The accumulations of organic matter range in depth from about 12 inches to 25 feet. The deposits are underlain by mineral soil that varies in texture.

A profile of peat in Cedar Swamp about 2 miles northeast of Stafford Springs in the town of Stafford:

0 to 6 inches, very dark brown (10YR 2/2) fibrous peat, well matted with roots; 10 to 25 percent woody material; pH 4.0.

6 to 18 inches, very dark grayish-brown (10YR 3/2) fibrous peat; 10 to 25 percent woody material; pH 4.0.

18 to 36 inches, black (10YR 2/1) fibrous peat; pH 4.2.

36 to 48 inches, black (10YR 2/1) fibrous peat; 10 to 20 percent woody material.

48 to 72 inches, very dark brown (10YR 2/1) fibrous peat; 10 to 20 percent woody material; pH 4.5.

72 to 96 inches, black (10YR 2/1) fibrous peat; 10 to 20 percent woody material; pH 4.6.

96 to 120 inches, black (10YR 2/1) fibrous peat; pH 4.9.

120 to 168 inches, black (10YR 2/1) and very dark brown (10YR 2/2), disintegrated peat.

168 to 252 inches, dark olive-gray (5Y 3/2) sedimentary peat; pH 5.2.

252 to 276 inches, very dark gray (5Y 5/1) silt loam; slightly plastic; pH 6.2.

A profile of muck over peat observed in Cedar Swamp 1½ miles southeast of South Willington in the town of Willington:

0 to 6 inches, black (10YR 2/1), finely divided organic matter, well matted with roots; more than 0.75 percent of the organic matter is soluble in pyrophosphate solution; pH 4.4.

6 to 14 inches, same as overlying horizon, except that roots are less numerous.

14 to 42 inches, very dark brown (10YR 2/2) fibrous peat; 10 to 20 percent woody material; less than 0.75 percent of the organic matter is soluble in pyrophosphate solution; pH 4.6.

42 to 60 inches, dark-brown (10YR 3/3) fibrous peat; 15 to 20 percent woody material; less than 0.75 percent of the organic matter is soluble in pyrophosphate solution; pH 4.6.

60 to 90 inches, very dark gray (10YR 3/1) to dark-brown (10YR 3/3) peat that consists largely of finely divided organic matter and some woody material and visible plant remains; pH 4.8.

90 to 96 inches, very dark gray (10YR 3/1) coarse sand; pH 6.2.

Peat and Muck occurs in small to fairly large bodies scattered throughout the county. The common trees and shrubs are red maple, elm, ash, gray birch, alder, white-cedar, and some hemlock and white and black spruce. Sweet pepper bush, blueberry, viburnum, cinnamon fern, and royal fern are also common. Scattered areas support mainly sedges, cattails, and water-tolerant shrubs.

Observations indicate that more than 50 percent of the Peat and Muck areas have a mucky surface layer that is about 6 to 24 inches thick over peaty material. Some of the deeper bogs have little or no mucky material on the surface. Areas that are less than 3 feet deep are generally mucky to a depth of 18 to 24 inches. The reaction ranges from 4.1 to 5.2 in the upper horizon and 4.6 to 6.5 in the deepest horizon.

PODUNK SERIES

The Podunk series consists of moderately well drained Alluvial soils in moderately coarse materials of mixed mineralogy. This series is the member of a catena that includes the well-drained Ondawa, the poorly drained Rumney, and the very poorly drained Saco series. The Podunk soils are closely associated with soils of the Hinckley, Agawam, and Merrimac series. They have a texture of coarse sandy loam to fine sandy loam in contrast with the very fine sandy loam and silt loam of the moderately well drained Winooski soils, which are also in alluvial sediments.

A profile of Podunk fine sandy loam in a hayfield in the town of Mansfield:

Ap—0 to 6 inches, very dark grayish-brown (10YR 3/2) fine sandy loam; weak, coarse, granular structure; very friable; 5 percent coarse skeleton; abrupt, smooth boundary.

C1—6 to 8 inches, dark-brown (10YR 3/3) and grayish-brown (10YR 5/2) loamy coarse sand; 10 percent coarse skeleton; abrupt, smooth boundary.

C2—8 to 16 inches, dark-brown (10YR 3/3) fine sandy loam; massive but breaks into soft subangular clods that are very friable; clear, wavy boundary.

C3—16 to 20 inches, dark-brown (10YR 3/3) fine sandy loam mottled with dark gray (10YR 4/1) and dark reddish brown (5YR 3/3); mottles are many, fine, and distinct; massive; very friable; abrupt, smooth boundary.

C4—20 to 24 inches, very dark brown (10YR 2/2) loamy fine sand; massive; abrupt, smooth boundary.

C5—24 to 30 inches, dark yellowish-brown (10YR 3/4) loamy fine sand with very dark grayish-brown (10YR 3/2) organic stains; very friable.

C6—30 to 36 inches, very dark grayish-brown (10YR 3/2) fine sandy loam with a few fine mottles of dark reddish brown (5YR 3/3); very friable.

C7—36 to 48 inches, dark grayish-brown (10YR 4/2) and yellowish-brown (10YR 5/4) coarse sand and gravel.

Textures generally grade to loamy sand, sand, or sand and gravel at a depth of 24 to 30 inches along the smaller streams. Coarse materials may be deeper along larger streams. Mottling generally occurs at a depth of 14 to 24 inches.

POQUONOCK SERIES

The Poquonock series consists of well-drained Brown Podzolic soils that have a fragipan. These soils are in sandy, windblown or water-laid deposits over till. The yellowish-brown or strong-brown upper B horizon has developed in poorly graded sandy deposits, whereas the fragipan is in the upper part of the nonconforming till.

The Poquonock soils are closely associated with the moderately well drained Birchwood soils of the same catena and with the Broadbrook soils, which are similar but have a silt loam solum.

A profile of Poquonock sandy loam in an old field that has reverted to forest about 2 miles southwest of North Somers, off Wood Road:

O1—2 inches to 1 inch, raw leaf litter.
O2—1 inch to 0, partly decomposed litter.
Ap—0 to 8 inches, very dark grayish-brown (10YR 3/2) sandy loam; very weak, coarse, granular structure; very friable; about 5 percent coarse skeleton; abrupt, smooth boundary.
B21—8 to 20 inches, yellowish-brown (10YR 5/8) light sandy loam; breaks into soft, subangular clods that are very friable; about 5 percent coarse skeleton; clear, wavy boundary.
B22—20 to 28 inches, yellowish-brown (10YR 5/4) light sandy loam or loamy sand; massive but breaks into very soft subangular clods that are very friable; 10 to 15 percent coarse skeleton; clear, wavy boundary.
IICx—28 to 40 inches, reddish-brown (5YR 4/4) gravelly sandy loam or loam; weak, coarse, platy structure; very firm; 20 to 30 percent coarse skeleton derived principally from reddish-brown Triassic rocks.

The texture in the solum ranges from fine sandy loam to loamy sand. The principal diagnostic feature of the Poquonock soils is the sandy deposit over a fragipan in till. The color of the till ranges from olive to red, but the upper B horizon is not redder than 7.5YR. Generally the B horizon just over the fragipan shows some of the color of the underlying till. The depth to the fragipan generally is 24 to 36 inches but may be a little more in some places. The upper B horizon ranges in hue from 7.5YR to 10YR and fades with depth. Just above the fragipan, the lower B horizon has a hue of 5YR in places. Poquonock soils are mostly well drained but range from well drained to somewhat excessively drained.

RAINBOW SERIES

The Rainbow series consists of moderately well drained Brown Podzolic soils that developed in a silty mantle over a fragipan. The fragipan has developed on Late Wisconsin glacial till derived from a variety of rocks. In the Central Lowland of Connecticut the till was derived principally from reddish-brown Triassic rocks and basalt. In other places it was derived from other rocks, including schist, gneiss, and granite.

The Rainbow soils are near the well drained Broadbrook soils, and the series is the moderately well drained member of the Broadbrook catena. Rainbow soils also commonly occur near the moderately well drained Wapping soils but differ from them in having a fragipan. The Wapping soils have developed on a silty mantle over very friable to firm glacial till. The Rainbow soils have a finer textured solum than the Woodbridge. They occur principally in the Central Lowland section of Connecticut.

A profile of Rainbow silt loam in a cultivated field just north of Wapping Wood Road about 0.7 of a mile west of the junction of Wapping Wood and Skinner Roads:

Ap—0 to 10 inches, dark-brown (10YR 3/3) silt loam; weak, coarse, granular structure; friable; 15 percent coarse skeleton; abrupt, smooth boundary.
B21—10 to 14 inches, dark yellowish-brown (10YR 4/4) silt loam; weak, coarse, platy structure as a result of traffic compaction; friable; 10 to 15 percent coarse skeleton; clear, wavy boundary.
B22—14 to 17 inches, yellowish-brown (10YR 5/4) silt loam; breaks into soft subangular clods that are very friable; about 15 percent coarse skeleton; clear, wavy boundary.
B23—17 to 22 inches, yellowish-brown (10YR 5/4) silt loam mottled with gray (5Y 5/1) and strong brown (7.5YR 5/8); mottles are common, medium, and distinct; breaks into soft subangular clods that are very friable; 15 percent coarse skeleton; clear, wavy boundary.
IIA'2—22 to 26 inches, pinkish-gray (5YR 5/2) gravelly sandy loam, with a few faint mottles of olive gray (5Y 5/2); weak, coarse, platy structure with clear sand coatings on some faces; firm; clear, wavy boundary.
IICx—26 to 36 inches, reddish-brown (5YR 4/3) gravelly sandy loam finely mottled with dark reddish brown (5YR 3/4) and reddish gray (5YR 5/2); moderate, coarse, platy structure; very firm.

Silt loam is the dominant texture, but very fine sandy loam is within the range of the series. Most nonstony areas probably had a few stones before being cleared. The thickness of the silty mantle is generally about 24 inches, but the range is from about 18 to 36 inches. The proportion of coarse skeleton, which consists mainly of angular rock fragments, varies from about 2 to 20 percent. Drainage ranges from moderately good to the upper range of somewhat poor. Therefore, the depth to mottling varies. In places the break between the silty mantle and the underlying fragipan is not sharp and there is a 3- to 8-inch transitional horizon that varies in texture and consistence.

In cultivated fields, the Ap horizon generally is dark grayish brown (10YR 3/2) to dark brown (10YR 3/3). The B horizon generally has hues of 10YR and 7.5YR in the upper part and 10YR and 2.5Y in the matrix of the lower mottled horizons. The chroma of the B horizon is 2 to 6 and the value is 4 to 5.

RAYNHAM SERIES

The Raynham series consists of poorly drained Low-Humic Gley soils that developed in glaciofluvial deposits of silt loam and very fine sandy loam. These soils have a dark surface horizon over a mottled B horizon. Raynham soils occur on nearly level, low areas and are near the poorly drained Walpole and very poorly drained Scarboro soils. The poorly drained Walpole soils differ from the Raynham in being moderately coarse textured in the solum.

A profile of Raynham silt loam in a pasture about one-half mile southeast of Ellington Center in the town of Ellington:

Ap—0 to 8 inches, very dark gray (10YR 3/1) silt loam; weak, medium, granular structure; friable; abrupt, smooth boundary.
B21g—8 to 18 inches, grayish-brown (2.5Y 5/2) silt loam mottled with brown (10YR 5/3) and yellowish brown (10YR 5/6); mottles are common, fine, and distinct; massive but breaks into soft subangular clods when disturbed; friable; clear, wavy boundary.
B22g—18 to 30 inches, olive-gray (5Y 5/2) silt loam mottled with yellowish brown (10YR 5/4) and strong brown (7.5YR 5/8); mottles are many, medium, and prominent; massive; friable; clear, wavy boundary.
Cg—30 to 40 inches, light brownish-gray (10YR 6/1) loamy fine sand streaked with very dark grayish brown (10YR 3/2) and reddish gray (5YR 5/2); massive, single grain; very friable to loose.

The Raynham series is centered on soils that have a silt loam B horizon that contains less than 18 percent clay, but very fine sandy loam is within the range of the series. The A and B horizons are generally free of coarse fragments, but thin strata of sand and gravel and scattered gravel are present in the B horizons in places. Thin strata of coarse sand or sand and gravel interbedded with finer textured materials are more common in the C horizon.

The Ap and A1 horizons are generally a hue of 10YR, with a value of 2 to 3 and a chroma of 1 to 2. The matrix of the B horizon has a hue of 5Y to 10YR, with a value of 4 to 6 and a chroma of 1 to 3. The B horizons are mottled throughout.

RIDGEBURY SERIES

The Ridgebury series consists of the poorly drained to somewhat poorly drained Low-Humic Gley soils that developed on a fragipan in glacial till of Late Wisconsin age. The till was derived principally from schist, granite, and gneiss. The Ridgebury series is the poorly drained member of the catena that includes the well drained Paxton, the moderately well drained Woodbridge, and the very poorly drained Whitman series. The Ridgebury soils are near the poorly drained Leicester and associated soils of the Charlton catena. They differ from the Leicester in having a prominent fragipan, generally at a depth of 18 to 24 inches. Also the Leicester soils vary in texture and consistence below a depth of 30 inches.

A profile of Ridgebury stony fine sandy loam on a nearly level slope on the Agronomy Farm, Storrs Agricultural Experiment Station:

Ap—0 to 5 inches, black (10YR 2/1) fine sandy loam; weak, coarse, granular structure; friable; 5 percent coarse skeleton; abrupt, smooth boundary.

B21g—5 to 9 inches, olive (5Y 4/3) fine sandy loam mottled with light olive gray (5Y 6/2), yellowish brown (10YR 5/8), and reddish brown (2.5YR 4/4); contains many worm casts filled with organic material from the Ap horizon; mottles are many, fine, and distinct; massive to very weak, medium, subangular blocky structure; very friable; about 10 percent coarse skeleton; clear, wavy boundary.

B22g—9 to 18 inches, olive-gray (5Y 4/2) sandy loam mottled with olive (5Y 5/2) and dark brown (7.5YR 4/4); massive; very friable; 10 to 15 percent coarse skeleton; clear, wavy boundary.

Cxg—18 to 30 inches, gray (5Y 5/1) to olive-gray (5Y 4/2) gravelly sandy loam mottled with strong brown (7.5YR 5/8) and dark reddish brown (5YR 3/4); very weak, coarse, platy structure; firm to very firm in place but crumbles very easily when disturbed.

The dominant textures are fine sandy loam, and gravelly and stony fine sandy loam. Light loam or silt loam are also within the range of the series. Surface stoniness ranges from nearly nonstony in some cleared areas to extremely stony. The proportion of gravel-sized coarse fragments ranges from about 10 to 30 percent. The depth to the fragipan generally ranges from about 18 to 24 inches but is greater in places. Drainage ranges from poor to the lower range of somewhat poor.

The hue of the Ap or A1 horizon generally is 10YR, with a value of 2 to 3 and a chroma of 1 to 2. The matrix of the mottled B and C horizons varies in hue from 5Y to 10YR, with a value of 4 to 6 and a chroma of 1 to 3.

A profile of Ridgebury stony fine sandy loam is shown in figure 10.

Figure 10.—**Profile of Ridgebury stony fine sandy loam.**

RUMNEY SERIES

The Rumney series consists of moderately coarse, poorly drained Low-Humic Gley soils that formed in sediments derived largely from granite, gneiss, and schist and, in places, from other rocks. The Rumney series is the poorly drained member of the catena that includes the well drained Ondawa, the moderately well drained Podunk, and the very poorly drained Saco series. The texture of the Rumney soils ranges from coarse sandy loam to fine sandy loam, in contrast to the very fine sandy loam and silt loam of the poorly drained Limerick soils, which also formed in sediments on flood plains.

A profile of Rumney fine sandy loam about one-half mile northwest of South Willington Center in the town of Willington:

Ap—0 to 10 inches, black (10YR 2/1) fine sandy loam; weak, coarse, granular structure; friable; abrupt, smooth boundary.

C1g—10 to 17 inches, dark grayish-brown (2.5Y 4/2) sandy loam mottled with reddish brown (5YR 3/4); mottles are many, fine, and distinct; massive; very friable.

C2g—17 to 19 inches, light olive-brown (2.5Y 5/4) gravelly coarse sandy loam; very friable.

C3g—19 to 24 inches, light olive-gray (5Y 6/2) fine sandy loam mottled with light olive brown (2.5Y 5/4) and pale brown (10YR 6/3); massive; very friable.

C4g—24 to 36 inches, dark grayish-brown (10YR 4/2) and yellowish-brown (10YR 5/4) coarse sand with some fine gravel.

The texture ranges from coarse sandy loam to fine sandy loam to a depth of 18 to 24 inches. Along small streams the texture generally grades to loamy sand, sand, or sand and gravel, but along larger streams, coarse material is at a depth below 24 inches in places.

SACO SERIES

The Saco series consists of very poorly drained, medium to moderately coarse textured Humic Gley soils. These soils are strongly to slightly acid. They are on flood plains with the associated well-drained Ondawa and Hadley series. The Saco soils developed in materials that had their source in glacial drift derived from schist, gneiss, or granite, and, in places, from dark, fine-textured rock such as shale, slate, or phyllite. The Saco soils receive fresh material during floods, and their horizonation is weak. They occur in narrow strips along most streams in New England. The aggregate acreage is large, but the soils are too wet for important agricultural use.

A profile of Saco silt loam on the flood plain of the Scantic River about 1½ miles southwest of North Somers in the town of Somers:

Ap—0 to 6 inches, very dark brown (10YR 2/2) silt loam; weak, medium, granular structure; friable; many roots; clear, smooth boundary.

A1—6 to 14 inches, black (10YR 2/1) silt loam; weak, medium to coarse, subangular blocky structure; roots are fairly numerous; friable; slightly plastic when wet; clear, wavy boundary.

C1g—14 to 30 inches, gray (5Y 5/1) and dark-gray (5Y 4/1) silt loam; breaks into coarse, subangular blocky clods; slightly plastic when wet; many old root channels and dead roots.

C2g—30 to 48 inches, gray (5Y 5/1) very fine sandy loam with streaks of dark gray (5Y 4/1) and with a few lenses of fine sand; friable.

Silt loam and fine sandy loam are the dominant textures, but some areas of sandy loam are included, especially along smaller, fast-running streams. The texture of the C horizon ranges from sandy loam to silt loam. Strata of silty clay loam less than 6 inches thick occur in the C horizon in some places. Below 30 inches the texture varies; but coarse materials generally occur 3 to 4 feet below the surface. In places, gravelly or coarse sandy material are at a depth as shallow as 15 inches. In areas that receive very little fresh material, the surface may be nearly black and mucky. In other areas it may be dark gray or very dark gray. In the Saco soils, horizonation below the A1 horizon is weak and much less conspicuous than in the associated Humic Gley soils on the terraces. Reaction ranges from strongly acid to nearly neutral throughout. The color of the C horizon ranges from 10YR to 5BG.

SCARBORO SERIES

The Scarboro series consists of very poorly drained Humic Gley soils that developed on sandy or sandy and gravelly glaciofluvium of Late Wisconsin age. The glaciofluvial sediments were derived from a variety of rocks but mainly from granite, gneiss, and schist.

Typically, the Scarboro series is the very poorly drained member of the Merrimac catena, but it is mapped in association with the soils of the Agawam, Enfield, Hartford, and other catenas. The Scarboro soils commonly occur near the very poorly drained Whitman soils of the uplands. Their profile is generally coarser textured than that of the Whitman soils and lacks the conspicuously stony and bouldery characteristic of the Whitman soils.

A profile of Scarboro fine sandy loam in an idle area just east of Ellington Center in the town of Ellington:

A1—0 to 12 inches, black (10YR 2/1) fine sandy loam or loamy fine sand; about 10 percent organic matter; weak, medium, granular structure in upper 6 inches; friable; clear, smooth boundary.

C1g—12 to 20 inches, gray (5Y 5/1) loamy sand or loamy fine sand with a few, faint, pale-olive (5Y 6/3) mottles; massive; loose; clear, wavy boundary.

C2g—20 to 30 inches, dark-gray (10YR 4/1) and gray (10YR 5/1) medium and coarse sand; loose.

The texture is generally loamy sand, light fine sandy loam, or sandy loam, but finer textures are included. The proportion of coarse skeleton ranges from practically none to about 20 percent in the upper part of the profile. Below 18 inches the material ranges from gravel-free sand or loamy sand to sand and gravel.

SUDBURY SERIES

The Sudbury series consists of moderately well drained Brown Podzolic soils that developed on stratified deposits of sand and gravel of Late Wisconsin age. The sand and gravel deposits were derived principally from gneiss, granite, and schist but, in places, include sediments from other kinds of rocks. In the Central Lowland of Connecticut, the sand and gravel deposits consist of a high proportion of reddish-brown Triassic sediments in places.

The Sudbury series is the moderately well drained member of the catena that includes the well-drained to somewhat excessively drained Merrimac, the poorly drained Walpole, and the very poorly drained Scarboro series. The Sudbury soils differ from the moderately well drained Tisbury soils in having a coarser textured solum and from the Ninigret soils in having sand and gravel substrata at a depth of about 2 feet.

A profile of Sudbury fine sandy loam on a slope of 2 percent in a cultivated field off Hurlburt Road, 0.7 of a mile northeast of Somersville in the town of Somers:

Ap—0 to 9 inches, very dark brown (10YR 3/3) fine sandy loam; weak, medium to coarse, granular structure; friable; 5 percent coarse skeleton; abrupt, smooth boundary.

B21—9 to 18 inches, yellowish-brown (10YR 5/4) fine sandy loam; breaks into soft subangular clods when disturbed; very friable; coarse skeleton about 5 percent; clear, wavy boundary.

B22—18 to 26 inches, brown (10YR 5/3) gravelly sandy loam mottled with strong brown (7.5YR 5/6) and light brownish gray (10YR 6/2); mottles are common, fine, and distinct; massive; very friable; clear, wavy boundary.

C—26 to 36 inches, dark grayish-brown (10YR 4/2) sand and gravel mottled with reddish brown (5YR 4/3) and strong brown (7.5YR 5/6); loose.

The texture ranges from coarse sandy loam to fine sandy loam, but sandy loam and fine sandy loam are most common. The depth to coarse sand or sand and gravel is generally 24 inches, but the range is from about 18 to 30 inches. The proportion of coarse fragments in the A and B horizons range from about 3 to more than 20 percent. Drainage ranges from moderately good to the upper range of somewhat poor. Therefore, the depth to mottling varies.

The hue in the Ap horizon is generally 10YR, with a value of 3 to 4 and a chroma of 2 to 3. The hue in the upper B horizon is generally 10YR and grades to 2.5Y in the matrix of the lower B horizon. The value ranges from 4 to 5, and the chroma from 4 to 8.

SUTTON SERIES

The Sutton series consists of moderately well drained Brown Podzolic soils that developed on Late Wisconsin glacial till. The till was derived principally from schist, gneiss, and granite in varying proportions. Generally, materials from schistose rocks are dominant.

The Sutton series is the moderately well drained member of the catena that includes the well drained Charlton, the poorly drained Leicester, and the very poorly drained Whitman series. The Sutton soils are commonly associated with the moderately well drained Woodbridge soils, which have a prominent fragipan, generally at a depth of 18 to 30 inches. The Sutton series is centered on soils that have a fine sandy loam B horizon that generally contains more than 30 percent silt. The moderately well drained Sudbury soils, which developed on sand and gravel, have a somewhat wider range of texture in the solum than the Sutton soils and lack the stoniness of those soils. The Sutton soils are fairly extensive and are important on many dairy farms.

A profile of Sutton fine sandy loam, in a nearly level, recently cleared hayfield 2 miles southeast of Tolland Center:

- Ap—0 to 5 inches, very dark gray (10YR 3/1) fine sandy loam; massive; friable; about 5 percent coarse skeleton; abrupt, smooth boundary.
- B21—5 to 15 inches, yellowish-brown (10YR 5/4) fine sandy loam; breaks into soft subangular blocky clods when disturbed; very friable; about 10 percent coarse skeleton; clear, wavy boundary.
- B22—15 to 24 inches, light olive-brown (2.5Y 5/4) fine sandy loam mottled with pale brown (10YR 6/3) and yellowish brown (10YR 5/8); mottles are common, medium, and distinct; breaks into soft subangular clods when disturbed; very friable; about 10 percent coarse skeleton; clear, wavy boundary.
- C1g—24 to 40 inches, gray (N 6/0) fine sandy loam mottled with yellowish brown (10YR 5/6) and strong brown (7.5YR 5/8); contains streaks and pockets of loamy sand; mottles are common, medium, and distinct; massive to weak, coarse, platy structure; firm to very friable; 10 to 15 percent coarse skeleton; abrupt, smooth boundary.
- C2g—40 to 48 inches, dark-gray (10YR 4/1) and dark grayish-brown (10YR 4/2) loamy coarse sand; massive; very friable.

The main textures are fine sandy loam, stony fine sandy loam, and very stony fine sandy loam. The texture in the upper 18 to 24 inches is dominantly fine sandy loam that contains more than 30 percent silt, but the range of the series includes sandy loam that contains much silt and light silt loam or loam in the upper 6 to 10 inches. The Sutton soils vary in texture and consistence below a depth of 24 to 30 inches. Moderately well drained soils that have a fine sandy loam solum over very friable to slightly firm loamy sand were formerly included in the Acton series but are now within the range of the Sutton series. The consistence in the C horizon ranges from very friable to firm. In places the firm layer occurs below a depth of 30 inches, and there is generally a mottled, slightly coarse, discontinuous A′2 horizon above the firm layer. A profile that has a friable to firm gravelly fine sandy loam or sandy loam substratum is not generally uniform in texture but consists of thin lenses and pockets of coarse-textured material within the predominantly moderately coarse textured materials. The proportion of coarse skeleton of gravel-size fragments in the solum ranges from about 10 to 30 percent. Stones and weathered schist fragments are common throughout the profile. Surface stoniness ranges from nearly nonstony, in some cleared areas, to extremely stony.

Very dark gray (10YR 3/1) and very dark grayish brown (10YR 3/2) are the dominant colors in the Ap horizon. The upper B horizon generally has a hue of 10YR, with a chroma of 4 to 8 and a value of 4 to 6. In the mottled lower B horizon, the matrix colors are generally hues of 10YR and 2.5YR; hues of 2.5Y and 5Y are dominant in the C horizon. The depth to distinct mottling ranges from about 12 to 24 inches.

TISBURY SERIES [5]

The Tisbury series consists of moderately well drained Brown Podzolic soils that developed in a silty mantle over stratified sand and gravel. In the Central Lowland, the sand and gravel deposits were derived principally from reddish-brown Triassic rocks, but in other areas, from crystalline rocks.

The Tisbury series is the moderately well drained member of the Enfield catena. Associated wet soils are the Walpole and Scarboro. The Tisbury soils have a silt loam or very fine sandy loam solum, in contrast to the coarser textured solum of the Sudbury soils. The Tisbury and Wapping soils have developed in a silty mantle and are moderately well drained. The Wapping soils, however, are on uplands underlain by coarse-textured to moderately coarse textured glacial till, whereas the Tisbury soils are on terraces underlain by sand and gravel at a depth of about 24 inches.

A profile of Tisbury silt loam in a cultivated area about 2 miles west of Ellington Center in the town of Ellington:

- Ap—0 to 8 inches, very dark grayish-brown (10YR 3/2) silt loam; weak, medium, granular structure; friable; 2 percent coarse skeleton; abrupt, smooth boundary.
- B21—8 to 16 inches, yellowish-brown (10YR 5/4) silt loam; breaks into soft, subangular clods when disturbed; very friable; about 5 percent coarse skeleton; clear, wavy boundary.
- B22—16 to 22 inches, light olive-brown (2.5Y 5/4) silt loam with a few, fine, yellowish-brown (10YR 5/6) and grayish-brown (2.5Y 5/2) mottles; breaks into soft, subangular clods when disturbed; very friable; about 5 percent coarse skeleton; clear, wavy boundary.
- IIC—22 to 36 inches, reddish-brown (5YR 4/4) coarse sand and gravel derived principally from Triassic rocks.

The texture of the A and B horizons is generally silt loam, but very fine sandy loam is within the range of the series. The depth to sand and gravel is generally about 24 inches, but the range is from about 20 to 30 inches. The proportion of coarse fragments in the A and B horizons ranges from about 2 to 15 percent. Drainage ranges from moderately good to the upper range of somewhat poor.

The color of the Ap horizon generally is very dark grayish brown (10YR 3/2) to dark brown (10YR 3/3). The upper B horizon generally has a hue of 7.5YR or

[5] The Tisbury soils in Tolland County closely resemble the Belgrade soils of other areas to a depth of about 2 feet. Further study may result in the combination of the two series in other areas.

10YR and the matrix of the lower B horizon a hue of 10YR or 2.5Y, with a value of 4 to 5 and a chroma of 4 to 8.

WALPOLE SERIES

The Walpole series consists of poorly to somewhat poorly drained Low-Humic Gley soils that developed on sandy or sandy and gravelly glaciofluvium. The sandy or sandy and gravelly deposits were derived principally from crystalline rocks (schist, gneiss, and granite), but in places in the Central Lowland the deposits include a rather high proportion of sediments from reddish-brown Triassic rocks. Generally, however, these reddish sediments are not strongly reflected in the solum.

Typically, the Walpole series is the poorly drained member of the catena that includes the well drained to somewhat excessively drained Merrimac, the moderately well drained Sudbury, and the very poorly drained Scarboro series. The Walpole soils are mapped in association with the Agawam, Windsor, Enfield, and other soils. The Walpole soils differ from the poorly drained Leicester soils in that the latter have developed on friable to firm glacial till on uplands and contain stones and boulders throughout the profile.

A profile of Walpole sandy loam in an idle hayfield at the junction of Crystal Lake and Burbank roads in the town of Ellington:

Ap—0 to 6 inches, very dark brown (10YR 2/2) sandy loam or fine sandy loam; massive; friable; clear, smooth boundary.

B21g—6 to 14 inches, grayish-brown (2.5Y 5/2) sandy loam finely mottled with yellowish-brown (10YR 5/4), strong-brown (7.5YR 5/8), and a few reddish-brown (5YR 4/4) streaks along old root channels; massive in place, but breaks into very weak, coarse plates because of compaction; friable; 3 to 5 percent coarse skeleton; gradual, wavy boundary.

B22g—14 to 18 inches; olive-gray (5Y 5/2) sandy loam with a few yellowish-brown (10YR 5/4) mottles and dark-brown organic stains; massive; very friable; 5 percent coarse skeleton; clear, wavy boundary.

IICg—18 to 40 inches; dark grayish-brown (10YR 4/2) coarse sand and gravel; mottled and streaked with brown (10YR 5/3); loose.

The texture of the surface layer and upper subsoil is commonly sandy loam and fine sandy loam, but silt loam in the surface layer is within the range of the series. The texture in the lower subsoil grades to loamy sand or sand and gravel at a depth of 18 to 30 inches. The content of gravel in the solum ranges from practically none to about 20 percent.

The color of the Ap and A1 horizons ranges from very dark grayish brown (10YR 3/2) to black or very dark brown (10YR 2/1 to 2/2). The B horizon is strongly mottled with matrix hues of 10YR, 2.5Y, and 5Y, with a chroma of 1, 2, or 3 and a value of 4, 5, or 6.

WAPPING SERIES

The Wapping series consists of moderately well drained Brown Podzolic soils that developed in a silty mantle over coarse to moderately coarse glacial till. The till is of Late Wisconsin age and varies in composition. In the Central Lowland, the till was derived mainly from reddish-brown Triassic rocks.

The Wapping series is the moderately well drained member of the Narragansett catena. The Wapping soils occur near the Cheshire, Watchaug, Broadbrook, and Rainbow soils. They differ from the moderately well drained Watchaug soils in texture and color of solum, and from the moderately well drained Rainbow soils in not having a well-developed fragipan.
Street, 1.2 miles southwest of Somersville in the town of
A profile of Wapping silt loam in a pasture off Maple
Somers:

Ap—0 to 9 inches, dark-brown (10YR 3/3-4/3) silt loam, weak, medium, granular structure; friable; 5 percent coarse skeleton; abrupt, smooth boundary.

B21—9 to 20 inches, brown (7.5YR 5/4) silt loam; soft, subangular blocky clods crush to weak, granular structure; very friable; about 5 percent coarse skeleton; clear, wavy boundary.

B22—20 to 28 inches, brown (10YR 5/3) very fine sandy loam mottled with yellowish brown (10YR 5/6) and very pale brown (10YR 7/3); mottles are few, fine, and distinct; breaks into soft, subangular clods that are very friable; 5 to 10 percent coarse skeleton; clear, wavy boundary.

IIC—28 to 36 inches, reddish-brown (2.5YR 4/4) gravelly fine sandy loam or sandy loam; friable to slightly firm; silt caps on some rock fragments.

Silt loam is the dominant texture, but very fine sandy loam is within the range of the series. The silty mantle generally ranges from about 20 to 30 inches in thickness but is thicker in places. Drainage ranges from moderately good to the upper range of somewhat poor. Therefore, the depth to mottling and the intensity of mottling vary. The proportion of coarse skeleton, which consists of angular rock fragments, ranges from about 2 to 20 percent in the A and B horizons. The texture of the underlying till ranges from gravelly loamy sand to gravelly sandy loam, and the consistence ranges from very friable to firm.

The Ap horizon is generally very dark grayish brown (10YR 3/2). The upper B horizon has a hue of 10YR or 7.5YR; the mottled lower horizon generally has a hue of 10YR in the matrix.

WATCHAUG SERIES

The Watchaug series consists of reddish, moderately well drained Brown Podzolic soils that developed in Late Wisconsin glacial till. The till was derived principally from reddish-brown Triassic sandstone, conglomerate, and arkose.

The Watchaug series is the moderately well drained member of the Cheshire catena. The Watchaug soils commonly occur near the moderately well drained Wapping soils, which developed in a silty mantle over very friable to firm till. The Watchaug soils differ from Wapping in being coarser textured and reddish colored in the solum.

A profile of Watchaug fine sandy loam on a slope of 2 percent in a cultivated field 2 miles northeast of Ellington Center:

Ap—0 to 8 inches, dark reddish-gray (5YR 4/2) fine sandy loam; weak, medium, granular structure; friable; 10 to 15 percent coarse skeleton; abrupt, smooth boundary.

B21—8 to 18 inches, reddish-brown (5YR 4/4) fine sandy loam; very weak, medium, subangular blocky structure; friable; 10 to 15 percent coarse skeleton; clear, wavy boundary.

B22—18 to 26 inches, reddish-brown (5YR 5/3) fine sandy loam mottled with reddish gray (5YR 5/2), strong brown (7.5YR 5/6), and dark reddish gray (5YR 4/2); mottles are few, fine, and faint to distinct;

breaks into soft, subangular blocky clods when disturbed; very friable; 15 percent coarse skeleton; gradual, wavy boundary.

C—26 to 40 inches, yellowish-red (5YR 4/8) gravelly loamy sand and gravelly sandy loam with streaks of reddish gray (5YR 5/2); very friable to slightly firm; firm layer crushes very easily when disturbed.

The main texture is fine sandy loam, but in the upper part of the solum, sandy loam and light loam or silt loam are within the range of the series. The proportion of coarse skeleton in the A and B horizons generally ranges from about 10 to 30 percent. In the C horizon texture and consistence vary. The texture ranges from gravelly loamy sand to gravelly fine sandy loam or sandy loam, and the consistence from very friable to firm. The firm or weak fragipan is generally thin and discontinuous.

The Ap horizon has a hue of 10YR or 5YR, with a value of 3 to 4 and a chroma of 2 to 3. The upper B horizon and matrix of the lower B horizon normally have a hue of 5YR, but in places the hue is 2.5YR and fades slightly with depth. The value generally ranges from 4 to 5, and the chroma from 2 to 3. The depth to mottling ranges from about 10 to 20 inches, and the mottles are generally fine and of low contrast.

WHITMAN SERIES

The Whitman series consists of very poorly drained Humic Gley soils that developed on Late Wisconsin till. The till was derived principally from schist, gneiss, and granite and varies in texture and consistence.

The Whitman series is the very poorly drained member of several catenas, including the Charlton, Paxton, and Gloucester catenas. The Whitman soils differ from the very poorly drained Scarboro soils in color and parent material. The Scarboro soils are generally coarser than the Whitman, have developed on coarse sand and gravel, and lack the stones and boulders that are characteristic of the Whitman soils.

A profile of Whitman stony fine sandy loam in a pasture about one-quarter of a mile east of the junction of U.S. Routes 44A and 31 in the town of Coventry:

A1—0 to 10 inches, very dark brown (10YR 2/2) stony fine sandy loam; weak, coarse, granular structure in upper 6 inches; friable; clear, smooth boundary.

B21g—10 to 14 inches, olive-gray (5Y 4/2) sandy loam with a few fine mottles of strong brown (7.5YR 5/6) and brownish yellow (10YR 6/6); massive; friable; 10 to 15 percent coarse skeleton; clear, wavy boundary.

B22g—14 to 19 inches, pale-olive (5Y 6/3) sandy loam with a few fine mottles of strong brown (7.5YR 5/6) and brownish yellow (10YR 6/6); massive; friable; 10 to 15 percent coarse skeleton; clear, wavy boundary.

Cg—19 to 30 inches, light-gray (5Y 7/2) gravelly sandy loam; firm in place, very friable when disturbed.

The texture is dominantly fine sandy loam and sandy loam that contains much organic matter, but the range is from loamy sand to silt loam or loam. The Whitman soils are conspicuously stony and bouldery, and most areas range from very stony to extremely stony. The thickness of the A1 horizon ranges from about 8 to 14 inches, and some areas have a thin, mucky or peaty layer on the surface. The subsurface layer varies in texture, consistence, and mottling. The horizon below 18 to 24 inches varies from loose gravelly loamy sand to a fragipan of gravelly sandy loam or loam. Probably, in many places, soils classified as Whitman are underlain by water-worked glacial till.

WILBRAHAM SERIES

The Wilbraham series consists of poorly drained and somewhat poorly drained Low-Humic Gley soils that are medium textured and have a fragipan. The fragipan has developed in glacial till derived principally from reddish-brown Traissic rocks.

The Wilbraham soils are on nearly level and slightly concave slopes. In many areas they are at the head of drains or along sluggish drainageways. Closely associated with them are the well-drained Cheshire, Broadbrook, and Poquonock and the moderately well drained Birchwood and Wapping soils. The Wilbraham soils are finer textured than the poorly drained Ridgebury soils and have a reddish fragipan.

A profile of Wilbraham silt loam in an unimproved pasture about 1.7 miles northeast of Osborn Prison Farm:

Ap—0 to 6 inches, very dark gray (10YR 3/1) silt loam with a few streaks of dark reddish brown (5YR 3/3) along root channels; very weak, medium, granular structure; friable; about 15 percent gravel; abrupt, smooth boundary.

B21g—6 to 14 inches, grayish-brown (10YR 5/2) silt loam mottled with reddish brown (5YR 5/3) and yellowish brown (10YR 5/6); mottles are common, medium, and distinct; very weak, medium, subangular blocky structure; friable; about 15 percent gravel; clear, wavy boundary.

B22g—14 to 20 inches, reddish-brown (5YR 4/4) gravelly silt loam mottled with grayish brown (2.5Y 5/2) and yellowish brown (10YR 5/4); mottles are many, medium, and prominent; massive but breaks into medium subangular clods when disturbed; friable; clear, wavy boundary.

Cx—20 to 30 inches, yellowish-red (5YR 4/6) gravelly fine sandy loam finely mottled with reddish gray (5YR 5/2) and brown (10YR 5/3); very weak, coarse, platy structure; firm to very firm.

Silt loam is the dominant texture, but loam, very fine sandy loam, and fine sandy loam are within the range of the series. Angular rock fragments of gravel size are common throughout the profiles and range from about 10 to 30 percent. Surface stoniness ranges from stony to nearly nonstony in areas that have been cleared.

The A horizon usually has a hue of 10YR, with a value of 2 to 4 and a chroma of 1 to 2. The B horizon generally ranges in hue from 5YR to 2.5YR, with a value of 4 to 5 and a chroma of 2 to 6. Reddish colors are more common in the lower B than the upper B horizon. The hue of the fragipan is 5YR or 2.5YR.

WINDSOR SERIES

The Windsor series consists of excessively drained Brown Podzolic soils that have a sand or loamy sand solum and developed on sandy deposits laid down by water, wind, or both. Typically, Windsor soils occur on glaciofluvial terraces of Late Wisconsin age. In many places on these terraces the freshly deposited, sandy, water-lain material may have been rearranged by wind. The Windsor soils have faint to evident horizonation.

The less well drained associates of the Windsor soils are the moderately well drained Sudbury, the poorly to somewhat poorly drained Walpole, and the very poorly drained Scarboro. The closely associated Hinckley soils are similar to the Windsor in color and lithology but are more gravelly in the solum and are underlain by coarse stratified deposits of gravelly sand at a shallow depth. The Agawam soils are closely associated with the Windsor and are in the same catena but have a fine sandy loam to sandy loam solum.

A profile of Windsor loamy sand about 0.3 of a mile west of Somers High School in the town of Somers:

Ap—0 to 8 inches, dark yellowish-brown (10YR 3/4) loamy sand; very weak, medium, granular structure; very friable to loose; abrupt, smooth boundary.
B21—8 to 18 inches, yellowish-brown (10YR 5/6) loamy sand with a few rounded pebbles; loose; clear, wavy boundary.
B22—18 to 26 inches, brown (10YR 5/3) loamy sand with a few rounded pebbles; loose; gradual, wavy boundary.
C—26 to 50 inches, pale-brown (10YR 6/3) and light brownish-gray (10YR 6/2), medium and coarse sand; loose.

The texture of the A and B horizons ranges from loamy sand to sand. The sand ranges from coarse to fine but is dominantly medium. The C horizon consists mainly of medium-sized sand, but the range is from coarse to fine. Windsor and Hinckley loamy sands intergrade in places, and boundaries between the two soils are arbitrary.

The color of the upper B horizon is generally a hue of 10YR, but in places it is 7.5 YR. The hue of the lower B and the C horizon ranges from 10YR to 2.5Y.

WINOOSKI SERIES

The Winooski series consists of moderately well drained Alluvial soils that are in medium-textured recent sediments. The sediments are derived from schist, gneiss, and other fine-textured rocks.

Winooski soils occur in a catena with the well-drained Hadley, the poorly drained Limerick, and the very poorly drained Saco soils. Soils on glaciofluvial terraces closely associated with Winooski are the well-drained Enfield, Agawam, and Merrimac soils. The Winooski profile has silt loam or very fine sandy loam in the upper part in contrast to the fine sandy loam and sandy loam of the moderately well drained Podunk soils, which also are in alluvial sediments.

A profile of Winooski silt loam in a pasture about 1 mile southeast of Flanders School in the town of Coventry:

Ap—0 to 10 inches, very dark brown (10YR 2/2) silt loam; weak, medium and coarse, granular structure in the upper 4 inches and weak, coarse, platy structure in the lower part because of compaction; friable to very friable; many fine roots; abrupt, smooth boundary.
C1—10 to 20 inches, intermingled, dark-brown (10YR 3/3) and very dark grayish-brown (10YR 3/2) silt loam; breaks into medium, subangular clods that crush easily to weak, coarse, granular structure; friable to very friable; roots common; clear, wavy boundary.
C2g—20 to 30 inches, grayish-brown (10YR 5/2) silt loam finely mottled with yellowish brown (10YR 5/6) and strong brown (7.5YR 5/8); massive; friable; few roots; clear, wavy boundary.
C3g—30 to 42 inches, dark-gray (10YR 4/1) loamy sand that is streaked with dark-brown (7.5YR 4/4) lenses of fine sandy loam; small amount of fine gravel; very friable.

Silt loam is dominant in the upper part of the profile, but some areas are very fine sandy loam. The depth to coarse-textured materials, generally loamy sand to sand and gravel, varies but is 20 to 36 inches in most places.

The A horizon is generally a hue of 10YR, with a value of 2 to 4 and a chroma of 1 to 2. The upper C horizon generally is a hue of 10YR or 2.5Y, with a value of 3 to 5 and a chroma of 2 to 3. The depth to mottling ranges from about 12 to 24 inches. In a mottled horizon some of the mottles have a redder hue and a higher chroma than the matrix color.

In areas that have not been limed, the reaction ranges from strongly acid to medium acid.

WOODBRIDGE SERIES

The Woodbridge series consists of moderately well drained Brown Podzolic soils that have a fragipan and developed on deep Late Wisconsin glacial till. The till was derived principally from gray mica schist and from gneiss and granite, but in places it contains an appreciable amount of weathered, brown schist.

The Woodbridge series is the moderately well drained member of the catena that includes the well drained Paxton, the somewhat poorly drained Ridgebury, and the very poorly drained Whitman series. The Woodbridge soils also occur near the Charlton and Sutton and, in some places, near the Gloucester soils. They differ from the Sutton soils in having a distinct or prominent fragipan generally within 30 inches of the surface. Also, the Sutton soils vary in texture and consistence below a depth of 24 to 30 inches. The Woodbridge soils have a coarser solum than the moderately well drained Rainbow soils, which have developed in a silty mantle over a fragipan.

A profile of Woodbridge fine sandy loam in a nearly level, cultivated field 0.6 of a mile southwest of the junction of State Highway 32 and U.S. Route 44A in the town of Coventry:

Ap—0 to 8 inches, very dark grayish-brown (10YR 3/2) fine sandy loam; massive; friable; 15 percent coarse skeleton; abrupt, smooth boundary.
B21—8 to 16 inches, dark yellowish-brown (10YR 4/4) fine sandy loam; very weak, coarse, subangular blocky structure; friable to very friable; 10 to 15 percent coarse skeleton; clear, wavy boundary.
B22—16 to 24 inches, yellowish-brown (10YR 5/4) fine sandy loam mottled with grayish brown (10YR 5/2) and strong brown (7.5YR 5/8); very weak, coarse, subangular blocky structure; 15 percent coarse skeleton; clear, wavy boundary.
Cxg—24 to 40 inches, grayish-brown (10YR 5/2) and olive-gray (5Y 5/2) gravelly sandy loam mottled with yellowish brown (10YR 5/6) and strong brown (7.5YR 5/8); massive to weak, coarse, platy structure; breaks into coarse, subangular blocky clods when disturbed; very firm; some silt films around rock fragments; 15 to 20 percent coarse skeleton.

The dominant textures are fine sandy loam, stony fine sandy loam, and very stony fine sandy loam, but very fine sandy loam and light loam are within the range of the series. The texture of the fragipan is generally fine sandy loam or sandy loam, with gravelly counterparts, but the texture is loam in some places. Coarse fragments that are as large as 3 inches in diameter generally make up 10 to 30 percent of the solum. Surface stoniness ranges from nearly nonstony, in some cleared areas, to extremely stony. The depth to the fragipan generally is 20 to 24 inches, but it ranges from about 16 to 30 inches. In places, a thin A′2 horizon is present just above the fragipan, and it is coarser than the material above or below it.

The Ap horizon has a hue of 10YR, with a value of 3 to 4 and a chroma of 2 to 3. In the upper B horizon, 10YR is the dominant hue, but in a few places, the hue is 7.5YR or 2.5Y. In the lower B horizon, the matrix generally has a hue of 10YR or 2.5Y. The depth to mottling ranges from about 12 to 20 inches.

Laboratory Data on Selected Soil Profiles

Physical and chemical properties of four selected soil profiles are described in this section. The laboratory data on these soils are shown in tables 10 and 11. These data are helpful in characterizing and classifying the soils and in understanding their genesis. The information is also useful in making interpretations for use and management.

The soils from which the samples were collected are considered representatives of their respective series. One of the Charlton samples was collected in Hartford County but near the Hartford-Tolland County line. The laboratory analyses were made at the soil survey laboratory of the Soil Conservation Service, Beltsville, Md., and the Connecticut Agricultural Experiment Station, Windsor, Conn. Moisture retention values and bulk densities on all samples, except Woodbridge fine sandy loam, were made at the Connecticut Agricultural Experiment Station. The other analyses were made at the soil survey laboratory.

Particle-size distribution and other data for the four selected soils are shown in table 10. Particle-size distribution was determined by the pipette method (*17*, *18*). Moisture retention values for the Woodbridge soil were determined by the use of a pressure-plate and pressure-membrane apparatus on fragmented samples. For the Charlton and Gloucester soils, moisture determinations at 15 atmospheres pressure were made by using the pressure-membrane apparatus procedures of Richards (*23*) on fragmented samples. Moisture determinations at 1/3 atmosphere pressure were made on undisturbed core samples, equilibrated on ceramic pressure plates in a pressure cooker at 1/3 atmosphere. Water held at sixty centimeters of tension was determined by using ceramic plates after saturation. All moisture percentages are recorded on a weight basis. Bulk densities for Woodbridge fine sandy loam were determined by the plastic-coated clod method, measuring water displaced. Bulk densities for the Charlton and Gloucester soils were calculated from oven-dried, known-volume core samples.

The Gloucester soils are coarser textured than the Charlton. They were derived from coarse-textured granite till, and the Charlton soils from till derived principally from schist and gneiss.

The Woodbridge soil is a moderately well drained Brown Podzolic soil with a fragipan. The sample was collected in a cultivated field. Compared with the Charlton and Gloucester samples, the Woodbridge sample has a higher pH, a lower cation exchange capacity, and a higher base status throughout. The pH and base status of the Woodbridge has been altered by liming. The fragipan has a higher base status than the overlying horizons. This indicates that less movement of water or leaching occurs in the pan than in the overlying horizons, or a small transfer of bases into the pan has occurred.

Chemical data for the four soils are shown in table 11. The reaction (pH) was determined with a glass electrode and a 1:1 soil-water ratio (*22*). Organic carbon was determined by wet combustion (*22*); nitrogen by a semimicro Kjeldahl method (*22*). The cation exchange capacity and extractable cations were determined by a method developed by Peech, Alexander, and others (*22*), except that sodium and potassium were determined by flame spectrophotometry. Free iron oxide was determined by a modification of Deb's method (*16*).

The Charlton and Gloucester soils have low pH and low base saturation. Other properties associated with Brown Podzolic soils are (1) a relatively high C/N ratio and (2) a relatively high exchange capacity in the B horizon, considering the clay and organic-matter content. Apparently the exchange capacity is high partly because of substances other than organic matter and silicate clay as such. The distribution of free iron oxides, which decrease abruptly with depth and are at a maximum in the B horizon, is characteristic of Brown Podzolic soils.

Following are profile descriptions of three of the soils sampled. A description of the Woodbridge profile at the sampling location is given in the preceding subsection "Morphology of Soils."

Charlton stony fine sandy loam. S58 Conn. 7-1-(1-8).—A profile on a slope of about 6 percent in a forested area 0.9 of a mile southwest of Grant School on the north side of New Road in the town of Tolland:

O1—1½ inches to 1 inch, undecomposed leaves.

O2—1 inch to 0, partly decomposed and well-decomposed litter.

A1—0 to 1 inch, very dark grayish-brown (10YR 3/2) fine sandy loam; very weak, medium, granular structure; very friable; well matted with fine roots; abrupt, smooth boundary.

B21—1 to 6 inches, dark-brown (10YR 3/3) fine sandy loam; very weak, coarse, granular structure; very friable; coarse skeleton of gravel-size fragments, about 10 percent; clear, abrupt boundary.

B22—6 to 16 inches, dark-brown (7.5YR 4/4) fine sandy loam; structureless; massive but breaks readily to soft, irregular clods when disturbed; very friable; coarse skeleton of gravel-size fragments, 15 to 20 percent; clear, wavy boundary.

B23—16 to 26 inches, dark yellowish-brown (10YR 4/4) fine sandy loam; structureless; massive but breaks readily to soft, irregular clods when disturbed; very friable; coarse skeleton of gravel-size fragments about 20 percent; clear, wavy boundary.

C1—26 to 45 inches, light olive-brown (2.5Y 4/4) and dark grayish-brown (10YR 4/2) interbedded gravelly fine sandy loam and loamy sand; the horizon consists of firm to very firm discontinuous tongues or pockets and very friable material in about equal proportions; weak, coarse, platy to massive; silt caps and silt films common; clear, wavy boundary.

C2—45 to 54 inches, olive (5Y 4/3) gravelly fine sandy loam; very friable to loose.

Charlton stony fine sandy loam. S58 Conn. 2-1-(1-9).—A profile on an east-northeast slope of about 7 percent, 0.7 of a mile northeast of the lookout tower on John Tom Hill in the town of Glastonbury in Hartford County:

O1—1½ inches to ½ inch, undecomposed litter.

O2—½ inch to 0, partly and well-decomposed litter.

TABLE 10.—*Particle-size distribution*

[Dashes in columns indicate

Soil type and sample number	Horizon	Depth	Particle-size distribution			
			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.)
		Inches	*Percent*	*Percent*	*Percent*	*Percent*
Charlton stony fine sandy loam; S58 Conn. 7–1–(3–8), Tolland County.	O1	1½–1	----------	----------	----------	----------
	O2	1–0	----------	----------	----------	----------
	A1	0–1	3. 2	8. 9	9. 5	21. 6
	B21	1–5½	2. 9	7. 6	9. 2	20. 0
	B22	5½–16	3. 3	8. 2	9. 6	21. 0
	B23	16–26	3. 2	9. 8	10. 3	22. 9
	C1	26–45	3. 2	8. 3	9. 8	21. 8
	C2	45–54	3. 2	10. 0	12. 7	27. 6
Charlton stony fine sandy loam; S58 Conn. 2–1–(3–9), Hartford County (near Tolland County line).	O1	1½–½	----------	----------	----------	----------
	O2	½–0	----------	----------	----------	----------
	A1	0–½	----------	----------	----------	----------
	A1–A2	½–1½	5. 0	8. 2	8. 7	22. 1
	B21	1½–5	4. 4	7. 6	8. 2	21. 5
	B22	5–11½	6. 7	8. 1	8. 6	22. 6
	B23	11½–17	6. 3	8. 0	8. 5	22. 4
	B3	17–23	5. 3	8. 0	8. 8	23. 4
	C	23–36	5. 9	9. 2	11. 9	30. 9
Gloucester stony loamy sand; S58 Conn. 7–3–(2–8), Tolland County.	O1	1½–1	----------	----------	----------	----------
	O2	1–0	----------	----------	----------	----------
	A1–A2	0–1½	4. 2	10. 3	11. 8	33. 0
	B21	1½–6	4. 6	8. 7	10. 1	29. 7
	B22	6–11	6. 0	9. 7	10. 5	29. 3
	B23	11–21	5. 6	10. 2	11. 3	30. 7
	B3–C1	21–27	5. 1	10. 7	11. 6	31. 8
	C	27–40	5. 7	12. 2	13. 2	33. 4
Woodbridge fine sandy loam; S58 Conn. 7–4–(1–4), Tolland County.	Ap	0–8	2. 2	7. 4	8. 6	19. 2
	B21	8–16	2. 8	7. 5	8. 7	19. 7
	B22	16–24	3. 4	7. 3	8. 4	18. 4
	Cxg	24–36	4. 3	8. 2	9. 0	22. 3

[1] Moisture held at tension of 1/10 atmosphere.

A1—0 to ½ inch, very dark grayish-brown (10YR 3/2) fine sandy loam.

A1–A2—½ inch to 1½ inches, very dark grayish-brown (10YR 3/2) and dark-brown (10YR 3/3) fine sandy loam; very weak, medium, granular structure; very friable; abrupt, smooth boundary.

B21—1½ to 5 inches, dark-brown (7.5YR 4/4) gravelly fine sandy loam; structureless; massive but breaks readily to soft, irregular clods when disturbed; very friable; clear, wavy boundary.

B22—5 to 11½ inches, dark yellowish-brown (10YR 4/4) gravelly fine sandy loam; structureless; massive but breaks readily to soft, irregular clods when disturbed; very friable; clear, wavy boundary.

B23—11½ to 17 inches, olive-brown (2.5Y 4/4) gravelly fine sandy loam; structureless; massive but breaks readily to soft, irregular clods when disturbed; very friable; clear, wavy boundary.

B3—17 to 23 inches, olive-brown (2.5Y 4/4) gravelly fine sandy loam; structureless; massive but breaks readily to soft, irregular clods when disturbed; very friable; clear, wavy boundary.

C—23 to 36 inches, olive-gray (5Y 4/2) and olive (5Y 4/3) gravelly and stony loamy sand; highly micaceous; very friable to slightly firm in place.

Gloucester stony loamy sand. S58 Conn. 7–3–(1–8).—A profile on a northeast slope of about 5 percent, 0.7 of a mile west of State Line Pond on the south side of Crow Hill Road in the town of Stafford:

O1—1½ inches to 1 inch, undecomposed leaves.

O2—1 inch to 0, partly decomposed litter.

A1–A2—0 to 1½ inches, very dark grayish-brown (10YR 3/2) and dark-brown (10YR 3/3) loamy sand with prominent white sand grains; very friable; abrupt, smooth boundary.

B21—1½ inches to 6 inches, dark-brown (7.5YR 4/4) loamy fine sand; structureless; massive but breaks to very soft, irregular clods when disturbed; very friable; coarse skeleton, about 10 percent; clear, wavy boundary.

B22—6 to 11 inches, yellowish-brown (10YR 5/8) gravelly loamy sand; structureless; massive but breaks to very soft, irregular clods when disturbed; very friable; clear, wavy boundary.

B23—11 to 21 inches, light olive-brown (2.5Y 4/4) gravelly loamy sand; very friable; clear, wavy boundary.

B3-C1—21 to 27 inches, olive-brown (2.5Y 4/4) and gray (2.5Y 6/0) loamy sand; slightly firm to very friable in place; the olive-brown streaks and pockets appear to be in old root channels and surrounding weathered gneiss fragments.

C—27 to 40 inches, gray (2.5Y 6/0) sand to loamy sand with some light brownish-gray (2.5Y 6/2) coatings; slightly firm to very friable in place.

and moisture data for selected soils

sample not taken or test not run]

Particle-size distribution—Continued				Textural class	Moisture held at tension of—			Bulk density
Very fine sand (0.10–0.5 mm.)	Silt (0.05-0.002 mm.)	Clay (less than 0.002 mm.)	Coarse fragments (greater than 2 mm.)		60 cm.	1/3 atmos.	15 atmos.	
Percent	*Percent*	*Percent*	*Percent*		*Percent*	*Percent*	*Percent*	*(gm./cc.)*
----	----	----	----	----	----	----	----	----
----	----	----	----	----	----	----	----	----
17. 8	32. 3	6. 7	3	Fine sandy loam	----	----	----	----
18. 3	34. 2	7. 8	8	Fine sandy loam	26. 8	14. 3	5. 6	1. 32
18. 7	32. 6	6. 6	20	Fine sandy loam	21. 2	10. 4	4. 9	1. 44
20. 0	30. 2	3. 6	20	Fine sandy loam	20. 8	11. 0	4. 0	1. 43
19. 4	31. 7	5. 8	20	Fine sandy loam	9. 6	7. 3	3. 5	1. 70
22. 5	21. 8	2. 2	23	Fine sandy loam	----	----	----	----
----	----	----	----	----	----	----	----	----
----	----	----	----	----	----	----	----	----
----	----	----	----	----	----	----	----	----
16. 8	33. 2	6. 0	8	Fine sandy loam	----	----	----	----
16. 6	34. 7	7. 0	38	Fine sandy loam	32. 5	27. 2	6. 6	. 96
17. 8	30. 7	5. 5	30	Fine sandy loam	23. 1	12. 8	5. 2	1. 37
18. 6	33. 0	3. 2	23	Fine sandy loam	18. 2	9. 6	4. 0	1. 48
19. 0	32. 6	2. 9	23	Fine sandy loam	----	----	----	----
19. 0	22. 5	. 6	45	Loamy sand	----	----	----	----
----	----	----	----	----	----	----	----	----
----	----	----	----	----	----	----	----	----
22. 4	17. 1	1. 2	2	Loamy sand	----	----	----	----
22. 1	22. 1	2. 7	10	Loamy fine sand	27. 4	13. 4	5. 4	1. 21
22. 6	19. 0	2. 9	28	Loamy sand	16. 1	8. 3	2. 7	1. 45
22. 6	17. 9	. 7	21	Loamy sand	16. 1	7. 9	1. 9	1. 53
24. 1	16. 2	. 5	20	Loamy sand	----	----	----	----
21. 6	12. 9	1. 0	17	Sand to loamy sand	----	----	----	----
18. 0	35. 6	9. 0	17	Fine sandy loam	[1] 37. 7	----	10. 5	1. 21
18. 6	38. 3	4. 4	11	Fine sandy loam	[1] 31. 8	----	5. 1	1. 25
18. 1	39. 6	4. 8	14	Fine sandy loam	[1] 30. 8	----	4. 5	1. 30
23. 6	29. 1	3. 5	16	Fine sandy loam	[1] 15. 6	----	2. 5	2. 08

General Nature of the County

In this section the settlement and growth of Tolland County are briefly discussed and information is given about agriculture, population, industry, and transportation. Also in this section is a discussion of the climate and its effect on agriculture.

Settlement and Growth

Tolland County was formed in 1785. Before then the area was a part of Hartford County. Early settlers came mainly from the area along the Connecticut River, from the Massachusetts Bay Colony, and from the southeast by way of the Thames River.

From early settlement until about 1810, the acreage of improved land in farms increased steadily. Communities scattered throughout the county were predominantly self-sufficient.

After 1810, there were three distinct periods in the history of Connecticut agriculture (*5*). 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 markets in the East. During this period the acreage of improved land was not seriously reduced on Connecticut farms. The period from 1880 to 1920, however, brought a shift from extensive to intensive agriculture, partly because industries competed for the available labor. During this period much of the improved farmland of the State was not maintained, and the farmland 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 in the State decreased from 174,180 in 1880 to about 10,843 in 1920. These changes were reflected in Tolland County.

Agriculture

Dairying is the principal agricultural enterprise in the county. Also important are poultry, tobacco, fruit, and market garden crops, especially potatoes.

Since 1950 urbanization has increased rapidly in some sections and reduced the acreage of farmland. In 1959,

TABLE 11.—*Chemical*

[Dashes in column indicate sample

Soil type and sample number	Horizon	Depth	Reaction (1:1)	Organic matter		
				Organic carbon	Nitrogen	Carbon-nitrogen (C/N) ratio
		Inches	*pH*	*Percent*	*Percent*	
Charlton stony fine sandy loam; S58 Conn. 7-1-(3-8), Tolland County.	O1	1½-1	------	------	------	------
	O2	1-0	------	------	------	------
	A1	0-1	4.0	5.36	0.141	38
	B21	1-5½	4.6	.98	.440	22
	B22	5½-16	4.6	.29	------	------
	B23	16-26	4.9	.26	------	------
	C1	26-45	5.3	.10	------	------
	C2	45-54	5.6	.04	------	------
Charlton stony fine sandy loam; S58 Conn. 2-1-(3-9), Hartford County (near Tolland County line).	O1	1½-½	------	------	------	------
	O2	½-0	------	------	------	------
	A1	0-½	------	------	------	------
	A1-A2	½-1½	3.9	24.50	.805	30
	B21	1½-5	4.7	7.24	.186	38
	B22	5-11½	4.6	1.46	.042	35
	B23	11½-17	4.7	.59	.032	18
	B3	17-23	4.8	.45	.033	14
	C	23-26	5.0	.31	------	------
Gloucester stony loamy sand; S58 Conn. 7-3-(2-8), Tolland County.	O1	1½-1	------	------	------	------
	O2	1-0	------	12.34	.356	35
	A1-A2	0-1½	3.8	3.33	.104	32
	B21	1½-6	4.6	2.11	.079	27
	B22	6-11	4.8	.47	.032	15
	B23	11-21	4.9	.34	------	------
	B3-C1	21-27	5.0	.13	------	------
	C	27-40	5.2	.06	------	------
Woodbridge fine sandy loam; S58 Conn. 7-4-(1-4), Tolland County.	Ap	0-8	6.1	3.21	215	15
	B21	8-16	5.8	.73	058	13
	B22	16-24	5.7	.51	039	13
	Cxg	24-36	5.7	.14	------	------

according to the U.S. Census of Agriculture, 34.3 percent of the total acreage, or 91,263 acres, in Tolland County was in farms, and the farms averaged 107.9 acres in size.

The acreage of the principal crops and the number of fruit trees in 1954 and 1959 are shown in table 12, page 104. A larger acreage is used for hay than for any other crop. From 1954 to 1959, the acreage of potatoes increased. The acreage of binder tobacco decreased drastically from 1954 to 1959, partly because of the development of a synthetic cigar binder, but the acreage of shade tobacco, or wrapper tobacco, increased during this period.

The number of livestock and poultry on farms in stated years, according to the U.S. Census of Agriculture, is shown in table 13, page 104.

Population, Industries, and Transportation

Tolland County is composed of 13 towns (townships), which had a population of 68,737 in 1960 (*27*). Most of the towns are distinctly rural in character. In eleven of the thirteen towns the population ranged from 383 to 7,476 in 1960. The town of Vernon, which includes the city of Rockville, had a population of 16,961, and the town of Mansfield, which includes the University of Connecticut, had a population of 14,638.

The towns of Vernon and Stafford are the principal industrial centers. Other towns with some industries are the towns of Mansfield, Somers, Willington, and Coventry. Some of the principal manufactured products (*27*) are woolens, worsteds, silk goods, print goods, thread, ribbons, envelopes, paper boxes, fiberboard, and pearl and plastic buttons.

All towns in the county have good, hard-surfaced roads. The county is served by many highway freight and passenger carriers. The southeast corner of the county is provided freight service by a branch line of the New York, New Haven, and Hartford Railroad. The Central Vermont Railway runs north-south through the eastern part of the county and provides freight service.

Climate [6]

Tolland County has a humid, continental climate, classified as a snow-forest type with warm summers. The continental weather is sometimes changed by the arrival of maritime air from the Atlantic Ocean to the south and east. But the prevailing westerly winds,

[6] This section was prepared by JOSEPH J. BRUMBACH, State climatologist for Connecticut and Rhode Island.

properties of selected soils

not taken or material not present]

Free iron Fe_2O_3	Cation exchange capacity (sum)	Extractable cations (milliequivalents per 100 grams of soil)					Base saturation (sum)
		Calcium	Magnesium	Sodium	Potassium	Hydrogen	
Percent	*Meq./100 gms.*						*Percent*
------	------	------	------	------	------	------	------
1.3	17.1	0.2	0.1	0.1	0.3	16.4	4
1.4	9.9	.2	<.1	<.1	.1	9.6	3
1.4	8.9	.3	.1	<.1	.1	8.4	6
.9	5.0	.2	<.1	<.1	<.1	4.8	4
.9	5.0	.5	.1	.1	<.1	4.3	14
.6	3.0	.3	.1	.1	<.1	2.6	13
------	------	------	------	------	------	------	------
1.0	56.2	2.0	1.0	.1	.4	52.7	6
1.7	23.7	.1	.2	<.1	.2	23.2	2
2.0	11.9	.1	.1	.1	.1	11.5	3
1.8	7.5	.2	<.1	<.1	.1	7.2	4
1.3	5.3	.1	<.1	<.1	<.1	5.2	2
1.1	5.2	.2	<.1	<.1	<.1	5.0	4
.7	2.8	.2	<.1	<.1	<.1	2.6	7
------	------	------	------	------	------	------	------
.6	29.4	.8	.6	.3	.2	27.5	6
.4	10.2	.3	.1	.1	.1	9.6	6
1.1	13.8	<.1	<.1	<.1	.1	13.7	1
.6	4.5	.1	<.1	.1	<.1	4.3	4
.4	3.0	.1	.1	<.1	<.1	2.8	7
.2	2.3	.1	<.1	<.1	<.1	2.2	4
.2	1.3	<.1	<.1	<.1	<.1	1.3	------
1.2	2.02	7.5	2.2	10.1	.2	.2	50
1.4	.82	1.3	.6	6.1	.1	.1	26
1.3	.43	1.2	.6	2.3	.1	.1	46
.7	.21	.9	.4	.6	.1	.1	71

blowing from the northwest in winter and from the southwest in summer, maintain the predominantly continental character of the climate. This explains the considerable temperature variation from winter to summer and from night to day.

Because of the county's location near the principal storm tracks, there are frequent changes from day to day as air is alternately brought in from northern and southern regions. A large variety of crops can be grown, because monthly mean temperatures throughout the county average 50° F. or higher for 6 months each year. In some of the western and southern valleys, where the July mean temperature reaches 72° or more, hot-weather crops thrive. Excessively hot weather is seldom experienced, however. Temperatures reach 90° or higher on about 10 days in the average summer in some parts of the western and southern lowlands. These occurrences are rarer—about 2 to 4 days—in most of the highlands, where the heat is tempered by the wind. Prolonged periods of extreme cold are also rare. Usually, cold and warm spells alternate and thus mitigate the winter discomfort. Nevertheless, during an average winter there are from 35 to 40 days when the maximum temperature does not rise above 32°; this increases to almost 50 days in some higher northern locations.

Rainfall is plentiful. In total precipitation received, Tolland County ranks high among New England counties. The average yearly amount ranges from 42 to 48 inches; the greatest amount is in the extreme south. The precipitation is well distributed throughout the year. Monthly totals average near 4 inches during the growing season and only slightly less during the winter months. The abundant precipitation guarantees that water will be available for irrigation during the fairly common, though rarely prolonged, dry spells that occur during the growing season.

Snowfall varies considerably from season to season, but seasonal totals in most sections are, on the average, between 40 and 50 inches, and nearly 60 inches in parts of the northern highlands. At Storrs, the number of snowfalls of 2 inches or more in a day has ranged from only 3 to as many as 17 in a season, with an average of 8. On the average, 2 such snowfalls come in each of the months of January, February, and March, and 2 in November and December together. The number of snowfalls of 4 inches or more during a day has ranged from none to 8 in a season; the average is nearly 4. The number of snowfalls of 8 inches during a day ranges from none to 3; the average is 1 per season. A 10-inch snowfall rarely occurs more than once in a season and

TABLE 12.—*Acreage of principal crops and number of apple and peach trees of bearing age in stated years*

Crop	1954	1959
	Acres	*Acres*
Corn for all purposes	2, 565	2, 987
Harvested for grain	292	221
Silage, hogged or grazed and cut for green or dry fodder	2, 273	2, 766
Hay, total	18, 340	15, 260
Alfalfa and alfalfa mixtures cut for hay and for dehydrating	3, 697	2, 504
Clover, timothy, and mixtures of clover and grasses cut for hay	8, 822	7, 560
Small grains cut for hay	269	205
Other hay	4, 147	3, 723
Grass silage made from grasses, alfalfa, clover, or small grain	1, 405	1, 268
Potatoes harvested for home use or for sale	[1] 1, 898	[1] 2, 183
Tobacco, total	1, 106	521
Binder	943	102
Wrapper	163	419
Vegetables harvested for sale	567	309
	Number [2]	*Number* [2]
Apple trees of bearing age	7, 730	15, 776
Peach trees of bearing age	6, 169	2, 787

[1] Does not include acreage of farms with less than 20 bushels harvested.
[2] Does not include data for farms with less than 20 trees.

can be expected in about half of the seasons. At Storrs, the probability of the greatest 24-hour seasonal snowfall being greater than 15 inches is about 1 in 10; but in the northern highlands, the probability is somewhat greater.

Also at Storrs, the chances are that 2 seasons in 10 will have 35 or fewer days with a snow cover of 1 inch or more in depth, and 2 seasons in 10 will have 75 days or more with a snow cover of 1 inch or more. Records show that in 9 seasons out of 29, the ground did not have a continuous snow cover, 1 inch or more deep, for as long as 3 weeks. However, for seasons that did have a prolonged snow cover, the average length was 41 days and the maximum length was 84 days. About half of the seasons that had a prolonged snow cover also had one or more shorter periods of snow cover. A continuous snow cover of 3 weeks or more has begun as early as November 27 and lasted as late as April 5.

TABLE 13.—*Number of livestock and poultry on farms in stated years*

Livestock and Poultry	1954	1959
Cattle and calves	[1] 15, 769	12, 967
Milk cows	8, 244	7, 157
Steers and bulls, including steer and bull calves	1, 062	804
Hogs and pigs	[2] 844	575
Sheep and lambs	[3] 1, 145	959
Chickens	[2] 452, 432	398, 070

[1] Over 3 months old. [2] Over 4 months old. [3] Over 6 months old.

The maximum depth of snow on the ground for 29 seasons ranged from 3 to 25 inches, and the average maximum depth was 12 inches. The average date of maximum depth was February 10. In the northern highlands, the average date of maximum depth is a little later, the accumulation is greater, and the season of snow cover is longer.

In tables 14 and 15 are summarized temperature and precipitation records for Storrs, the official long-term U.S. weather station in the county. Storrs is representative of most hill locations in the county, except that temperatures average lower at similar locations in the northern highlands, as shown by the slower growth and the later maturity dates of crops and other vegetation. Valley locations throughout the county are characterized by lower minimum temperatures in winter and higher maximum temperatures in summer.

In table 14 it should be noted that some data values are for specific risk levels. These are presented because they are less dependent upon the length of record than the usual extremes and may be more suitable for planning. The temperature values, both maximum and minimum, that occur on at least 4 days in the month in 2 years out of 10 are very nearly the same as the average monthly extremes. The long-period average of the monthly extremes is 0° to 4° higher for the maximum and 1° to 4° lower for the minimum than the risk values given. Table 14 also includes monthly precipitation for the 1 year in 10, or a 10 percent chance of occurrence.

In table 15 the average frequencies of specified important temperature levels are shown by months. Specific degree-day data are also presented. These are accumulations of time-temperature units in which the unit of time is 1 day and the unit of temperature is in degrees Fahrenheit. The number of heating degree-days for a given day is equal to the 65° F. base temperature, less that day's mean temperature. The total number of heating degree-days for a month is simply the addition of all the daily values. The base temperature of 65° is the lowest daily mean temperature for which no home heating is considered necessary. For example, a colder day with a mean temperature of 40° will have 65° minus 40°, or 25 heating degree-days. A warm day that averages 75° will have no degree-days. On the average there is an increase of about 500 in the number of heating degree-days per year from the southern and western lowlands to the northern highlands.

The growing degree-days are similarly calculated, except that they are determined by the daily mean temperatures in excess of the base. The base temperature is chosen according to the crop and should be the temperature below which no growth takes place. There are distinct differences among plants in their response to specific temperatures. Though a different base might ideally be selected for each crop, the usual practice is to settle for two standard base values—40° for grasses, peas, and other cool-weather crops, and 50° for corn, tobacco, and other warm-weather crops. Data based on these two levels are in table 15. Though all months are included in the table, the planning for certain crops may not require the use of all the information. The data based upon the 50° level would apply to a warm-weather crop, but the crop might not be planted until the end of May, and, therefore, the values given for April and May

TABLE 14.—*Temperature and precipitation*

[Storrs—elevation, 650 feet]

Month	Temperature: Average daily: Maximum	Temperature: Average daily: Minimum	Temperature: Average daily: Mean	Temperature: Two years in 10 will have at least 4 days with—: Maximum temperature equal to or higher than—	Temperature: Two years in 10 will have at least 4 days with—: Minimum temperature equal to or lower than—	Precipitation: Average total	Precipitation: One year in 10 will have—: Less than—	Precipitation: One year in 10 will have—: More than—	Precipitation: Snowfall average	Precipitation: Days with—: Snow of 1 inch or more	Precipitation: Days with—: Snow cover of 1 inch or more	Precipitation: Days with—: Precipitation of 0.10 inch or more
	°F.	°F.	°F.	°F.	°F.	Inches	Inches	Inches	Inches	Days	Days	Days
January	34. 4	18. 0	26. 2	51	2	3. 6	1. 6	5. 8	11. 3	12	17	8
February	35. 4	18. 2	26. 8	52	3	2. 8	1. 7	5. 2	10. 5	10	16	6
March	42. 9	25. 5	34. 2	58	11	4. 2	1. 7	6. 7	9. 1	9	10	8
April	55. 8	34. 9	45. 4	72	25	3. 9	1. 6	5. 8	1. 6	2	(1)	7
May	67. 7	44. 9	56. 3	83	35	3. 8	1. 6	6. 0	(2)	(1)	0	8
June	75. 7	54. 3	65. 0	87	44	3. 5	1. 2	5. 0	0	0	0	7
July	80. 4	59. 6	70. 0	90	50	3. 9	1. 8	7. 8	0	0	0	6
August	78. 5	58. 1	68. 3	89	48	4. 9	1. 7	7. 5	0	0	0	7
September	71. 5	50. 7	61. 1	84	38	4. 1	1. 0	7. 3	0	0	0	5
October	62. 0	41. 2	51. 6	76	29	3. 5	1. 0	6. 3	(2)	(1)	0	5
November	49. 7	32. 0	40. 9	64	18	4. 3	1. 2	6. 9	1. 9	2	2	7
December	37. 3	20. 9	29. 1	54	4	3. 7	1. 9	5. 6	6. 8	7	9	7
Year	57. 6	38. 2	47. 9	(3) 92	(4) −7	46. 2	35. 5	54. 0	41. 2	42	54	81

[1] Less than one-half a day.
[2] Trace.
[3] Average annual highest maximum.
[4] Average annual lowest minimum.

would not be used. Similarly, values at the end of the season, after the expected harvest date or after a killing freeze, would be disregarded.

In Tolland County the average growing season begins about mid-April for grasses and hardy crops and about mid-May for tender crops. It comes to an end for most crops early in October. Table 16 shows the probability of freezing temperatures in spring and fall at Storrs. For example, the seventh entry in the first column shows October 8 as the average date on which the first freeze will occur 5 years in 10, which is the 50 percent, or average, probability. It should be noted that there is a 10 percent chance that the first freeze in the fall will come on September 28 or earlier. The 32° freeze data are important to know in growing tender crops. The more severe freeze data are important to know in growing hardy

TABLE 15.—*Frequencies of selected temperature levels and averages of heating and growing degree-days*

[Storrs-elevation, 650 feet]

Month	Mean number of days with temperature (°F.)—: Maximum: 90° or higher	Mean number of days with temperature (°F.)—: Maximum: 32° or lower	Mean number of days with temperature (°F.)—: Minimum: 32° or lower	Mean number of days with temperature (°F.)—: Minimum: 0° or lower	Accumulated heat units (degree-days): Heating: Base 65° F.	Accumulated heat units (degree-days): Growing crops: Base 50° F.[1]	Accumulated heat units (degree-days): Growing crops: Base 40° F.[2]
	Days	Days	Days	Days	Degree-days	Degree-days	Degree-days
January	0	13	29	2	1, 203	0	0
February	0	10	27	2	1, 070	0	0
March	0	4	26	(3)	955	0	70
April	0	(3)	11	0	588	30	250
May	(3)	0	1	0	273	210	500
June	1	0	0	0	63	450	750
July	1	0	0	0	0	620	930
August	1	0	0	0	34	570	880
September	(3)	0	(3)	(3)	141	330	630
October	0	0	5	0	415	110	360
November	0	1	16	0	723	0	80
December	0	10	27	1	1, 113	0	0
Year	3	38	142	5	6, 578	2, 320	4, 450

[1] The base for warm-weather crops.
[2] The base for cool-weather crops.
[3] Less than one-half day.

TABLE 16.—*Probability of freezing temperatures in spring and fall*

[Storrs—elevation, 650 feet]

Probability	Dates for given probability and temperature				
	32° F. or lower	28° F. or lower	24° F. or lower	20° F. or lower	16° F. or lower
Spring:					
1 year in 10 later than	May 16	April 30	April 25	April 4	March 26
2 years in 10 later than	May 12	April 26	April 19	March 30	March 20
5 years in 10 later than	May 5	April 19	April 6	March 22	March 13
8 years in 10 later than	April 27	April 12	March 25	March 13	March 5
Fall:					
1 year in 10 earlier than	September 28	October 5	October 17	October 30	November 18
2 years in 10 earlier than	October 1	October 10	October 23	November 5	November 22
5 years in 10 earlier than	October 8	October 20	November 5	November 16	November 30
8 years in 10 earlier than	October 14	October 30	November 18	November 27	December 7

crops. Though table 16 indicates that the average length of the freeze-free season is 156 days at Storrs, this average growing season is considerably shorter at higher elevations in the northern highlands and in the valley bottoms throughout the county. At the most susceptible low spots, the season may be as short as 115 to 125 days. In rare instances frosts may be a threat in these areas, even in midsummer.

Until recently, annual, seasonal, or monthly records of precipitation generally have been used in projecting plans into the future. Shorter periods are of considerable interest, however. Table 17 shows selected percentages of probability that specified amounts of precipitation will occur during 7-day periods at Storrs during the approximate growing season. The periods do not overlap. Similar information for 2-week periods is given in table 18. For example, in table 17 the probability of Storrs receiving a trace or no rain during the week of July 19 through July 25 is 10 percent. The probability of receiving 0.20 of an inch or more during that week

TABLE 17.—*Probability of receiving trace of precipitation or less and at least the amounts indicated during 1-week periods*

[Storrs—elevation, 650 feet]

Week	Precipitation						
	Trace or less	0.10 inch	0.20 inch	0.40 inch	1.00 inch	2.00 inches	4.00 inches
	Percent	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
April 12 through April 18	4	89	82	67	35	11	1
April 19 through April 25	9	85	78	64	34	11	1
April 26 through May 2	8	84	76	62	31	9	1
May 3 through May 9	6	85	76	61	30	9	1
May 10 through May 16	1	90	81	65	32	9	1
May 17 through May 23	6	90	83	68	32	8	(1)
May 24 through May 30	8	87	81	66	33	9	1
May 31 through June 6	10	84	77	63	31	9	1
June 7 through June 13	9	85	78	65	34	10	1
June 14 through June 20	6	88	80	65	32	8	1
June 21 through June 27	7	86	78	63	30	8	(1)
June 28 through July 4	6	86	77	61	28	7	(1)
July 5 through July 11	9	83	73	56	23	5	(1)
July 12 through July 18	9	82	73	57	28	9	1
July 19 through July 25	10	80	71	56	28	10	2
July 26 through August 1	8	82	73	60	33	13	2
August 2 through August 8	7	86	78	65	37	15	2
August 9 through August 15	8	86	81	70	44	20	4
August 16 through August 22	11	83	78	69	45	21	5
August 23 through August 29	12	80	74	63	40	18	4
August 30 through September 5	14	73	65	52	28	11	2
September 6 through September 12	14	73	65	52	30	14	4
September 13 through September 19	18	68	59	47	28	14	4
September 20 through September 26	17	72	63	52	31	15	4
September 27 through October 3	18	70	61	48	24	9	1
October 4 through October 10	18	69	61	47	24	8	1

[1] Less than 0.5 percent.

TABLE 18.—*Probability of receiving trace of precipitation or less and at least the amounts indicated during 2-week periods*

[Storrs—elevation, 650 feet]

Week	Precipitation							
	Trace or less	0.40 inch	0.80 inch	1.40 inches	2.00 inches	2.80 inches	4.00 inches	6.00 inches
	Percent	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
April 12 through April 25	1	91	77	54	36	19	7	1
April 26 through May 9	1	89	73	49	31	16	6	1
May 10 through May 23	0	92	76	52	32	16	5	1
May 24 through June 6	0	89	73	49	31	16	6	1
June 7 through June 20	1	91	76	52	33	16	5	1
June 21 through July 4	0	91	73	47	28	13	4	1
July 5 through July 18	2	87	69	43	25	11	3	(1)
July 19 through August 1	2	87	72	50	33	18	7	1
August 2 through August 15	1	95	84	64	46	28	12	2
August 16 through August 29	4	88	78	62	48	32	17	3
August 30 through September 12	2	79	63	45	32	20	10	5
September 13 through September 26	1	76	61	44	33	22	13	3
September 27 through October 10	5	75	57	37	23	13	5	5

[1] Less than 0.5 percent.

is 71 percent. That is, in 10 years out of 100, the rainfall is expected to be a trace or zero, and in 71 years out of 100, it is expected to be 0.20 of an inch or more during the period July 19 through July 25. As shown in table 18, the probability is 25 percent that Storrs will receive 2.00 inches or more during the 2-week period of July 5 through July 18, but during the 2-week period of August 16 through August 29, the probability is 48 percent.

Table 19 shows selected chances of the occurrence of growing degree-days less than the indicated number for bases of 40° and 50°. The data are for Storrs and are given in 7-day periods. For example, for a base of 40°, in 50 out of 100 years there will be 100 growing degree-days or less during the week of May 10 through May 16. Strictly speaking, the data in tables 17, 18, and 19 represent Storrs, but they can be used in making rough esti-

TABLE 19.—*Probability of receiving growing degree-days less than the number indicated*

[Storrs—elevation 650 feet]

Week	Base 40° F.			Base 50° F.		
	20 percent	50 percent	80 percent	20 percent	50 percent	80 percent
	Degree-days	*Degree-days*	*Degree-days*	*Degree-days*	*Degree-days*	*Degree-days*
April 5 through April 11	10	29	48	0	5	13
April 12 through April 18	18	38	58	0	9	19
April 19 through April 25	33	56	79	1	14	27
April 26 through May 2	43	68	93	4	19	34
May 3 through May 9	72	99	126	17	37	57
May 10 through May 16	74	101	128	17	37	57
May 17 through May 23	92	119	146	29	51	73
May 24 through May 30	109	136	164	43	67	91
May 31 through June 6	126	153	180	58	83	108
June 7 through June 13	136	163	190	68	93	118
June 14 through June 20	145	171	197	76	101	126
June 21 through June 27	166	190	214	95	120	145
June 28 through July 4	172	196	220	102	126	150
July 5 through July 11	186	208	230	115	138	161
July 12 through July 18	187	209	231	118	140	162
July 19 through July 25	192	213	234	121	143	165
July 26 through August 1	195	216	237	125	146	167
August 2 through August 8	180	203	226	110	133	156
August 9 through August 15	183	205	227	112	135	158
August 16 through August 22	168	192	216	98	122	146
August 23 through August 29	158	183	208	88	113	138
August 30 through September 5	157	182	207	87	112	137
September 6 through September 12	134	159	185	64	89	114
September 13 through September 19	123	150	177	55	80	105
September 20 through September 26	100	128	156	38	61	84
September 27 through October 3	82	109	136	24	45	66
October 4 through October 10	76	103	130	21	42	63

mates at locations which have similar exposures and topography and hence, similar local climate.

Tolland County, being 25 to 50 miles from the Long Island Sound, is much less susceptible to hurricane damage than the coastal counties. However, some damage from wind or excessive rain from these storms has occurred on the average of about once in 10 years. Tornadoes may occur more frequently. Most of these locally destructive storms are small in extent and frequently strike in remote areas where they do no significant damage to property. Thus, they may go unreported. Since 1951 there have been four known tornadoes in the county. On the other hand, there was only one reported tornado from colonial times through 1950. Storrs has had thunderstorms on an average of 19 days annually over a 30-year period, and other sections of the county have had thunderstorms on 15 to 25 days annually; the greatest incidence is in the north. Though lightning damage to property and occasionally to animals may be the more spectacular, soil erosion and plant injury from heavy rains accompanying these storms have more effect on agriculture. Thunderstorms have occurred in every month in the year, but most frequently in June and July. At Storrs thunderstorms occur an average of 4 days each, in June and July. Spring and early summer thunderstorms are sometimes accompanied by hail. Data on hail frequency are incomplete, but hail may occur an average of 1 or 2 days a year. Hailstorms with stones of sufficient size and number to cause extensive damage are rare.

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Glossary

Alluvial soil. Soil developing from transported and relatively recently deposited material (alluvium) with little or no modification of the original materials by soil-forming processes.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern.

Bleicherde. The light-colored, leached A2 horizon of a Podzol.

Catena, soil. A group of soils within a specific soil zone, formed from similar parent materials; but differing in profile characteristics because of differences in relief or drainage.

Consistence. The combination of properties of soil material that determines its resistance to crushing and its ability to be molded or changed in shape. The feel of the soil and the ease with which it can be crushed by the fingers. Consistence depends mainly on the forces of attraction between soil particles.

Terms commonly used to describe consistence are as follows:

Loose.—Noncoherent.

Friable.—When moist, crushes easily under moderate pressure between thumb and forefinger, and can be pressed into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Hard.—When dry, moderately resistant to pressure; barely breakable between thumb and forefinger.

Cemented.—Hard and brittle, and little affected by moistening.

Plastic.—When wet, readily deformed by moderate pressure and can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material, and tends to stretch and pull apart rather than to pull free from other material.

Contour cultivation. Cultivation at right angles to the direction of slope, or parallel with terrace grades, and at the same level throughout.

Crystalline rock. A general term that includes both igneous and metamorphic rocks; a term 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 and thus protect areas downslope from erosion.

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, consisting of stream sediments, that occur along streams and are subject to flooding.

Fragipan. (Referred to as a compact layer in some sections of the report.) A compact horizon, rich in silt, sand, or both, and generally low in clay. A fragipan occurs in many gently sloping or nearly level soils in humid, warm-temperate climates. It commonly interferes with root penetration. When dry, the compact material appears to be indurated, but it breaks suddenly under pressure when the soil is moistened. A fragipan may occur in soils formed from residual or from transported material.

Glacial drift. The material picked up, mixed, disintegrated, transported, and deposited by glacial ice or by water melted from the glacial ice. In many places the glacial drift is covered by windblown sediments.

Glacial till. Material picked up, mixed, disintegrated, transported, and deposited by glacial ice.

Glaciofluvial deposits. The materials moved by glaciers and subsequently sorted and deposited by water that originated mainly from the melting of glacial ice.

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 or in the substratum. In a "gleyed" horizon the material ordinarily is bluish gray or olive gray, is sticky and compact, and in many places, is structureless.

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 contains some other minerals.

Great soil group. Any one of several broad groups of soils that have fundamental characteristics in common. 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 and may be subdivided.

O Horizon. The organic horizon of mineral soils. A horizon formed or forming in the upper part of mineral soils above the mineral part and dominated by fresh or partly decomposed organic material.

A Horizon. (1) A mineral horizon of organic-matter accumulation formed or forming at or adjacent to the surface; (2) a horizon that has lost clay, iron, or aluminum and, as a result, has a concentration of quartz or other resistant minerals of sand or silt size.

B Horizon. A mineral horizon in which the dominant feature is an accumulation of silicate clay, iron, aluminum, or humus, alone or in combination. The accumulations give a conspicuously darker, stronger, or redder color than that of the overlying or underlying horizon.

C Horizon. A mineral horizon either like or unlike the material from which the solum is presumed to have formed, relatively unaffected by soil-forming processes, and lacking properties diagnostic of A and B horizons.

R Horizon. Underlying consolidated bedrock, such as granite or sandstone.

Lithologic discontinuity. Changes in lithology from one of the master horizons. Such changes are identified by Roman numerals.

Gleyed horizon. A strongly mottled horizon that occurs in wet soils and is designated by g.

Fragipan horizon. A compact horizon designated by x.

Kame. A short, irregular ridge, hill, or hillock of stratified glacial drift. Most kames are interspersed with depressions, called kettles, that have no surface drainage.

Liquid limit. The moisture content at which a soil passes from a plastic state to a liquid state.

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 (about 0.2 inch) in diameter along the greatest dimension; medium, commonly ranging from 5 to 15 millimeters (about 0.2 to 0.6 inch) in diameter along the greatest dimension; and coarse, commonly more than 15 millimeters in diameter along the greatest dimension.

Munsell color system. A system for designating color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with a hue of 10YR, a value of 6, and a chroma of 4.

Optimum moisture content. The amount of moisture in a soil necessary to obtain the maximum dry density.

Parent material, soil. The horizon of weathered rock or partly weathered soil material from which soil has formed; horizon C in the profile.

Permeability, soil. That quality of the soil that enables water or air to move through it.

Phase, soil. A subdivision of a soil type based on features that affect its management but do not affect its classification. Steepness or character of slope, number of rock outcrops, degree of erosion, depth of soil over the substratum, and natural drainage are features that are the basis for dividing a soil type into phases.

Plasticity index. The numerical difference between the liquid limit and plastic limit; the range in moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil passes from a semisolid to a plastic state.

Plowsole. A compacted layer in the soil immediately below the plowed layer; formed by tillage. A plowpan.

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 a soil 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		
Medium acid	5.6 to 6.0	Strongly alkaline	8.5 to 9.0
Slightly acid	6.1 to 6.5	Very strongly alkaline.	9.1 and higher
Neutral	6.6 to 7.3		

Relief. The elevations or inequalities of a land surface, considered collectively.

Residual material. Unconsolidated and partly weathered mineral material (residuum) that accumulates over disintegrating rock. Residual material is not soil but is frequently the material in which a soil has formed.

Runoff. The surface flow of water over an area. The amount and rapidity of runoff are affected by texture, structure, and porosity of the surface soil; by vegetation; by prevailing climate; and by 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 accompained by more or less recrystallization of the constitutent 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 conglomerate (from gravel), sandstone (from sand), shale (from clay), and limestone (from soft masses of calcium carbonate).

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 includes 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.

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. The solum in a mature soil includes the A and B horizons.

Structure, soil. The arrangement of 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, fine, medium, coarse, or very coarse); and by 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.—Aggregates bounded by planes intersecting at relatively sharp angles.

Subangular, blocky.—Aggregates have some rounded and some plane surfaces; vertices are mostly rounded.

Columnar.—Aggregates are prismatic and are rounded at the upper ends.

Granular.—Aggregates are roughly spherical, firm, and may be hard or soft but are generally firmer than crumb and without the distinct faces of blocky structure.

Platy.—Aggregates are generally horizontal.

Prismatic.—Aggregates have flat vertical surfaces; soil particles are arranged around a vertical line.

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, generally flat or undulating, 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 proportions of sand, silt, and clay, determine soil texture. A coarse soil contains a large proportion of sand; a fine-textured soil contains a large proportion of clay.

Clay.—As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Silt.—Small mineral soil grains ranging from 0.05 millimeter to 0.002 millimeter in diameter. As a soil textural class, soil 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. As a textural class, soil that contains 85 percent or more sand and not more than 10 percent clay.

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.

Type, soil. A subdivision of the soil series made on the basis of difference in texture of the surface layer.

Upland (geological). Land consisting of material unworked by water in recent geologic time and ordinarily lying at a higher elevation than the alluvial plain or stream terrace.

Weathering, soil. The physical and chemical disintegration and decomposition of rocks and minerals.

GUIDE TO MAPPING UNITS

[Dashed lines indicate the mapping unit is not suitable for the classification. See table 1, p. 15, for estimated yields of soils, table 3, p. 21, for the productivity of the soils for trees, and table 8, p. 51, for the approximate acreage and proportionate extent of the soils. See the section beginning on p. 26, for use of the soils in engineering and the section beginning on p. 42, for use of the soils in urban development]

Map symbol	Soils	Page	Capability unit	Page	Woodland suitability group	Page	Urban group	Page
AbA	Agawam sandy loam, 0 to 3 percent slopes----------------------------	53	IIs-1	10	7	25	1	46
AbB	Agawam sandy loam, 3 to 8 percent slopes----------------------------	53	IIs-2	10	7	25	1	46
Am	Alluvial land-------------------------	53	IIIw-2	11	4	24	14	51
BhA	Birchwood sandy loam, 0 to 3 percent slopes----------------------------	53	IIw-2	9	1	22	9	49
BhB	Birchwood sandy loam, 3 to 8 percent slopes----------------------------	53	IIwe-2	10	1	22	9	49
Bk	Borrow and fill land, coarse materials--------------------------	53	------		9	26	--	
Bl	Borrow and fill land, loamy materials--------------------------	53	------		9	26	--	
BnC	Brimfield very rocky fine sandy loam, 3 to 15 percent slopes-------------	54	VIs-3	14	5	25	11	50
BnD	Brimfield very rocky fine sandy loam, 15 to 25 percent slopes------------	54	VIIs-3	15	6	25	11	50
BpC	Brimfield extremely rocky fine sandy loam, 3 to 15 percent slopes--------	54	VIIs-3	15	5	25	11	50
BpD	Brimfield extremely rocky fine sandy loam, 15 to 25 percent slopes-------	54	VIIs-3	15	6	25	11	50
BrA	Broadbrook silt loam, 0 to 3 percent slopes----------------------------	54	I-2	8	2	23	6	48
BrB	Broadbrook silt loam, 3 to 8 percent slopes----------------------------	55	IIe-2	8	2	23	6	48
BsB	Broadbrook stony silt loam, 3 to 8 percent slopes---------------------	55	IVes-2	12	2	23	6	48
BtB	Brookfield fine sandy loam, 3 to 8 percent slopes---------------------	55	IIe-1	8	2	23	2	47
BvC	Brookfield stony fine sandy loam, 3 to 15 percent slopes---------------	55	IVes-1	12	2	23	3	47
ByC	Brookfield very stony fine sandy loam, 3 to 15 percent slopes-------------	55	VIs-1	14	2	23	4	48
ByD	Brookfield very stony fine sandy loam, 15 to 25 percent slopes------------	55	VIIs-1	14	3	24	8	49
CaA	Charlton fine sandy loam, 0 to 3 percent slopes---------------------	55	I-1	7	2	23	2	47
CaB	Charlton fine sandy loam, 3 to 8 percent slopes---------------------	56	IIe-1	8	2	23	2	47
CaC	Charlton fine sandy loam, 8 to 15 percent slopes---------------------	56	IIIe-1	10	2	23	3	47
CaD	Charlton fine sandy loam, 15 to 25 percent slopes---------------------	56	IVe-1	12	3	24	8	49
ChB	Charlton stony fine sandy loam, 3 to 8 percent slopes-------------------	56	IVes-1	12	2	23	2	47
ChC	Charlton stony fine sandy loam, 8 to 15 percent slopes------------------	56	IVes-1	12	2	23	3	47
ChD	Charlton stony fine sandy loam, 15 to 25 percent slopes------------------	56	VIes-1	14	3	24	8	49
CrC	Charlton very stony fine sandy loam, 3 to 15 percent slopes-------------	56	VIs-1	14	2	23	4	48
CrD	Charlton very stony fine sandy loam, 15 to 25 percent slopes------------	56	VIIs-1	14	3	24	8	49
CsA	Cheshire fine sandy loam, 0 to 3 percent slopes---------------------	56	I-1	7	2	23	2	47

GUIDE TO MAPPING UNITS--CONTINUED

Map symbol	Soils	Page	Capability unit	Page	Woodland suitability group	Page	Urban group	Page
CsB	Cheshire fine sandy loam, 3 to 8 percent slopes	57	IIe-1	8	2	23	2	47
CsC	Cheshire fine sandy loam, 8 to 15 percent slopes	57	IIIe-1	10	2	23	3	47
CsC2	Cheshire fine sandy loam, 8 to 15 percent slopes, eroded	57	IIIe-1	10	2	23	3	47
CsD2	Cheshire fine sandy loam, 15 to 25 percent slopes, eroded	57	IVe-1	12	3	24	8	49
CtB	Cheshire stony fine sandy loam, 3 to 8 percent slopes	58	IVes-1	12	2	23	2	47
CtC	Cheshire stony fine sandy loam, 8 to 15 percent slopes	58	IVes-1	12	2	23	3	47
EfA	Ellington fine sandy loam, 0 to 3 percent slopes	58	IIw-1	9	1	22	5	48
EsA	Enfield silt loam, 0 to 3 percent slopes	58	I-1	7	2	23	1	46
EsB	Enfield silt loam, 3 to 8 percent slopes	58	IIe-1	8	2	23	1	46
EtA	Enfield silt loam, shallow, 0 to 3 percent slopes	58	IIs-1	10	2	23	1	46
EtB	Enfield silt loam, shallow, 3 to 8 percent slopes	59	IIs-2	10	2	23	1	46
GaB	Gloucester sandy loam, 3 to 8 percent slopes	59	IIs-2	10	7	25	2	47
GaC	Gloucester sandy loam, 8 to 15 percent slopes	60	IIIe-1	10	7	25	3	47
GbB	Gloucester stony sandy loam, 3 to 8 percent slopes	60	IVes-1	12	7	25	2	47
GbC	Gloucester stony sandy loam, 8 to 15 percent slopes	60	IVes-1	12	7	25	3	47
GeC	Gloucester and Charlton very stony soils, 3 to 15 percent slopes	60	VIs-1	14	7	25	4	48
GeE	Gloucester and Charlton very stony soils, 15 to 35 percent slopes	60	VIIs-1	14	3	24	8	49
HdA	Hartford fine sandy loam, 0 to 3 percent slopes	60	I-1	7	2	23	1	46
HdB	Hartford fine sandy loam, 3 to 8 percent slopes	61	IIe-1	8	2	23	1	46
HfA	Hartford sandy loam, 0 to 3 percent slopes	61	IIs-1	10	7	25	1	46
HfB	Hartford sandy loam, 3 to 8 percent slopes	61	IIs-2	10	7	25	1	46
HkA	Hinckley gravelly sandy loam, 0 to 3 percent slopes	61	IIIs-2	11	7	25	1	46
HkC	Hinckley gravelly sandy loam, 3 to 15 percent slopes	61	IIIse-1	11	7	25	1	46
HmC	Hinckley gravelly loamy sand, 3 to 15 percent slopes	61	IVse-1	12	7	25	1	46
HoC	Hollis rocky fine sandy loam, 3 to 15 percent slopes	62	VIs-3	14	5	25	11	50
HrC	Hollis very rocky fine sandy loam, 3 to 15 percent slopes	62	VIs-3	14	5	25	11	50
HrE	Hollis very rocky fine sandy loam, 15 to 35 percent slopes	62	VIIs-3	15	6	25	11	50
HxC	Hollis extremely rocky fine sandy loam, 3 to 15 percent slopes	62	VIIs-3	15	5	25	11	50
HxE	Hollis extremely rocky fine sandy loam, 15 to 35 percent slopes	62	VIIs-3	15	6	25	11	50
JaC	Jaffrey gravelly sandy loam and loamy sand, 3 to 15 percent slopes	62	IVse-1	12	7	25	1	46

GUIDE TO MAPPING UNITS--CONTINUED

Map symbol	Soils	Page	Capability unit	Page	Woodland suitability group	Page	Urban group	Page
Lc	Leicester fine sandy loam------------	63	IIIw-1	11	4	24	12	50
Le	Leicester stony fine sandy loam-------	63	Vws-2	13	4	24	12	50
Lg	Leicester-Ridgebury-Whitman very stony complex-----------------------------	63	VIIs-4	15	8	25	12	50
Lm	Limerick silt loam-------------------	63	IIIw-2	11	4	24	14	51
Ma	Made land----------------------------	63	------		9	26	--	
MgA	Manchester gravelly sandy loam, 0 to 3 percent slopes---------------------	64	IIIs-2	11	7	25	1	46
MgC	Manchester gravelly sandy loam, 3 to 15 percent slopes------------------	64	IIIse-1	11	7	25	1	46
MhC	Manchester gravelly loamy sand, 3 to 15 percent slopes------------------	64	IVse-1	12	7	25	1	46
MrA	Merrimac fine sandy loam, 0 to 3 percent slopes---------------------	64	I-1	7	2	23	1	46
MrB	Merrimac fine sandy loam, 3 to 8 percent slopes---------------------	64	IIe-1	8	2	23	1	46
MyA	Merrimac sandy loam, 0 to 3 percent slopes---------------------------	64	IIs-1	10	7	25	1	46
MyB	Merrimac sandy loam, 3 to 8 percent slopes---------------------------	64	IIs-2	10	7	25	1	46
NaA	Narragansett silt loam, 0 to 3 percent slopes---------------------	65	I-1	7	2	23	2	47
NaB	Narragansett silt loam, 3 to 8 percent slopes---------------------	65	IIe-1	8	2	23	2	47
NaC	Narragansett silt loam, 8 to 15 percent slopes---------------------	65	IIIe-1	10	2	23	3	47
NgB	Narragansett stony silt loam, 3 to 8 percent slopes---------------------	65	IVes-1	12	2	23	2	47
NgC	Narragansett stony silt loam, 8 to 15 percent slopes---------------------	65	IVes-1	12	2	23	3	47
NrA	Ninigret sandy loam, 0 to 3 percent slopes---------------------------	65	IIw-1	9	1	22	5	48
NrB	Ninigret sandy loam, 3 to 8 percent slopes---------------------------	66	IIwe-1	9	1	22	5	48
On	Ondawa sandy loam--------------------	66	IIw-4	9	2	23	14	51
PbA	Paxton fine sandy loam, 0 to 3 percent slopes---------------------	66	I-2	8	2	23	6	48
PbB	Paxton fine sandy loam, 3 to 8 percent slopes---------------------------	66	IIe-2	8	2	23	6	48
PbC	Paxton fine sandy loam, 8 to 15 percent slopes---------------------	66	IIIe-2	11	2	23	7	49
PbD	Paxton fine sandy loam, 15 to 25 percent slopes---------------------	67	IVe-2	12	3	24	8	49
PdB	Paxton stony fine sandy loam, 3 to 8 percent slopes---------------------	67	IVes-2	12	2	23	6	48
PdC	Paxton stony fine sandy loam, 8 to 15 percent slopes---------------------	67	IVes-2	12	2	23	7	49
PdD	Paxton stony fine sandy loam, 15 to 25 percent slopes---------------------	67	VIes-2	14	3	24	8	49
PeC	Paxton very stony fine sandy loam, 3 to 15 percent slopes---------------	67	VIs-2	14	2	23	7	49
PeD	Paxton very stony fine sandy loam, 15 to 25 percent slopes---------------	67	VIIs-2	14	3	24	8	49
Pk	Peat and Muck------------------------	67	VIw-1	14	8	25	13	50
Pm	Peat and Muck, shallow---------------	67	VIw-1	14	8	25	13	50
Po	Podunk fine sandy loam---------------	67	IIw-5	9	1	22	14	51
PuA	Poquonock sandy loam, 0 to 3 percent slopes---------------------------	68	I-2	8	2	23	6	48
PuB	Poquonock sandy loam, 3 to 8 percent slopes---------------------------	69	IIe-2	8	2	23	6	48
RaA	Rainbow silt loam, 0 to 3 percent slopes---------------------------	69	IIw-2	9	1	22	9	49

GUIDE TO MAPPING UNITS--CONTINUED

Map symbol	Soils	Page	Capability unit	Page	Woodland suitability group	Page	Urban group	Page
RaB	Rainbow silt loam, 3 to 8 percent slopes	69	IIwe-2	10	1	22	9	49
RbB	Rainbow stony silt loam, 0 to 6 percent slopes	69	IVws-2	13	1	22	9	49
Rc	Raynham silt loam	69	IIIw-1	11	4	24	12	50
Rd	Ridgebury fine sandy loam	70	IIIw-1	11	4	24	12	50
Rg	Ridgebury stony fine sandy loam	70	Vws-2	13	4	24	12	50
Rk	Rock land	70	VIIIs-1	15	9	26	11	50
Ru	Rumney fine sandy loam	70	IIIw-2	11	4	24	14	51
Sa	Saco fine sandy loam	70	VIw-1	14	8	25	14	51
Sb	Saco silt loam	70	VIw-1	14	8	25	14	51
Sf	Scarboro fine sandy loam	71	Vw-1	13	8	25	13	50
SsA	Sudbury fine sandy loam, 0 to 6 percent slopes	71	IIw-1	9	1	22	5	48
SvA	Sutton fine sandy loam, 0 to 3 percent slopes	71	IIw-1	9	1	22	5	48
SvB	Sutton fine sandy loam, 3 to 8 percent slopes	71	IIwe-1	9	1	22	5	48
SwA	Sutton stony fine sandy loam, 0 to 3 percent slopes	72	IVws-1	13	1	22	5	48
SwB	Sutton stony fine sandy loam, 3 to 8 percent slopes	72	IVws-1	13	1	22	5	48
SxA	Sutton very stony fine sandy loam, 0 to 3 percent slopes	72	Vs-1	13	1	22	5	48
SxB	Sutton very stony fine sandy loam, 3 to 15 percent slopes	72	VIs-1	14	1	22	10	49
Tg	Terrace escarpments	72	VIe-1	13	3	24	--	
TsA	Tisbury silt loam, 0 to 3 percent slopes	72	IIw-1	9	1	22	5	48
Wd	Walpole sandy loam	73	IIIw-1	11	4	24	12	50
WeA	Wapping silt loam, 0 to 3 percent slopes	73	IIw-1	9	1	22	5	48
WeB	Wapping silt loam, 3 to 8 percent slopes	73	IIwe-1	9	1	22	5	48
WfB	Wapping stony silt loam, 3 to 8 percent slopes	73	IVws-1	13	1	22	5	48
WgA	Watchaug fine sandy loam, 0 to 3 percent slopes	73	IIw-1	9	1	22	5	48
WgB	Watchaug fine sandy loam, 3 to 8 percent slopes	74	IIwe-1	9	1	22	5	48
Wp	Whitman stony fine sandy loam	74	Vws-1	13	8	25	13	50
Wr	Wilbraham silt loam	74	IIIw-1	11	4	24	12	50
Ws	Wilbraham stony silt loam	74	Vws-2	13	4	24	12	50
WvB	Windsor loamy sand, 3 to 8 percent slopes	74	IVse-1	12	7	25	1	46
WvC	Windsor loamy sand, 8 to 15 percent slopes	74	IVse-1	12	7	25	1	46
Ww	Winooski and Hadley silt loams	75	IIw-5	9	1	22	14	51
WxA	Woodbridge fine sandy loam, 0 to 3 percent slopes	75	IIw-2	9	1	22	9	49
WxB	Woodbridge fine sandy loam, 3 to 8 percent slopes	75	IIwe-2	10	1	22	9	49
WyA	Woodbridge stony fine sandy loam, 0 to 3 percent slopes	75	IVws-2	13	1	22	9	49
WyB	Woodbridge stony fine sandy loam, 3 to 8 percent slopes	75	IVws-2	13	1	22	9	49
WzA	Woodbridge very stony fine sandy loam, 0 to 3 percent slopes	75	Vs-1	13	1	22	10	49
WzC	Woodbridge very stony fine sandy loam, 3 to 15 percent slopes	76	VIs-2	14	1	22	10	49

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