United States
Department of
Agriculture

Soil
Conservation
Service

In cooperation with
Virginia Polytechnic
Institute and State
University and United
States Department of
Agriculture, Forest
Service

Soil Survey of Shenandoah County, Virginia

How To Use This Soil Survey

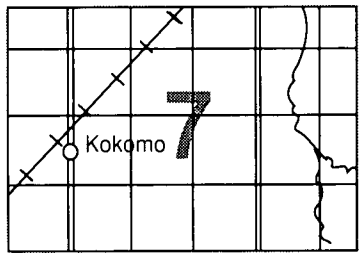
General Soil Map

The general soil map, which is the color map preceding the detailed soil maps, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

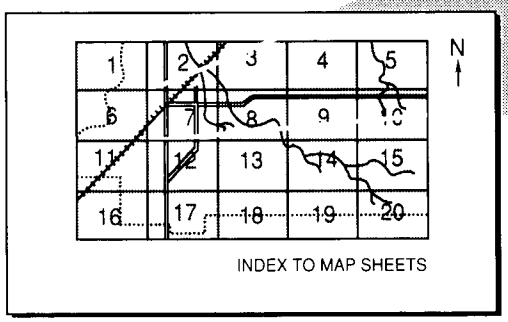
Detailed Soil Maps

The detailed soil maps follow the general soil map. These maps can be useful in planning the use and management of small areas.



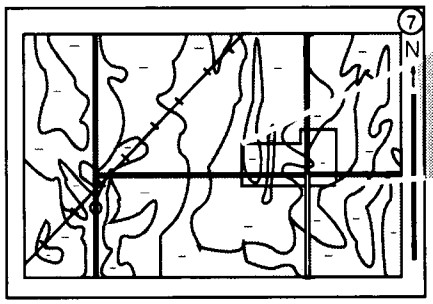
MAP SHEET

To find information about your area of interest, locate that area on the **Index to Map Sheets**, which precedes the soil maps. Note the number of the map sheet, and turn to that sheet.



INDEX TO MAP SHEETS

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Index to Map Units** (see Contents), which lists the map units by symbol and name and shows the page where each map unit is described.



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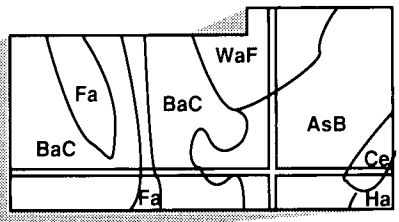

AREA OF INTEREST

NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

The **Summary of Tables** shows which table has data on a specific land use for each detailed soil map unit. See **Contents** for sections of this publication that may address your specific needs.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal agencies, state agencies including the Agricultural Experiment Stations, and local agencies. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1984. Soil names and descriptions were approved in 1988. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1984. This survey was made cooperatively by the Soil Conservation Service, the Virginia Polytechnic Institute and State University, and the United States Department of Agriculture, Forest Service. The survey is part of the technical assistance furnished to the Lord Fairfax Soil and Water Conservation District. The Virginia Department of Conservation and Historic Resources and Shenandoah County Board of Supervisors provided financial assistance for the survey.

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

All programs and services of the Soil Conservation Service are offered on a nondiscriminatory basis, without regard to race, color, national origin, religion, sex, age, marital status, or handicap.

Cover: The North Fork of the Shenandoah River, as it meanders through the Great Valley of Virginia, from the summit of Massanutten Mountain. The Weikert-Berks-Laidig association is in the foreground and background; the Frederick-Poplimento-Endcav association is in the middleground.

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Foreword

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

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

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

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

George C. Norris
State Conservationist
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Soil Survey of Shenandoah County, Virginia

By Louis W. Heidel, Edward P. Ealy, and Steve Osborne, Soil Conservation Service

United States Department of Agriculture, Soil Conservation Service and Forest Service,
in cooperation with
the Virginia Polytechnic Institute and State University

SHENANDOAH COUNTY is in the northern part of Virginia (fig. 1). It has an area of 512 square miles, or 327,900 acres. It is bounded on the south by Rockingham County, on the southeast by Page and Warren Counties, on the north by Frederick County, and on the west by Hardy County, West Virginia.

Shenandoah County was formed from Frederick County in 1772. It was originally called Dunmore County in honor of Governor Dunmore but in 1778 was renamed Shenandoah County after the Shenandoah River. According to the U.S. Bureau of the Census, the population of Shenandoah County in 1982 was 27,702 and that of the city of Woodstock was 2,651.

U.S. 11 extends north-south through the central part of the county and through each of the incorporated towns. Interstate 81 runs parallel to U.S. 11 and has seven interchanges in the county. Shenandoah County is connected to Washington, D.C., by Interstate 66, which intersects Interstate 81 just north of Strasburg. State Route 55 extends east-west through Strasburg. U.S. 211, which extends across the southern tip of the county and intersects with U.S. 11 at New Market, also provides a direct route to Washington, D.C.

The general relief of Shenandoah County is that of a broad valley flanked on the east by the Massanutten Mountains and on the west by the Allegheny Mountains. About 60 percent of the survey area is forested, primarily commercial forest. Oak and hickory are the dominant species. Cropland and pasture make up 38 percent of the county. The remaining area is used for commercial, industrial, and residential development.

The principal sources of farm income, according to the U.S. Census of Agriculture in 1974, are livestock, livestock products, dairy products, poultry, crops, and fruit. The major nonfarm industries in the county are apparel, food processing, and textile industries.

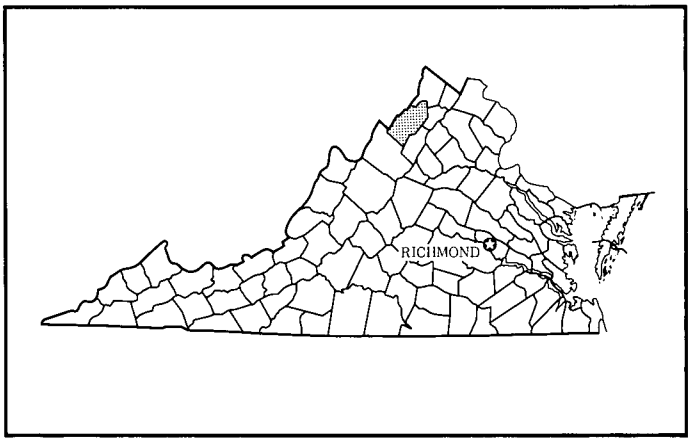

Figure 1.—Location of Shenandoah County in Virginia.

The best cropland is in the Limestone Valley and along the North Fork of the Shenandoah River. The rolling hills provide good pasture for livestock, chiefly cattle and sheep. Raising livestock is one of the main sources of agricultural income. Fruit, poultry, and dairy products also are important to the economy. About 56 percent of the farms in the county are operated on a full-time commercial basis. The rest are maintained on a part-time basis.

Approximately 76 percent of the county, or 250,200 acres, is publicly owned. The mountainous areas bordering the eastern and western parts of the county are in the George Washington National Forest, which includes approximately 77,700 acres.

The water supply in Shenandoah County is provided mostly by private wells and springs.

General Nature of the County

This section provides information on the climate of the county and describes the physiography, relief, and drainage of the area.

Climate

Prepared by the Virginia Polytechnic Institute and State University, Blacksburg, Virginia.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Woodstock, Virginia, in the period 1952 to 1981. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter, the average temperature is 35 degrees F and the average daily minimum temperature is 24 degrees. The lowest temperature on record, which occurred at Woodstock on January 29, 1963, is -10 degrees. In summer, the average temperature is 73 degrees and the average daily maximum temperature is 86 degrees. The highest recorded temperature, which occurred at Woodstock on July 28, 1952, is 105 degrees.

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

The total annual precipitation is 34.21 inches. Of this, 19.7 inches, or 58 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 15.9 inches. The heaviest 1-day rainfall during the period of record was 4.19 inches at Woodstock on August 18, 1955. Thunderstorms occur on about 18 days each year.

The average seasonal snowfall is 27.4 inches. The greatest snow depth at any one time during the period of record was 24 inches. On the average, 7 days of the year have at least 1 inch of snow on the ground. The number of such days varies greatly from year to year.

Physiography, Relief, and Drainage

Shenandoah County lies in the Ridge and Valley Physiographic Province. It is in a rolling valley flanked on the west and east by mountains, ridges, and other valleys. The mountains, ridges, and valleys in the west belong to the Appalachian System, and those in the east belong to the Massanutten Mountain Range.

The county is primarily underlain by sedimentary rocks. The western part of the county is underlain by various combinations of sandstone, shale, and small amounts of limestone. Prominent landscape features of the western ridge belt in or bordering Shenandoah County are Little North Mountain, Great North Mountain, and Paddy Mountain.

Little North Mountain has an elevation of 2,521 feet just northwest of Columbia Furnace. Southwest from Columbia Furnace, numerous water gaps break the continuity of the ridge. The remnants of the ridge between the gaps consist of short, linear ridges and isolated rounded hills, locally called mountains or knobs.

Great North Mountain is along the extreme western part of the county. It is northwest of and parallel to Little North Mountain on a northeast-southwest plane. It has an elevation of 3,293 feet at the Airway Beacon Triangular Station, approximately 5 miles north of Wolf Gap. The top of Great North Mountain is the border between Virginia and West Virginia.

Paddy Mountain is between Great North Mountain and Little North Mountain in the northwestern part of the county. It begins northwest of Columbia Furnace and extends along the border between Virginia and West Virginia to about the vicinity of Vances Cove in Frederick County. The highest elevation of Paddy Mountain in Virginia is 3,013 feet.

The Massanutten Mountains are on the eastern side of Shenandoah County. They are twin ridges separated by a valley floor known as Fort Valley, which is underlain by shale. The ridge to the west begins just southeast of Strasburg, where it has an elevation of 2,106 feet at Signal Knob. It is split by a series of small, narrow valleys.

Southwest of Signal Knob the valley is characterized by numerous gaps, which break the continuity of the Massanutten Mountain ridge. The ridges between these gaps are short, linear mountains with numerous peaks. This ridge extends southwest to Wesleys Chapel. It has an elevation of 2,811 feet southwest of Edinburg Gap on Short Mountain.

The second major ridge of the Massanutten Mountains is east of Fort Valley. It is a continuous ridge separating Shenandoah County from Warren and Page Counties.

The valley belt, which is flanked by mountains on the east and west, is divided into two distinct regions. West of U.S. 11, the bedrock is predominantly limestone and dolomite and the topography is characterized by low

ridges and shallow valleys on a gently sloping surface. The bedrock is shale east of U.S. 11. Shallow drainage channels dissect the area and become deeper and more numerous as they move eastward, forming a dendritic pattern.

The North Fork of the Shenandoah River, which flows southwest to northeast along the Massanutten Mountains, is the major drainage basin for all of Shenandoah County west of the Massanutten Mountains. The southern part of the county is drained by Holman and Mill Creeks, which flow southeast to the North Fork of the Shenandoah River. The central section is drained by Stony and Narrow Passage Creeks, which flow southeast to the North Fork of the Shenandoah River. Toms Brook and Tumbling Runs, which flow southeast to the North Fork of the Shenandoah River, drain the north-central section of the county. The Cedar Creek Valley in the northwestern section of the county is drained by Cedar Creek. Turkey and Mulberry Runs, which flow north to Cedar Creek, drain the northeastern section of the county. Cedar Creek flows into the North Fork of the Shenandoah River near Strasburg. The extreme southeastern section of the county between the North Fork of the Shenandoah River and the Massanutten Mountains is drained by Smyth Creek, which flows northwest to the North Fork of the Shenandoah River. Fort Valley is drained by Passage Creek, which flows northeast to the North Fork of the Shenandoah River.

How This Survey Was Made

This survey was made to provide information about the soils in the survey area. The information includes a description of the soils and their location and a discussion of the suitability, limitations, and management of the soils for specified uses. Soil scientists observed the steepness, length, and shape of slopes; the general pattern of drainage; the kinds of crops and native plants growing on the soils; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material has few or no roots or other living organisms and has been changed very little by other biological activity.

The soils in the survey area occur in an orderly pattern that is related to the geology, the landforms, relief, climate, and the natural vegetation of the area. Each kind of soil is associated with a particular kind of landscape or with a segment of the landscape. By observing the soils in the survey area and relating their position to specific segments of the landscape, a soil scientist develops a concept, or model, of how the soils were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. The system of taxonomic classification used in the United States is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate

and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot assure that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Map Unit Composition

A map unit delineation on a soil map represents an area dominated by one major kind of soil or an area dominated by several kinds of soil. A map unit is identified and named according to the taxonomic classification of the dominant soil or soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural objects. In common with other natural objects, they have a characteristic variability in their properties. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of soils of other taxonomic classes. Consequently, every map unit is made up of the soil or soils for which it is named and some soils that belong to other taxonomic classes. These latter soils are called inclusions or included soils.

Most inclusions have properties and behavioral patterns similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting (similar) inclusions. They may or may not be mentioned in the map unit descriptions. Other inclusions, however, have properties and behavior divergent enough to affect use or require different management. These are contrasting (dissimilar) inclusions. They generally occupy small areas and cannot be shown separately on the soil maps because of the scale used in mapping. The inclusions of contrasting soils are mentioned in the map unit descriptions. A few inclusions may not have been observed and consequently are not mentioned in the descriptions, especially where the soil pattern was so complex that it was impractical to make enough observations to identify all of the kinds of soil on the landscape.

The presence of inclusions in a map unit in no way diminishes the usefulness or accuracy of the soil data. The objective of soil mapping is not to delineate pure taxonomic classes of soils but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but onsite investigation is needed to plan for intensive uses in small areas.

General Soil Map Units

The general soil map at the back of this publication shows the soil associations in this survey area. Each association has a distinctive pattern of soils, relief, and drainage. Each is a unique natural landscape. Typically, an association consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one association can occur in another but in a different pattern.

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

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

The soil boundaries on the general soil map and the names of the general soil map units may not match those of adjoining counties. These discrepancies result from differences in the detail of mapping, changes in soil classification, and variations in the extent of the soils in the counties. If these discrepancies occur, the adjoining counties match with similar soils.

Soil Descriptions

Soils Formed in Residuum of Limestone and Interbedded Limestone and Calcareous Shale; on Uplands in the Shenandoah Valley

1. Frederick-Poplimento-Endcav

Deep and very deep, gently sloping to moderately steep, well drained soils that have a clayey subsoil

These soils are on broad, moderately dissected uplands. Generally, slopes are long and smooth.

This map unit makes up about 23 percent of the county. It is about 35 percent Frederick soils, 24 percent Poplimento soils, 15 percent Endcav soils, and 26 percent soils of minor extent.

The Frederick and Poplimento soils generally are gently sloping and sloping. Both soils have a surface layer of silt loam and are gravelly or rocky in some areas. The Endcav soils generally are gently sloping and sloping. They have a surface layer of silt loam. Some areas are rocky.

Of minor extent in this map unit are the well drained Carbo and Timberville soils. Also of minor extent are the somewhat poorly drained Toms soils, the poorly drained Maurertown soils along small streams and drainageways, rock outcrop, and soils that are steeper than the major soils.

The soils in this map unit are used mainly for crops or pasture. The nonrocky soils are used mostly as cropland and are well suited to cultivated crops. The steeper soils and the rocky soils are suited to grasses and trees. The potential for erosion, rockiness, and the slope are the main limitations in areas used for farming. The clayey subsoil, rockiness, and the slope are the main limitations affecting community development and most other uses.

2. Chilhowie-Carbo-Endcav

Moderately deep and deep, gently sloping to steep, well drained soils that have a clayey subsoil

This map unit makes up about 10 percent of the county. It is about 30 percent Chilhowie soils, 15 percent Carbo soils, 12 percent Endcav soils, and 43 percent soils of minor extent.

Carbo and Endcav soils generally are gently sloping to strongly sloping. Both soils have a surface layer of silty clay loam. The Carbo soils are moderately deep, and the Endcav soils are deep. The Chilhowie soils are on upland summits and on short, steep side slopes. They generally are gently sloping to steep. They have a surface layer of silty clay loam. Numerous rock outcrops and sinkholes are throughout this map unit.

Of minor extent in this map unit are the shallow, well drained Opequon soils; the deep, well drained Edom and Timberville soils; soils that are steeper than the major soils; and Pits and Dumps.

This map unit is used mainly for crops or pasture (fig. 2). Most of the steep and rocky areas are used for pasture or as woodland. The potential for erosion, rockiness, and the slope are the main limitations in

Figure 2.—Farmland in an area of the Chilhowie-Carbo-Endcav association.

areas used for farming. The clayey subsoil, the depth to bedrock, and the slope are the main limitations affecting community development and most other uses.

Soils Formed in Residual or Colluvial Material Derived From Shale and Sandstone; on Uplands and Mountain Side Slopes

3. Weikert-Berks-Laidig

Shallow to very deep, gently sloping to very steep, well drained and somewhat excessively drained soils that have a loamy subsoil

These soils are on the sides of hills and ridges and on foothills. They are mainly along small streams and the North Fork of the Shenandoah River.

This map unit makes up about 38 percent of the county. It is about 21 percent Weikert soils, 20 percent Berks soils, 12 percent Laidig soils, and 47 percent soils of minor extent.

The Weikert and Berks soils generally are moderately steep to very steep. Both have a surface layer of channery silt loam. Some areas are very stony. The Weikert soils are shallow and are somewhat excessively drained. The Berks soils are moderately deep and are well drained. The two soils occur as closely intermingled areas on hills and ridges in the Shenandoah Valley and on the lower mountain side slopes.

The Laidig soils are very deep and well drained. They generally are gently sloping to steep. In most areas they are stony or very stony. They are on the lower side slopes, on the summits of hills and ridges, and on side slopes in the foothills.

Of minor extent in this map unit are the well drained Gilpin, Sequoia, and Wolfgap soils, the somewhat poorly drained Toms and Guyan soils, and the poorly drained Maurertown and Purdy soils.

This map unit is mostly woodland. A few areas are used for cultivated crops or pasture. The slope and the depth to bedrock are the main limitations affecting community development and most other uses.

4. Lehew-Gainesboro

Moderately deep, gently sloping to very steep, well drained and somewhat excessively drained soils that have a loamy subsoil

These soils are on hills and ridges. They generally have short, smooth slopes and are highly dissected.

This map unit makes up about 3 percent of the county. It is about 40 percent Lehew soils, 20 percent Gainesboro soils, and 40 percent soils of minor extent.

The Lehew and Gainesboro soils generally are on side slopes on the hills and ridges. The Lehew soils are somewhat excessively drained, and the Gainesboro soils are well drained.

Of minor extent in this map unit are the moderately deep, well drained Berks, Gilpin, and Wallen soils and the shallow, well drained Weikert soils.

This map unit is mostly woodland. A few small areas along the ridgetops are used for pasture. The slope and the depth to bedrock are the main limitations affecting community development and most other uses.

Rock Outcrop and Soils Formed in Residual or Colluvial Material Weathered From Sandstone; in the Appalachian and Massanutten Mountains

5. Wallen-Laidig

Moderately deep and very deep, gently sloping to very steep, somewhat excessively drained and well drained soils that have a loamy subsoil

These soils are on the summits and side slopes of the Appalachian Mountains. Most of this map unit is in the George Washington National Forest.

This map unit makes up about 11 percent of the county. It is about 38 percent Wallen soils, 35 percent Laidig soils, and 27 percent soils of minor extent.

The Wallen soils are somewhat excessively drained. They have a very stony and extremely stony surface. They are on the side slopes and summits of the mountains. They are droughty in the summer. The Laidig soils are well drained. They have a very stony surface. They are on the lower side slopes and foot slopes.

Of minor extent in this map unit are the well drained Zepp, Lehew, and Gilpin soils, the excessively drained Drall soils, and rock outcrop.

All areas of this map unit are woodland. The slope and stones on the surface are the main limitations affecting community development and most other uses.

6. Wallen-Rock Outcrop-Drall

Rock outcrop and moderately deep and deep, gently sloping to very steep, somewhat excessively drained and excessively drained soils that have a loamy or sandy subsoil

These soils are on the summits and upper side slopes of the Massanutten Mountains. Most of this map unit is in the George Washington National Forest.

This map unit makes up about 9 percent of the county. It is about 40 percent Wallen soils, 18 percent Rock outcrop, 8 percent Drall soils, and 34 percent soils of minor extent.

The Wallen soils are somewhat excessively drained. They have a very stony and extremely stony surface. They are on the upper side slopes and summits of the mountains. The Rock outcrop is sandstone. The outcrops are mainly 30 feet apart. They are on the upper side slopes and summits of the mountains. The Drall soils are excessively drained. They have an extremely stony surface. They are on the summits and upper side slopes of the mountains.

Of minor extent in this map unit are the well drained Massanutten, Laidig, and Weikert soils.

All areas of this map unit are woodland. The slope, the Rock outcrop, and the surface stones are the main limitations affecting community development and most other uses.

Soils Formed in Alluvial Material; on River Terraces

7. Unison-Moomaw-Braddock

Very deep, gently sloping to moderately steep, well drained and moderately well drained soils that have a loamy or clayey subsoil

These soils are on terraces along the North Fork of the Shenandoah River and Stony Creek.

This map unit makes up about 6 percent of the county. It is about 26 percent Unison soils, 15 percent Moomaw soils, 11 percent Braddock soils, and 48 percent soils of minor extent.

The Unison and Braddock soils are well drained and are slightly higher on the landscape than the Moomaw soils. Some areas are gravelly or cobbly. The Moomaw soils are moderately well drained and generally are adjacent to the flood plains. They have a seasonal high water table. Some areas are cobbly.

Of minor extent in this map unit are the well drained Alonzville, Caverns, and Nomberville soils and the moderately well drained Coursey soils.

This map unit is used mainly for crops or pasture. A small acreage is wooded. The seasonal high water table in the Moomaw soils and the permeability of the Unison and Braddock soils are the main limitations affecting community development and most other uses. Flooding is a hazard on some of the minor soils.

Detailed Soil Map Units

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

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

A symbol identifying the soil precedes the map unit name in the soil descriptions. Each description includes general facts about the soil and gives the principal hazards and limitations to be considered in planning for specific uses.

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

Soils of one series can differ in texture of the surface layer or of the substratum. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Unison cobbly loam, 2 to 7 percent slopes, is a phase of the Unison series.

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

A *soil complex* consists of two or more soils, or one or more soils and a miscellaneous area, in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Weikert-Berks complex, 15 to 35 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils in the mapped areas are not uniform. An area can be made up of only one of the major soils, or it can be made up of all of them. Frederick and Poplimento silt loams, 2 to 7 percent slopes, is an undifferentiated group in this survey area.

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

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

The soil boundaries on the detailed soil maps and the names of the detailed soil map units may not match those of adjoining counties. These discrepancies result from differences in the detail of mapping, changes in soil classification, and variations in the extent of the soils in the counties. If these discrepancies occur, the adjoining counties match with similar soils.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils.

Soil Descriptions

1B—Alonzville loam, 2 to 7 percent slopes, rarely flooded. This soil is deep, gently sloping, and well drained. It is on terraces along the major streams in the Shenandoah Valley. Areas are elliptical or long and narrow. They range from about 3 to 40 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 9 inches, dark brown loam

Subsoil:
9 to 19 inches, yellowish brown loam
19 to 37 inches, strong brown clay loam
37 to 54 inches, strong brown loam

Substratum:
54 to 65 inches, strong brown sandy clay loam

Included with this soil in mapping are Caverns, Moomaw, and Wolfgap soils. The Caverns and Wolfgap soils are in low areas adjacent to the flood plains. The Moomaw soils are in the higher positions on the landscape. Included soils make up about 25 percent of this unit.

Important soil properties—

Permeability: Moderate
Available water capacity: Moderate
Surface runoff: Medium
Erosion potential: Medium
Organic matter content: Low
Natural fertility: Low
Soil reaction: Extremely acid to strongly acid
Depth to bedrock: More than 72 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: Rare, very brief

Most areas of this soil are cultivated or pastured. The rest are used as woodland.

This soil is well suited to cultivated crops, but flooding damages the crops in some years. The potential for erosion is a major management concern. Conservation tillage and crop rotations that include grasses and legumes reduce the runoff rate, help to control erosion, and conserve soil moisture. Tilth is good and can be maintained by incorporating organic matter into the surface layer and by cultivating only at the proper moisture content.

This soil is well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotating grazing among pastures, deferring grazing, controlling weeds, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on this soil is high. The estimated production for shortleaf pine is 130 cubic feet, or 700 board feet, per acre.

Flooding is the main hazard affecting community development. It limits the development of sites for dwellings with and without basements and for local roads and streets.

The flooding, the slope, and small stones are the main limitations affecting recreational development. The flooding limits the development of camping areas. The small stones and the slope limit the development of playgrounds.

Capability subclass: IIe.

1C—Alonzville loam, 7 to 15 percent slopes. This soil is deep, strongly sloping, and well drained. It is on terraces along the major streams in the Shenandoah Valley. Areas are elliptical or long and narrow. They range from about 3 to 40 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 9 inches, dark brown loam

Subsoil:
9 to 19 inches, yellowish brown loam
19 to 37 inches, strong brown clay loam
37 to 54 inches, strong brown loam

Substratum:
54 to 65 inches, strong brown sandy clay loam

Included with this soil in mapping are Moomaw and Wolfgap soils. The Wolfgap soils are in low areas adjacent to the flood plains. The Moomaw soils are in the higher positions on the landscape. Included soils make up about 15 percent of this unit.

Important soil properties—

Permeability: Moderate
Available water capacity: Moderate
Surface runoff: Rapid
Erosion potential: Medium
Organic matter content: Low
Natural fertility: Low
Soil reaction: Extremely acid to strongly acid
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are cultivated or pastured.

This soil is moderately well suited to cultivated crops. The potential for erosion is a management concern. Conservation tillage and crop rotations that include grasses and legumes reduce the runoff rate, help to control erosion, and conserve soil moisture. Terraces and diversions are used in some areas. Tilth is good and can be maintained by incorporating organic matter into the surface layer and by cultivating only at the proper moisture content.

This soil is moderately well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotating grazing among pastures, deferring grazing, controlling weeds, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on this soil is high. The estimated production for shortleaf pine is 130 cubic feet, or 700 board feet, per acre.

The slope is the main limitation affecting community development. It limits the development of sites for septic tank absorption fields, shallow excavations, dwellings with and without basements, local roads and streets, and lawns and landscaping.

The slope and small stones are the main limitations affecting recreational development. They limit the development of playgrounds. The slope also limits the development of camp areas and picnic areas.

Capability subclass: IIIe.

2B—Berks channery silt loam, 2 to 7 percent slopes. This soil is moderately deep, gently sloping, and well drained. It is on the summits and shoulders of broad, smooth and dissected uplands. Slopes are smooth and are commonly complex. Areas are commonly long and winding. They range from about 3 to 100 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 7 inches, yellowish brown channery silt loam

Subsoil:
7 to 16 inches, yellowish brown very channery silt loam
16 to 33 inches, yellowish brown extremely channery silt loam

Substratum:
33 to 37 inches, yellowish brown extremely channery silt loam
37 inches, hard, acid shale bedrock

Included with this soil in mapping are Blairton, Gilpin, and Weikert soils. The Blairton soils are in small depressions and at the head of shallow drainageways. The Gilpin soils are in landscape positions similar to those of the Berks soil. They have fewer rock fragments throughout than the Berks soil. The Weikert soils are on the steeper slopes near the boundary of the mapped areas. Included soils make up about 20 percent of this unit.

Important soil properties—

Permeability: Moderate
Available water capacity: Very low
Surface runoff: Medium
Erosion potential: Medium
Organic matter content: Low
Natural fertility: Low or medium
Soil reaction: Very strongly acid or strongly acid
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are used for hay and pasture. The rest are wooded.

This soil is well suited to cultivated crops. Tilth is fair. The potential for erosion is a major management concern. Other management concerns are the need to increase the content of organic matter in the surface layer and the need for lime and fertilizer to offset the acidity and low natural fertility of the soil. Conservation tillage, cover crops, and a cropping system that includes grasses and legumes can help to control runoff and erosion. Crop residue should be kept on the surface or incorporated into the plow layer.

This soil is well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotating grazing among pastures, deferring grazing, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures. If the pasture is overgrazed, the runoff rate increases and erosion is excessive.

The potential productivity for trees on this soil is moderately high. The estimated productivity for northern red oak is 280 board feet per acre. The wooded areas are managed mostly for Virginia pine. The estimated productivity for this species is 107 cubic feet, or 592 board feet, per acre. The survival of seeds and seedlings is affected by a very low available water capacity during the growing season.

The depth to bedrock is the main limitation affecting community development. It especially limits excavation and the use of this soil for septic tank absorption fields, sanitary landfills, roadfill, and dwellings with basements.

Capability subclass: IIIs.

3C—Berks-Weikert complex, 7 to 15 percent slopes. These are strongly sloping, well drained soils on the side slopes and nose slopes of ridges. They occur as areas so intermingled that it was not practical to map them separately. This map unit is about 55 percent moderately deep Berks soil, 35 percent shallow Weikert soil, and 10 percent other soils and rock outcrop. Areas are long and winding and range from about 5 to 75 acres.

A typical profile of the Berks soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 7 inches, yellowish brown channery silt loam

Subsoil:
7 to 16 inches, yellowish brown very channery silt loam
16 to 33 inches, yellowish brown extremely channery silt loam

Substratum:
33 to 37 inches, yellowish brown extremely channery silt loam
37 inches, hard, acid shale bedrock

A typical profile of the Weikert soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 3 inches, yellowish brown channery silt loam

Subsoil:
3 to 16 inches, yellowish brown very channery silt loam

Substratum:
16 inches, acid shale bedrock

Included with these soils in mapping are Blairton and Gilpin soils. The Blairton soils are in depressions, in small drainageways, and along foot slopes. The Gilpin soils are in landscape positions similar to those of the Berks soil. They have fewer rock fragments throughout than the Berks soil. Also included are small areas of rock outcrop.

Important properties of the Berks soil—

Permeability: Moderate
Available water capacity: Very low
Surface runoff: Rapid
Erosion potential: Medium
Organic matter content: Low
Natural fertility: Low or medium
Soil reaction: Very strongly acid or strongly acid
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Important properties of the Weikert soil—

Permeability: Moderately rapid
Available water capacity: Very low
Surface runoff: Rapid
Erosion potential: High
Organic matter content: Low to moderate
Natural fertility: Low or medium
Soil reaction: Very strongly acid or strongly acid
Depth to bedrock: 10 to 20 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

About half of the acreage of this map unit is pastured. A small acreage is cultivated. The rest is used as woodland.

These soils are poorly suited to cultivated crops. Tilth is only fair because of the high content of shale fragments in the surface layer. The major limitations are the slope, the very low available water capacity, a shallow rooting depth, and the acidity. The potential for erosion is a management concern. Conservation tillage and crop rotations that include grasses and legumes help to control runoff and erosion and conserve moisture. Crops respond well to applications of lime and fertilizer if the amount of rainfall is adequate throughout the growing season.

These soils are moderately well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are the major concerns in managing pasture. Proper stocking rates, rotation of grazing among pastures, timely deferment of grazing, and applications of lime and fertilizer help to maintain the productivity of the pastures. If the pasture is overgrazed, the runoff rate increases and erosion is excessive.

The potential productivity for trees is moderately high on the Berks soil and moderate on the Weikert soil. The estimated production for northern red oak is 280 board feet per acre on the Berks soil and 235 board feet per acre on the Weikert soil. The survival of seeds and seedlings is limited by the very low available water capacity and a high content of shale fragments.

The slope and the depth to bedrock are the main limitations affecting community development. They especially limit the use of these soils as sites for buildings, sanitary landfills, and septic tank absorption fields.

Capability subclass: IVs.

4B—Blairton silt loam, 2 to 7 percent slopes. This soil is moderately deep, gently sloping, and somewhat poorly drained. It is adjacent to the head of drainageways and on broad flats and in depressions on uplands in the Shenandoah Valley. Slopes are smooth, slightly concave, or convex. Areas commonly are irregularly shaped and parallel to the drainageways. They range from about 3 to 80 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 9 inches, brown silt loam

Subsoil:
9 to 31 inches, yellowish brown silty clay loam

Substratum:
31 inches, acid shale bedrock

Included with this soil in mapping are Berks and Weikert soils. The Berks soils are on small knolls and in the slightly higher landscape positions. The Weikert soils are on the steeper slopes near the boundaries of the mapped areas. Included soils make up about 25 percent of this unit.

Important soil properties—

Permeability: Moderately slow
Available water capacity: Low
Surface runoff: Medium
Erosion potential: Medium
Organic matter content: Low
Natural fertility: Low
Soil reaction: Very strongly acid or strongly acid
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: 6 to 36 inches
Flooding: None

Most areas of this soil are used for farming. The rest are wooded.

This soil is moderately well suited to cultivated crops. Tilth is fair. The soil commonly is droughty during the growing season because of the low available water capacity. The potential for erosion is a major management concern. Other management concerns are the need to increase the organic matter content of the surface layer and the need for lime and fertilizer to offset the acidity and low natural fertility of the soil. Conservation tillage, cover crops, and a cropping system that includes grasses and legumes can help to control runoff and erosion. Crop residue should be kept on the surface or incorporated into the plow layer.

This soil is moderately well suited to pasture and hay. Alfalfa commonly is short lived because of wetness during the fall and winter. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are the major concerns in managing pasture. Proper stocking rates, rotation of grazing among pastures, timely deferment of grazing, and applications of lime and fertilizer, which offset the acidity and low natural fertility of the soil, increase the productivity and carrying capacity of the pasture. If the pasture is overgrazed, the runoff rate increases and erosion is excessive. Grazing during wet periods often cuts up and compacts the surface layer and thereby reduces yields and increases the susceptibility to erosion.

The potential productivity for trees on this soil is moderately high. The estimated production for northern red oak is 280 board feet per acre. The wooded areas are managed for hardwoods and pine. Seeds and seedlings survive and grow well if competing vegetation is controlled. During wet periods the soil is soft and cannot support heavy equipment.

The seasonal high water table, the moderate depth to bedrock, and the potential for frost action are the main limitations affecting community development. The seasonal high water table and the depth to bedrock are limitations on sites for septic tank absorption fields, sewage lagoons, and sanitary landfills. The high water table is a limitation in shallow excavations and on sites for dwellings. The potential for frost action is a limitation on sites for local roads and streets.

Capability subclass: IVw.

4C—Blairton silt loam, 7 to 15 percent slopes. This soil is moderately deep, strongly sloping, and somewhat poorly drained. It is adjacent to the head of drainageways and on broad flats and in depressions on uplands in the Shenandoah Valley. Slopes are smooth, slightly concave, or convex. Areas commonly are irregularly shaped and parallel to the drainageways. They range from about 3 to 25 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 9 inches, brown silt loam

Subsoil:
9 to 31 inches, yellowish brown silty clay loam

Substratum:
31 inches, acid shale bedrock

Included with this soil in mapping are Berks and Weikert soils. The Berks soils are on small knolls and in the slightly higher landscape positions. The Weikert soils are on the steeper slopes near the boundaries of the mapped areas. Included soils make up about 25 percent of this unit.

Important soil properties—

Permeability: Moderately slow
Available water capacity: Low
Surface runoff: Rapid
Erosion potential: High
Organic matter content: Low

Natural fertility: Low
Soil reaction: Very strongly acid or strongly acid
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: 6 to 36 inches
Flooding: None

Most areas of this soil are used for farming. The rest are wooded.

This soil is moderately well suited to cultivated crops. Tilth is fair. The soil commonly is droughty during the growing season because of the low available water capacity. The potential for erosion is a major management concern. Other management concerns are the need to increase the content of organic matter in the surface layer and the need for lime and fertilizer to offset the acidity and low natural fertility of the soil. Conservation tillage, cover crops, and a cropping system that includes grasses and legumes can help to control runoff and erosion. Crop residue should be kept on the surface or incorporated into the plow layer.

This soil is moderately well suited to pasture and hay. Alfalfa commonly is short lived because of wetness during the fall and winter. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are the major concerns in managing pasture. Proper stocking rates, rotation of grazing among pastures, timely deferment of grazing, and applications of lime and fertilizer, which offset the acidity and low natural fertility of the soil, increase the productivity and carrying capacity of the pastures. If the pasture is overgrazed, the runoff rate increases and erosion is excessive. Grazing during wet periods often cuts up and compacts the surface layer and thereby reduces yields and increases the susceptibility to erosion.

The potential productivity for trees on this soil is moderately high. The estimated production for northern red oak is 280 board feet per acre. The wooded areas are managed for hardwoods and pine. Seeds and seedlings survive and grow well if competing vegetation is controlled. During wet periods the soil is soft and cannot support heavy equipment.

The seasonal high water table, the moderate depth to bedrock, the slope, and the potential for frost action are the main limitations affecting community development. The seasonal high water table and the depth to bedrock are limitations on sites for septic tank absorption fields, sewage lagoons, and sanitary landfills. The seasonal high water table and the slope limit construction and the use of this soil as a site for dwellings and local roads and streets. The potential for frost action is a limitation on sites for local roads and streets.

Capability subclass: IVw.

5B—Braddock loam, 2 to 7 percent slopes. This soil is very deep, gently sloping, and well drained. It is on stream terraces in the Shenandoah Valley. Areas are long and winding and range from about 5 to 50 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 7 inches, dark brown loam

Subsoil:
7 to 13 inches, strong brown clay loam
13 to 28 inches, yellowish red clay
28 to 37 inches, yellowish red very gravelly clay loam
37 to 51 inches, red, mottled very cobbly clay loam

Substratum:
51 to 65 inches, red extremely cobbly sandy clay loam

Included with this soil in mapping are Moomaw and Unison soils. These soils are in landscape positions similar to those of the Braddock soil. The Unison soils have a browner subsoil than the Braddock soil. The Moomaw soils have a fragipan. Also included are soils that have less clay in the subsoil than the Braddock soil and a slightly higher base saturation. Included soils make up about 25 percent of this unit.

Important soil properties—

Permeability: Moderate
Available water capacity: Moderate
Surface runoff: Medium
Erosion potential: Medium
Organic matter content: Low
Natural fertility: Low
Soil reaction: Extremely acid to strongly acid
Depth to bedrock: More than 60 inches
Shrink-swell potential: Moderate
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are used for farming. The rest are wooded.

This soil is well suited to cultivated crops. The major limitations are the acidity and the low natural fertility. The potential for erosion is a management concern. Conservation tillage and crop rotations that include grasses and legumes help to control runoff and erosion. The surface layer is friable and can be easily tilled through a variety of moisture conditions. Tilth is fair. It can be improved or maintained by incorporating organic matter into the soil and by cultivating only at the proper

moisture content. Crops respond well to applications of lime and fertilizer.

This soil is well suited to pasture. The major limitations are the acidity and the low natural fertility. Establishing and maintaining a mixture of grasses and legumes, rotating grazing among pastures, deferring grazing, controlling weeds, using proper stocking rates, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on this soil is moderately high. The estimated production for northern red oak is 288 board feet per acre. The high content of clay often limits the use of heavy equipment, especially during periods of extreme wetness.

The high clay content, low strength, and the moderate shrink-swell potential are the main limitations affecting the use of this soil for shallow excavations, dwellings, small commercial buildings, roads, roadfill, and cover for landfills. The moderate permeability of the subsoil is a limitation on sites for septic tank absorption fields.

Capability subclass: IIe.

5C—Braddock loam, 7 to 15 percent slopes. This soil is very deep, strongly sloping, and well drained. It is on the narrow side slopes of stream terraces in the Shenandoah Valley. Areas are long and winding and range from about 5 to 30 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 7 inches, dark brown loam

Subsoil:
7 to 13 inches, strong brown clay loam
13 to 28 inches, yellowish red clay
28 to 37 inches, yellowish red very gravelly clay loam
37 to 51 inches, red, mottled very cobbly clay loam

Substratum:
51 to 65 inches, red extremely cobbly sandy clay loam

Included with this soil in mapping are Moomaw and Unison soils. These soils are in landscape positions similar to those of the Braddock soil. The Unison soils have a browner subsoil than the Braddock soil. The Moomaw soils have a fragipan. Also included are soils that have less clay in the subsoil than the Braddock soil and a slightly higher base saturation. Included soils make up about 25 percent of this unit.

Important soil properties—

Permeability: Moderate
Available water capacity: Moderate
Surface runoff: Rapid
Erosion potential: High
Organic matter content: Low
Natural fertility: Low
Soil reaction: Very strongly acid or strongly acid
Depth to bedrock: More than 60 inches
Shrink-swell potential: Moderate
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are used for farming. The rest are wooded.

This soil is moderately well suited to cultivated crops. The major limitations are the slope, the acidity, and the low natural fertility. The potential for erosion is a major management concern. Conservation tillage and crop rotations that include grasses and legumes help to control runoff and erosion. The surface layer is friable and can be easily tilled through a variety of moisture conditions. Tilth is fair. It can be improved or maintained by incorporating organic matter into the soil and by cultivating only at the proper moisture content. Crops respond well to applications of lime and fertilizer.

This soil is well suited to pasture. The major limitations are the acidity and the low natural fertility. Establishing and maintaining a mixture of grasses and legumes, rotating grazing among pastures, deferring grazing, controlling weeds, using proper stocking rates, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on this soil is moderately high. The estimated production for northern red oak is 288 board feet per acre. The high content of clay often limits the use of heavy equipment, especially during periods of extreme wetness.

The high clay content, low strength, the moderate shrink-swell potential, and the slope are the main limitations affecting the use of this soil for shallow excavations, dwellings, small commercial buildings, roads, roadfill, and cover for landfills. The moderate permeability of the subsoil is a limitation on sites for septic tank absorption fields.

Capability subclass: IIIe.

6B—Braddock cobbly loam, 2 to 7 percent slopes. This soil is very deep, gently sloping, and well drained. It is on stream terraces in the Shenandoah Valley. Areas are long and winding and range from about 5 to 50 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 7 inches, dark brown cobbly loam

Subsoil:
7 to 13 inches, strong brown clay loam
13 to 28 inches, yellowish red clay
28 to 37 inches, yellowish red very gravelly clay loam
37 to 51 inches, red, mottled very cobbly clay loam

Substratum:
51 to 65 inches, red extremely cobbly sandy clay loam

Included with this soil in mapping are Moomaw and Unison soils. These soils are in landscape positions similar to those of the Braddock soil. The Unison soils have a browner subsoil than the Braddock soil. The Moomaw soils have a fragipan. Also included are soils that have less clay in the subsoil than the Braddock soil and a slightly higher base saturation. Included soils make up about 25 percent of this unit.

Important soil properties—

Permeability: Moderate
Available water capacity: Moderate
Surface runoff: Medium
Erosion potential: Medium
Organic matter content: Low
Natural fertility: Low
Soil reaction: Very strongly acid or strongly acid
Depth to bedrock: More than 60 inches
Shrink-swell potential: Moderate
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are used for farming. The rest are wooded.

This soil is well suited to cultivated crops. Cobbles in the surface layer damage equipment and interfere with field operations. The potential for erosion is a management concern. Conservation tillage and crop rotations that include grasses and legumes help to control runoff and erosion. Tilth is fair. It can be improved or maintained by incorporating organic residue into the soil. Crops respond well to applications of lime and fertilizer.

This soil is well suited to pasture. The major limitations are the acidity and the low natural fertility. Establishing and maintaining a mixture of grasses and legumes, rotating grazing among pastures, deferring grazing, controlling weeds, using proper stocking rates, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on this soil is high. The estimated production for northern red oak is 288 board feet per acre. The high content of clay often limits the use of heavy equipment, especially during periods of extreme wetness.

The high clay content, low strength, the rock fragments, and the moderate shrink-swell potential are the main limitations affecting the use of this soil for shallow excavations, dwellings, small commercial buildings, roads, roadfill, and cover for landfills. The moderate permeability of the subsoil is a limitation on sites for septic tank absorption fields.

Capability subclass: IIIs.

6C—Braddock cobbly loam, 7 to 15 percent slopes. This soil is very deep, strongly sloping, and well drained. It is on the narrow side slopes on stream terraces in the Shenandoah Valley. Areas are long and winding and range from about 5 to 55 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 7 inches, dark brown cobbly loam

Subsoil:
7 to 13 inches, strong brown clay loam
13 to 28 inches, yellowish red clay
28 to 37 inches, yellowish red very gravelly clay loam
37 to 51 inches, red, mottled very cobbly clay loam

Substratum:
51 to 65 inches, red extremely cobbly sandy clay loam

Included with this soil in mapping are Moomaw and Unison soils. The Unison soils are near the boundary of the mapped areas in landscape positions similar to those of the Braddock soil. They have a browner subsoil than the Braddock soil. The Moomaw soils are in landscape positions similar to those of the Braddock soil. They have a fragipan. Also included are soils that have less clay in the subsoil than the Braddock soil and a slightly higher base saturation. Included soils make up about 25 percent of this unit.

Important soil properties—

Permeability: Moderate
Available water capacity: Moderate
Surface runoff: Rapid
Erosion potential: Medium
Organic matter content: Low
Natural fertility: Low
Soil reaction: Very strongly acid or strongly acid
Depth to bedrock: More than 60 inches
Shrink-swell potential: Moderate

Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are used for farming. The rest are wooded.

This soil is moderately well suited to cultivated crops. Cobbles in the surface layer damage equipment and interfere with field operations. The major limitations are the slope, the acidity, and the low natural fertility. The potential for erosion is a management concern. Conservation tillage and crop rotations that include grasses and legumes help to control runoff and erosion. Tilth is fair. It can be improved or maintained by incorporating organic residue into the soil. Crops respond well to applications of lime and fertilizer.

This soil is well suited to fruit crops if air drainage is adequate. The major limitations are the acidity and the low natural fertility. Fruit trees respond well to applications of lime and fertilizer.

This soil is well suited to pasture. The major limitations are the acidity and the low natural fertility. Establishing and maintaining a mixture of grasses and legumes, rotating grazing among pastures, deferring grazing, controlling weeds, using proper stocking rates, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on this soil is moderately high. The estimated production for northern red oak is 288 board feet per acre. A high content of clay often limits the use of heavy equipment, especially during periods of extreme wetness.

The high clay content, low strength, the moderate shrink-swell potential, the rock fragments, and the slope are the main limitations affecting the use of this soil for shallow excavations, dwellings, small commercial buildings, roads, roadfill, and cover for landfills. The moderate permeability of the subsoil also is a limitation on sites for septic tank absorption fields.

Capability subclass: IVs.

6D—Braddock cobbly loam, 15 to 25 percent slopes. This soil is very deep, moderately steep, and well drained. It is on narrow side slopes on stream terraces in the Shenandoah Valley. Areas are long and winding and range from about 5 to 30 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 7 inches, dark brown cobbly loam

Subsoil:
7 to 13 inches, strong brown clay loam
13 to 28 inches, yellowish red clay
28 to 37 inches, yellowish red very gravelly clay loam
37 to 51 inches, red, mottled very cobbly clay loam

Substratum:
51 to 65 inches, red extremely cobbly sandy clay loam

Included with this soil in mapping are Unison soils. These soils are in landscape positions similar to those of the Braddock soil. They have a strong brown subsoil. Also included are soils that have less clay in the subsoil than the Braddock soil and a slightly higher base saturation. Included soils make up about 20 percent of this unit.

Important soil properties—

Permeability: Moderate
Available water capacity: Moderate
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low
Natural fertility: Low
Soil reaction: Very strongly acid or strongly acid
Depth to bedrock: More than 60 inches
Shrink-swell potential: Moderate
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are used for pasture. The rest are wooded.

This soil is poorly suited to cultivated crops because of the high potential for erosion. Conservation tillage and crop rotations that include grasses and legumes reduce the runoff rate and help to control erosion in cultivated areas.

This soil is well suited to fruit crops if air drainage is adequate. The major limitations are the acidity and the low natural fertility. Fruit trees respond well to applications of lime and fertilizer.

This soil is moderately well suited to pasture. Establishing and maintaining a mixture of grasses and legumes, rotating grazing among pastures, deferring grazing, controlling weeds, using proper stocking rates, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees is moderately high on north and south aspects. The estimated production for northern red oak is 288 board feet per acre on north aspects and 278 board feet per acre on south aspects.

The slope, a high content of clay, low strength, and the moderate shrink-swell potential are the main limitations affecting the use of this soil for shallow excavations, dwellings, small commercial buildings,

roads, roadfill, and cover for landfills. The moderate permeability of the subsoil and the slope are limitations on sites for septic tank absorption fields.

Capability subclass: VIs.

7A—Broadway silt loam, 0 to 2 percent slopes, occasionally flooded. This soil is very deep, nearly level, and well drained. It is on flood plains in the Shenandoah Valley. Areas commonly are long and winding and follow the course of the adjacent streams. They range from 5 to 80 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 11 inches, dark brown silt loam

Subsoil:
11 to 46 inches, brown silty clay loam

Substratum:
46 to 72 inches, grayish brown, mottled loamy sand

Included with this soil in mapping are Nomberville and Gladehill soils. The Nomberville soils are in landscape positions similar to those of the Broadway soil. The Gladehill soils are in scoured areas and on levees adjacent to the streams. Included soils make up about 20 percent of this unit.

Important soil properties—

Permeability: Moderate
Available water capacity: Moderate
Surface runoff: Slow
Erosion potential: Low
Organic matter content: Moderate
Natural fertility: Medium
Soil reaction: Mildly alkaline or moderately alkaline
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: Occasional, very brief

Most areas of this soil are farmed. A few areas are wooded.

This soil is well suited to cultivated crops. Tilth is good. Flooding damages crops or limits the use of machinery in some years. Crops respond well to applications of fertilizer, but liming is not needed. Conservation tillage, cover crops, and a cropping system that includes grasses and legumes increase the organic matter content of the surface layer and help to maintain tilth. Crop residue should be kept on the surface or incorporated into the plow layer.

This soil is well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotating grazing among pastures, deferring grazing, controlling weeds, and applying fertilizer can increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on this soil is high. The estimated production for yellow poplar is 550 board feet per acre. The flooding limits the use of equipment for managing and harvesting timber.

The flooding is the major hazard affecting community development. It limits the use of this soil as a site for septic tank absorption fields, sanitary facilities, shallow excavations, dwellings, and small commercial buildings. It also is a hazard in camp areas and on playgrounds.

Capability class: I.

8B—Carbo silty clay loam, 2 to 7 percent slopes. This soil is moderately deep, gently sloping, and well drained. It is on the broad summits or shoulders of upland hills and ridges in the Shenandoah Valley. Areas are rectangular in shape. They range from about 3 to 50 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 8 inches, yellowish brown silty clay loam

Subsoil:
8 to 18 inches, strong brown clay
18 to 37 inches, yellowish brown clay

Substratum:
37 inches, limestone bedrock

Included with this soil in mapping are Chilhowie, Endcav, and Opequon soils. These soils are in landscape positions similar to those of the Carbo soil. Chilhowie soils have a thinner solum than that of the Carbo soil. Endcav soils are deeper over bedrock than the Carbo soil, and Opequon soils are shallower over bedrock. Included soils make up about 25 percent of this unit.

Important soil properties—

Permeability: Slow
Available water capacity: Low
Surface runoff: Medium
Erosion potential: Medium
Organic matter content: Low to moderate
Natural fertility: High
Soil reaction: Moderately acid to mildly alkaline
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: High

Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are farmed. The rest are wooded.

This soil is well suited to cultivated crops. The potential for erosion is a management concern. Conservation tillage and crop rotations that include grasses and legumes help to control runoff and erosion and conserve moisture. Tilth is fair. It can be maintained or improved by incorporating organic matter into the plow layer and by cultivating at the proper moisture content. Crops respond well to applications of lime and fertilizer.

This soil is well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotating grazing among pastures, deferring grazing, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on this soil is moderately high. The estimated production of northern red oak is 280 board feet per acre.

The depth to bedrock, the slow permeability, the high shrink-swell potential, and low strength are the main limitations affecting community development. The depth to bedrock and the slow permeability are limitations on sites for septic tank absorption fields. The depth to bedrock is the dominant limitation in shallow excavations and on sites for sanitary landfills. The high shrink-swell potential generally is the main limitation on sites for dwellings. The low strength and the high shrink-swell potential are limitations on sites for local roads and streets.

Capability subclass: IIe.

8C—Carbo silty clay loam, 7 to 15 percent slopes. This soil is moderately deep, strongly sloping, and well drained. It is on the side slopes of hills and ridges in the Shenandoah Valley. Areas are rectangular in shape. They range from about 3 to 35 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 8 inches, yellowish brown silty clay loam

Subsoil:
8 to 18 inches, strong brown clay
18 to 37 inches, yellowish brown clay

Substratum:
37 inches, limestone bedrock

Included with this soil in mapping are Chilhowie, Endcav, and Opequon soils. These soils are in landscape positions similar to those of the Carbo soil. Chilhowie soils have a thinner solum than that of the Carbo soil. Endcav soils are deeper over bedrock than the Carbo soil, and Opequon soils are shallower over bedrock. Included soils make up about 25 percent of this unit.

Important soil properties—

Permeability: Slow
Available water capacity: Low
Surface runoff: Rapid
Erosion potential: High
Organic matter content: Low to moderate
Natural fertility: High
Soil reaction: Very strongly acid to mildly alkaline
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: High
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are farmed. The rest are wooded.

This soil is moderately well suited to cultivated crops. The potential for erosion is a major management concern. Conservation tillage and crop rotations that include grasses and legumes help to control runoff and erosion and conserve moisture. Tilth is fair. It can be maintained or improved by incorporating organic matter into the plow layer and by cultivating at the proper moisture content. Crops respond well to applications of lime and fertilizer.

This soil is well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotating grazing among pastures, deferring grazing, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on this soil is moderately high. The estimated production for northern red oak is 280 board feet per acre.

The depth to bedrock, the slow permeability, the high shrink-swell potential, and low strength are the main limitations affecting community development. The depth to bedrock and the slow permeability are limitations on sites for septic tank absorption fields. The depth to bedrock is the dominant limitation in shallow excavations and on sites for sanitary landfills. The high shrink-swell potential is the main limitation on sites for dwellings. The low strength and the high shrink-swell potential are limitations on sites for local roads and streets.

Capability subclass: IIIe.

9C—Carbo-Endcav complex, 2 to 15 percent slopes, very rocky. These are moderately deep and deep, undulating to strongly rolling or sloping, well drained soils on side slopes and the summits of hills and ridges. They occur as areas so intermingled that it was not practical to map them separately. This map unit is about 50 percent moderately deep Carbo soil, 40 percent deep Endcav soil, and 10 percent other soils and rock outcrop. Areas are long and winding and range from 5 to 100 acres. The slopes are smooth and commonly are complex. Rock outcrops about 30 to 100 feet apart cover 2 to 10 percent of the surface. Sinkholes are common throughout areas of this unit.

A typical profile of the Carbo soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 8 inches, yellowish brown silty clay loam

Subsoil:
8 to 18 inches, strong brown clay
18 to 37 inches, yellowish brown clay

Substratum:
37 inches, limestone bedrock

A typical profile of the Endcav soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 8 inches, dark brown silt loam

Subsoil:
8 to 16 inches, yellowish brown silty clay
16 to 22 inches, strong brown clay
22 to 33 inches, dark brown clay
33 to 58 inches, yellowish brown clay

Included with these soils in mapping are Chilhowie soils. These included soils are in landscape positions similar to those of the Carbo and Endcav soils. They contain more rock fragments in the lower part of the subsoil than the Carbo soil and are shallower to bedrock than the Endcav soil. Also included are small areas of severely eroded soils that have a surface layer of silty clay or clay.

Important properties of the Carbo soil—

Permeability: Slow
Available water capacity: Low
Surface runoff: Medium or rapid
Erosion potential: Medium
Organic matter content: Low to moderate
Natural fertility: High
Soil reaction: Very strongly acid to mildly alkaline
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: High
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Important properties of the Endcav soil—

Permeability: Slow
Available water capacity: Moderate
Surface runoff: Medium or rapid
Erosion potential: Medium
Organic matter content: Low
Natural fertility: High
Soil reaction: Strongly acid to mildly alkaline
Depth to bedrock: 40 to 60 inches
Shrink-swell potential: High
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of these soils are used for pasture. A few areas are wooded.

These soils are poorly suited to cultivated crops. The rock outcrop is a major management concern. Other management concerns are the potential for erosion, the low or moderate available water capacity, and the need for lime and fertilizer.

These soils are moderately well suited to pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are the major concerns in managing pasture. Proper stocking rates, rotation of grazing among pastures, timely deferment of grazing, and applications of lime and fertilizer increase the productivity and carrying capacity of the pastures. If the pasture is overgrazed, the runoff rate increases and erosion is excessive.

The potential productivity for trees on these soils is moderately high. The estimated production for northern red oak is 280 board feet per acre on the Carbo soil and 290 board feet per acre on the Endcav soil. The rock outcrop hinders the use of logging equipment, and the low or moderate available water capacity adversely affects the survival of seeds and seedlings.

The depth to bedrock, the rock outcrop, the slow permeability, the high shrink-swell potential, and low strength are the main limitations affecting community development. The depth to bedrock and the slow permeability limit the use of these soils as sites for septic tank absorption fields. The depth to bedrock is the dominant limitation in shallow excavations and on sites for sanitary landfills. The high shrink-swell potential is the main limitation on sites for dwellings. The low strength and the high shrink-swell potential are limitations on sites for local roads and streets.

Capability subclass: IVe.

9D—Carbo-Endcav complex, 15 to 35 percent slopes, very rocky. These are moderately deep and deep, hilly to very steep, well drained soils on the side slopes of hills and ridges. They occur as areas so intermingled that it was not practical to map them separately. This map unit is about 50 percent moderately deep Carbo soil, 40 percent deep Endcav soil, and 10 percent other soils. Areas are long and winding and range from 5 to 100 acres. Slopes are smooth and commonly are complex. Rock outcrops about 30 to 100 feet apart cover 2 to 10 percent of the surface. Sinkholes are common throughout areas of this unit.

A typical profile of the Carbo soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 8 inches, yellowish brown silty clay loam

Subsoil:
8 to 18 inches, strong brown clay
18 to 37 inches, yellowish brown clay

Substratum:
37 inches, limestone bedrock

A typical profile of the Endcav soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 8 inches, dark brown silt loam

Subsoil:
8 to 16 inches, yellowish brown silty clay
16 to 22 inches, strong brown clay
22 to 33 inches, dark brown clay
33 to 58 inches, yellowish brown clay

Included with these soils in mapping are Chilhowie soils that have slopes of less than 15 percent. Also included are small areas of severely eroded soils that have a surface layer of silty clay or clay.

Important properties of the Carbo soil—

Permeability: Slow
Available water capacity: Low
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low to moderate
Natural fertility: High
Soil reaction: Very strongly acid to mildly alkaline
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: High
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Important properties of the Endcav soil—

Permeability: Slow
Available water capacity: Moderate
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low
Natural fertility: High
Soil reaction: Strongly acid to mildly alkaline
Depth to bedrock: 40 to 60 inches
Shrink-swell potential: High
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of these soils are used for pasture. A few areas are wooded.

These soils are poorly suited to cultivated crops. The rock outcrop and the slope limit the use of machinery.

These soils are poorly suited to pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are the major concerns in managing pasture. Proper stocking rates, rotation of grazing among pastures, timely deferment of grazing, and applications of lime and fertilizer increase the productivity and carrying capacity of the pastures. If the pasture is overgrazed, the runoff rate increases and erosion is excessive.

The potential productivity for trees on these soils is moderately high. The estimated production for northern red oak on the Carbo soil is 280 board feet per acre on north aspects and 240 board feet per acre on south aspects. The estimated production for northern red oak on the Endcav soil is 290 board feet per acre on north aspects and 240 board feet per acre on south aspects. The rock outcrop and the slope limit the use of logging equipment, and the low or moderate available water capacity adversely affects the survival of seeds and seedlings.

The depth to bedrock, the rock outcrop, the slope, the slow permeability, the high shrink-swell potential, and low strength are limitations affecting community development. They especially limit the use of these soils for building site development, sanitary facilities, and construction materials.

Capability subclass: VIe.

10A—Caverns sandy loam, 0 to 2 percent slopes, rarely flooded. This soil is very deep, nearly level, and well drained. It is on long, narrow or broad stream terraces. Areas are commonly long and winding and follow the course of the river. They range from about 3 to 40 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 10 inches, dark brown sandy loam

Subsoil:
10 to 18 inches, dark brown fine sandy loam
18 to 39 inches, brown fine sandy loam

Substratum:
39 to 72 inches, reddish brown and dark brown sandy loam

Included with this soil in mapping are Alonzville, Broadway, and Wolfgap soils. The Alonzville and Wolfgap soils are in the higher landscape positions. The Broadway soils are adjacent to streams. Also included are soils that have a surface layer of loamy sand. Included soils make up about 25 percent of this unit.

Important soil properties—

Permeability: Moderately rapid
Available water capacity: Moderate
Surface runoff: Slow
Erosion potential: Low
Organic matter content: Low to moderate
Natural fertility: High
Soil reaction: Very strongly acid to neutral in the surface layer and upper part of the subsoil; very strongly acid to moderately acid in the lower part of the subsoil and in the substratum.
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: Rare

Most areas of this soil are farmed. A small acreage is used as woodland.

This soil is well suited to cultivated crops. In some years, however, flooding can damage the crops or limit the use of machinery. Conservation tillage and crop rotations that include grasses and legumes help to control runoff and erosion and conserve moisture. Tilth is good and can be maintained by cultivating at the proper moisture content. Crops respond well to applications of lime and fertilizer.

This soil is well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotating grazing among pastures, deferring grazing, controlling weeds, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on this soil is high. The estimated production for shortleaf pine is 120 cubic feet, or 664 board feet, per acre.

The flooding is the main hazard affecting community development.

Capability class: I.

11B—Chilhowie silty clay loam, 2 to 7 percent slopes. This soil is moderately deep, gently sloping, and well drained. It is on the summits and shoulders of hills and ridges in the Shenandoah Valley. Slopes are smooth and commonly are complex. Areas are long and winding and follow the ridges and hilltops. They range from about 3 to 50 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 6 inches, dark yellowish brown silty clay loam

Subsoil:
6 to 18 inches, strong brown clay

Substratum:
18 to 35 inches, strong brown extremely channery clay
35 inches, calcareous shale bedrock

Included with this soil in mapping are Carbo and Edom soils. These soils are in landscape positions similar to those of the Chilhowie soil. The Carbo soils have a thicker solum than that of the Chilhowie soil and have fewer rock fragments in the lower part of the subsoil. The Edom soils are deeper over bedrock than the Chilhowie soil. Also included are soils that are severely eroded and rock outcrop. Included areas make up about 15 percent of this unit.

Important soil properties—

Permeability: Slow
Available water capacity: Low
Surface runoff: Medium
Erosion potential: Medium
Organic matter content: Low
Natural fertility: High
Soil reaction: Slightly acid to mildly alkaline in the surface layer and subsoil; neutral or mildly alkaline in the substratum
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: High
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are used for farming. The rest are mostly used as woodland.

This soil is moderately well suited to cultivated crops. Droughtiness during the growing season and the

potential for erosion are major management concerns. Conservation tillage and crop rotations that include grasses and legumes help to control runoff and erosion and conserve moisture. Tilth is fair. It can be maintained or improved by incorporating organic matter into the plow layer and by cultivating at the proper moisture content. Crops respond well to applications of lime and fertilizer.

This soil is moderately well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotating grazing among pastures, deferring grazing, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on this soil is moderate. The estimated production for northern red oak is 240 board feet per acre.

The moderate depth to bedrock, the slow permeability, and the high shrink-swell potential in the subsoil are the major limitations affecting building site development, sanitary facilities, and most recreational uses.

Capability subclass: IIe.

11C—Chilhowie silty clay loam, 7 to 15 percent slopes. This soil is moderately deep, strongly sloping, and well drained. It is on the side slopes of hills and ridges in the Shenandoah Valley. Slopes are smooth and commonly are complex. Areas are long and winding. They range from about 3 to 150 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 6 inches, dark yellowish brown silty clay loam

Subsoil:
6 to 18 inches, strong brown clay

Substratum:
18 to 35 inches, strong brown extremely channery clay
35 inches, calcareous shale bedrock

Included with this soil in mapping are Carbo and Edom soils. These soils are in landscape positions similar to those of the Chilhowie soil. The Carbo soils have a thicker solum than that of the Chilhowie soil and have fewer rock fragments in the lower part of the subsoil. The Edom soils are deeper over bedrock than the Chilhowie soil. Also included are soils that are severely eroded and rock outcrop. Included areas make up about 15 percent of this unit.

Important soil properties—

Permeability: Slow
Available water capacity: Low
Surface runoff: Rapid
Erosion potential: High
Organic matter content: Low
Natural fertility: High
Soil reaction: Slightly acid to mildly alkaline in the surface layer and subsoil; neutral or mildly alkaline in the substratum
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: High
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are farmed. The rest are mostly used as woodland.

This soil is poorly suited to cultivated crops. Droughtiness during the growing season and the potential for erosion are major management concerns. Conservation tillage and crop rotations that include grasses and legumes help to control runoff and erosion and conserve moisture. Tilth is fair. It can be maintained or improved by incorporating organic matter into the plow layer and by cultivating at the proper moisture content. Crops respond well to applications of lime and fertilizer.

This soil is moderately well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotating grazing among pastures, deferring grazing, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on this soil is moderate. The estimated production for northern red oak is 240 board feet per acre.

The moderate depth to bedrock, the slope, the slow permeability, and the high shrink-swell potential in the subsoil are the major limitations affecting building site development, sanitary facilities, and most recreational uses.

Capability subclass: IIIe.

11D—Chilhowie silty clay loam, 15 to 25 percent slopes. This soil is moderately deep, moderately steep, and well drained. It is on the side slopes of hills and ridges in the Shenandoah Valley. Areas are long and winding. They range from about 3 to 75 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 6 inches, dark yellowish brown silty clay loam

Subsoil:
6 to 18 inches, strong brown clay

Substratum:
18 to 35 inches, strong brown extremely channery clay
35 inches, calcareous shale bedrock

Included with this soil in mapping are Carbo and Edom soils. These soils are in landscape positions similar to those of the Chilhowie soil. The Carbo soils have a thicker solum than that of the Chilhowie soil and have fewer rock fragments in the lower part of the subsoil. The Edom soils are deeper over bedrock than the Chilhowie soil. Also included are soils that are severely eroded and rock outcrop. Included areas make up about 15 percent of this unit.

Important soil properties—

Permeability: Slow
Available water capacity: Low
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low
Natural fertility: High
Soil reaction: Slightly acid to mildly alkaline in the surface layer and subsoil; neutral or mildly alkaline in the substratum
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: High
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are used for pasture and hay. A few small areas are used for cultivated crops, and the remaining areas are wooded.

Because of droughtiness during the growing season and the high potential for erosion, this soil is unsuitable for cultivated crops. If cultivated crops are grown, conservation tillage and crop rotations that include grasses and legumes help to control runoff and erosion and conserve moisture. Crops respond well to applications of lime and fertilizer.

This soil is moderately well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotating grazing among pastures, deferring grazing, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on this soil is moderate. The estimated production for northern red oak is 240 board feet per acre on north aspects and 195 board feet per acre on south aspects.

The slope, the depth to bedrock, the slow permeability, and the high shrink-swell potential in the subsoil are the major limitations affecting building site development, sanitary facilities, and most recreational uses.

Capability subclass: IVe.

11E—Chilhowie silty clay loam, 25 to 35 percent slopes. This soil is moderately deep, steep, and well drained. It is on the side slopes of hills and ridges in the Shenandoah Valley. Areas are long and winding. They range from about 3 to 75 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 6 inches, dark yellowish brown silty clay loam

Subsoil:
6 to 18 inches, strong brown clay

Substratum:
18 to 35 inches, strong brown extremely channery clay
35 inches, calcareous shale bedrock

Included with this soil in mapping are Edom soils. These soils are in landscape positions similar to those of the Chilhowie soil. They are deeper over bedrock than the Chilhowie soil. Also included are soils that are severely eroded and rock outcrop. Included areas make up about 15 percent of this unit.

Important soil properties—

Permeability: Slow
Available water capacity: Low
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low
Natural fertility: High
Soil reaction: Slightly acid to mildly alkaline in the surface layer and subsoil; neutral or mildly alkaline in the substratum
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: High
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are used for pasture. A few areas are wooded.

Because of droughtiness during the growing season and the potential for erosion, this soil is unsuitable for cultivated crops. If cultivated crops are grown, conservation tillage and crop rotations that include grasses and legumes are needed to reduce the runoff rate, control erosion, and conserve moisture. Crops respond well to applications of lime and fertilizer.

This soil is poorly suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotating grazing among pastures, deferring grazing, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on this soil is moderate. The estimated production for northern red oak is 240 board feet per acre on north aspects and 195 board feet per acre on south aspects.

The slope, the depth to bedrock, and the high shrink-swell potential in the subsoil are the major limitations affecting building site development, sanitary facilities, and most recreational uses.

Capability subclass: VIe.

12C—Chilhowie silty clay loam, 7 to 15 percent slopes, rocky. This soil is moderately deep, strongly sloping, and well drained. It is on the side slopes of hills and ridges in the Shenandoah Valley. Slopes are smooth and commonly are complex. Rock outcrops about 100 to 300 feet apart cover up to 2 percent of the surface. Areas are long and winding and follow the ridges and hilltops. They range from about 5 to 50 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 6 inches, dark yellowish brown silty clay loam

Subsoil:
6 to 18 inches, strong brown clay

Substratum:
18 to 35 inches, strong brown extremely channery clay
35 inches, calcareous shale bedrock

Included with this soil in mapping are Carbo and Opequon soils. These soils are in landscape positions similar to those of the Chilhowie soil. The Carbo soils have fewer rock fragments in the lower part of the profile than the Chilhowie soil. The Opequon soils are shallower over bedrock than the Chilhowie soil. Also included are Chilhowie soils that are severely eroded and rock outcrops more than 300 feet apart. Included areas make up about 20 percent of this unit.

Important soil properties—

Permeability: Slow
Available water capacity: Low
Surface runoff: Rapid
Erosion potential: High
Organic matter content: Low
Natural fertility: High
Soil reaction: Slightly acid to mildly alkaline in the surface layer and subsoil; neutral or mildly alkaline in the substratum
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: High
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are used for pasture, hay, or woodland. The rest are used for cultivated crops.

This soil is poorly suited to cultivated crops. It is droughty during the growing season, and the rock outcrop interferes with tillage. The potential for erosion is a major management concern. Conservation tillage, cover crops, and a cropping system that includes grasses and legumes increase organic matter content, improve tilth, and help to control erosion.

This soil is moderately well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are the major concerns in managing pasture. Proper stocking rates, rotation of grazing among pastures, and timely deferment of grazing increase the productivity and carrying capacity of the pastures. If the pasture is overgrazed, the runoff rate increases and erosion is excessive.

The potential productivity for trees on this soil is moderate. The estimated production for northern red oak is 240 board feet per acre. The survival of seeds and seedlings is affected by droughtiness during the growing season and by the tendency of the silty clay loam surface layer to form a crust. Windthrow is a hazard because of the restricted rooting depth. Logging roads and skid trails should be laid out on the contour to reduce the concentration of runoff and thereby control erosion. During wet periods the surface layer is soft and slippery. The slope limits the safe operation of heavy equipment.

The moderate depth to bedrock, the slow permeability, and the high shrink-swell potential in the subsoil are the major limitations affecting building site development, sanitary facilities, and most recreational uses.

Capability subclass: IIIe.

12D—Chilhowie silty clay loam, 15 to 25 percent slopes, rocky. This soil is moderately deep, moderately steep, and well drained. It is on the side slopes of hills and ridges in the Shenandoah Valley. Slopes are smooth and commonly are complex. Most areas are dissected by shallow drainageways about 100 to 200 feet apart. Rock outcrops about 100 to 300 feet apart cover up to 2 percent of the surface. Areas are long

and winding. They range from about 5 to 50 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 6 inches, dark yellowish brown silty clay loam

Subsoil:
6 to 18 inches, strong brown clay

Substratum:
18 to 35 inches, strong brown extremely channery clay
35 inches, calcareous shale bedrock

Included with this soil in mapping are Carbo and Opequon soils. These soils are in landscape positions similar to those of the Chilhowie soil. The Carbo soils have fewer rock fragments in the lower part of the profile than the Chilhowie soil. The Opequon soils are shallower over bedrock than the Chilhowie soil. Also included are Chilhowie soils that are severely eroded and rock outcrops more than 300 feet apart. Included areas make up about 20 percent of this unit.

Important soil properties—

Permeability: Slow
Available water capacity: Low
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low
Natural fertility: High
Soil reaction: Slightly acid to mildly alkaline in the surface layer and subsoil; neutral or mildly alkaline in the substratum
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: High
Depth to a seasonal high water table: More than 72 inches
Flooding: None

All areas of this soil are used for pasture or woodland.

This soil is poorly suited to cultivated crops. It is droughty during the growing season, and the rock outcrop interferes with tillage. The slope limits the use of farm machinery. The potential for erosion is a major management concern.

This soil is moderately well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are the major concerns in managing pasture. Proper stocking rates, rotation of grazing among pastures, and timely deferment of grazing increase the productivity and carrying capacity of the pastures. If the pasture is overgrazed, the runoff rate increases and erosion is excessive.

The potential productivity for trees on this soil is moderate. The estimated production for northern red oak is 240 board feet per acre on north aspects and 195 board feet per acre on south aspects. The survival of seeds and seedlings is affected by droughtiness during the growing season and by the tendency of the silty clay loam surface layer to form a crust. Windthrow is a hazard because of the restricted rooting depth. Logging roads and skid trails should be laid out on the contour to reduce the concentration of runoff and thereby control erosion. During wet periods the surface layer is soft and slippery. The slope limits the safe operation of heavy equipment.

The moderate depth to bedrock, the slope, the slow permeability, and the high shrink-swell potential in the subsoil are the major limitations affecting building site development, sanitary facilities, and most recreational uses.

Capability subclass: IVe.

13C—Chilhowie silty clay loam, 7 to 15 percent slopes, very rocky. This soil is moderately deep, strongly sloping, and well drained. It is on the side slopes of hills and ridges in the Shenandoah Valley. Rock outcrops about 30 to 100 feet apart cover 2 to 10 percent of the surface. Areas are long and winding. They range from about 5 to 35 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 6 inches, dark yellowish brown silty clay loam

Subsoil:
6 to 18 inches, strong brown clay

Substratum:
18 to 35 inches, strong brown extremely channery clay
35 inches, calcareous shale bedrock

Included with this soil in mapping are Carbo and Opequon soils. These soils are in landscape positions similar to those of the Chilhowie soil. The Carbo soils have fewer rock fragments in the lower part of the profile than the Chilhowie soil. The Opequon soils are shallower over bedrock than the Chilhowie soil. Also included are Chilhowie soils that are severely eroded and rock outcrops less than 300 feet apart. Included areas make up about 20 percent of this unit.

Important soil properties—

Permeability: Slow

Available water capacity: Low
Surface runoff: Rapid
Erosion potential: High
Organic matter content: Low
Natural fertility: High
Soil reaction: Slightly acid to mildly alkaline in the surface layer and subsoil; neutral or mildly alkaline in the substratum
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: High
Depth to a seasonal high water table: More than 72 inches
Flooding: None

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

This soil is not suited to cultivated crops. It is droughty during the growing season, and the rock outcrop interferes with tillage. The potential for erosion is a major management concern.

This soil is moderately well suited to pasture and hay. The rock outcrop interferes with mowing and seedbed preparation. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are the major concerns in managing pasture. Proper stocking rates, rotation of grazing among pastures, and timely deferment of grazing increase the productivity and carrying capacity of the pastures. If the pasture is overgrazed, the runoff rate increases and erosion is excessive.

The potential productivity for trees on this soil is moderate. The estimated production for northern red oak is 240 board feet per acre. The survival of seeds and seedlings is affected by droughtiness during the growing season and by the tendency of the silty clay loam surface layer to form a crust. Windthrow is a hazard because of the restricted rooting depth. Logging roads and skid trails should be laid out on the contour to reduce the concentration of runoff and thereby control erosion. During wet periods the surface layer is soft and slippery.

The depth to bedrock, the slow permeability, the high shrink-swell potential in the subsoil, and the rock outcrop are the major limitations affecting building site development, sanitary facilities, and most recreational uses. The slope also is a limitation for most recreational uses.

Capability subclass: VIs.

13D—Chilhowie silty clay loam, 15 to 35 percent slopes, very rocky. This soil is moderately deep, moderately steep and steep, and well drained. It is on the side slopes of hills and ridges in the Shenandoah Valley. Rock outcrops about 30 to 100 feet apart cover 2 to 10 percent of the surface. Areas are long and winding. They range from about 3 to 25 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 6 inches, dark yellowish brown silty clay loam

Subsoil:
6 to 18 inches, strong brown clay

Substratum:
18 to 35 inches, strong brown extremely channery clay
35 inches, calcareous shale bedrock

Included with this soil in mapping are Carbo and Opequon soils. These soils are in landscape positions similar to those of the Chilhowie soil. The Carbo soils have fewer rock fragments in the lower part of the profile than the Chilhowie soil. The Opequon soils are shallower over bedrock than the Chilhowie soil. Also included are Chilhowie soils that are severely eroded and rock outcrops less than 300 feet apart. Included areas make up about 20 percent of this unit.

Important soil properties—

Permeability: Slow
Available water capacity: Low
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low
Natural fertility: High
Soil reaction: Slightly acid to mildly alkaline in the surface layer and subsoil; neutral or mildly alkaline in the substratum
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: High
Depth to a seasonal high water table: More than 72 inches
Flooding: None

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

This soil is not suited to cultivated crops. It is droughty during the growing season, and the rock outcrop interferes with tillage. The slope limits the use of farm machinery. The potential for erosion is a major management concern.

This soil is poorly suited to pasture and hay. The rock outcrop interferes with mowing and seedbed preparation. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are the major concerns in managing pasture. Proper stocking rates, rotation of grazing among pastures, and timely deferment of grazing increase the productivity

and carrying capacity of the pastures. If the pasture is overgrazed, the runoff rate increases and erosion is excessive.

The potential productivity for trees on this soil is moderate. The estimated production for northern red oak is 240 board feet per acre on north aspects and 195 board feet per acre on south aspects. The survival of seeds and seedlings is affected by droughtiness during the growing season and by the tendency of the silty clay loam surface layer to form a crust. Windthrow is a hazard because of the restricted rooting depth. Logging roads and skid trails should be laid out on the contour to reduce the concentration of runoff and thereby control erosion. During wet periods the surface layer is soft and slippery. The slope limits the safe operation of heavy equipment.

The rock outcrop, the slope, the depth to bedrock, the slow permeability, and the high shrink-swell potential in the subsoil are the major limitations affecting building site development, sanitary facilities, and most recreational uses.

Capability subclass: VIIe.

13E—Chilhowie silty clay loam, 35 to 55 percent slopes, very rocky. This soil is moderately deep, steep and very steep, and well drained. It is on the side slopes of hills and ridges in the Shenandoah Valley. Rock outcrops about 30 to 100 feet apart cover 2 to 10 percent of the surface. Areas are long and winding. They range from about 10 to 75 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 6 inches, dark yellowish brown silty clay loam

Subsoil:
6 to 18 inches, strong brown clay

Substratum:
18 to 35 inches, strong brown extremely channery clay
35 inches, calcareous shale bedrock

Included with this soil in mapping are Carbo and Opequon soils. These soils are in landscape positions similar to those of the Chilhowie soil. The Carbo soils have fewer rock fragments in the lower part of the profile than the Chilhowie soil. The Opequon soils are shallower over bedrock than the Chilhowie soil. Also included are rock outcrops less than 300 feet apart and soils with slopes of less than 35 percent. Included areas make up about 20 percent of this unit.

Important soil properties—

Permeability: Slow
Available water capacity: Low
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low
Natural fertility: High
Soil reaction: Slightly acid to mildly alkaline in the surface layer and subsoil; neutral or mildly alkaline in the substratum
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: High
Depth to a seasonal high water table: More than 72 inches
Flooding: None

All areas of this soil are wooded. The potential productivity for trees on this soil is moderate. The estimated production for northern red oak is 240 board feet per acre on north aspects and 195 board feet per acre on south aspects. The survival of seeds and seedlings is affected by droughtiness during the growing season and by the tendency of the silty clay loam surface layer to form a crust. Windthrow is a hazard because of the restricted rooting depth. Logging roads and skid trails should be laid out on the contour to reduce the concentration of runoff and thereby control erosion. During wet periods the surface layer is soft and slippery. The slope limits the safe operation of heavy equipment.

The rock outcrop and the slope are the major limitations affecting building site development, sanitary facilities, and most recreational uses.

Capability subclass: VIIe.

14B—Coursey loam, 2 to 7 percent slopes. This soil is very deep, gently sloping, and moderately well drained. It is on terraces along the major streams in the Shenandoah Valley. Areas are irregularly shaped or long and narrow. They range from about 3 to 30 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 12 inches, dark brown loam

Subsoil:
12 to 17 inches, yellowish brown loam
17 to 28 inches, yellowish red loam
28 to 34 inches, yellowish brown, mottled clay loam
34 to 58 inches, grayish brown, mottled clay loam

Substratum:
58 to 63 inches, strong brown, mottled sandy clay loam

Included with this soil in mapping are the well drained Alonzville, the moderately well drained

Moomaw, and the very poorly drained Purdy soils. The Alonzville and Moomaw soils are on the higher terraces closer to the streams. The Purdy soils are in the lower areas and farther away from the streams. Included soils make up about 20 percent of this unit.

Important soil properties—

Permeability: Moderate
Available water capacity: Moderate
Surface runoff: Medium
Erosion potential: Medium
Organic matter content: Low to moderate
Natural fertility: Low
Soil reaction: Extremely acid to strongly acid
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: 18 to 30 inches
Flooding: None

Most areas of this soil are used for pasture. A few areas are used for cultivated crops, and the rest is used as woodland.

This soil is well suited to cultivated crops. The potential for erosion is a management concern. Conservation tillage and crop rotations that include grasses and legumes help to control runoff and erosion and conserve soil moisture. Tilth is good and can be maintained by incorporating organic matter into the surface layer and by cultivating only at the proper moisture content. Wetness caused by the seasonal high water table sometimes delays tillage and spring planting.

This soil is well suited to pasture and hay. Alfalfa is commonly short lived, however, because of the wetness and restricted root growth caused by the seasonal high water table. Grazing when the soil is too wet compacts the surface layer and increases the potential for erosion by damaging the plant cover. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotating grazing among pastures, deferring grazing, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on this soil is high. The estimated production for Virginia pine is 120 cubic feet, or 664 board feet, per acre.

The seasonal high water table in winter and spring is the main limitation affecting community development. It especially limits the use of this soil for sanitary facilities and building site development.

Capability subclass: IIe.

14C—Coursey loam, 7 to 15 percent slopes. This soil is very deep, strongly sloping, and moderately well drained. It is on terraces along the major streams in the Shenandoah Valley. Areas are irregularly shaped or long and narrow. They range from about 3 to 25 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 12 inches, dark brown loam

Subsoil:
12 to 17 inches, yellowish brown loam
17 to 28 inches, yellowish red loam
28 to 34 inches, yellowish brown, mottled clay loam
34 to 58 inches, grayish brown, mottled clay loam

Substratum:
58 to 63 inches, strong brown, mottled sandy clay loam

Included with this soil in mapping are the well drained Alonzville, the moderately well drained Moomaw, and the poorly drained Purdy soils. The Alonzville and Moomaw soils are on the higher terraces closer to the streams. The Purdy soils are in the lower areas and farther away from the streams. Included soils make up about 20 percent of this unit.

Important soil properties—

Permeability: Moderate
Available water capacity: Moderate
Surface runoff: Rapid
Erosion potential: High
Organic matter content: Low to moderate
Natural fertility: Low
Soil reaction: Extremely acid to strongly acid
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: 18 to 30 inches
Flooding: None

Most areas of this soil are used for pasture. A few areas are used for cultivated crops, and the rest is used as woodland.

This soil is moderately well suited to cultivated crops. The potential for erosion is a major management concern. Conservation tillage and crop rotations that include grasses and legumes help to control runoff and erosion and conserve soil moisture. Tilth is good and can be maintained by incorporating organic matter into the surface layer and by cultivating only at the proper moisture content. Wetness caused by the seasonal high water table sometimes delays tillage and spring planting.

This soil is moderately well suited to pasture and hay. Alfalfa is commonly short lived, however, because of the wetness and restricted root growth caused by the

seasonal high water table. Grazing when the soil is too wet compacts the surface layer and increases the potential for erosion by damaging the plant cover. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotating grazing among pastures, deferring grazing, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on this soil is high. The estimated production for Virginia pine is 120 cubic feet, or 664 board feet, per acre.

The seasonal high water table in winter and spring is the main limitation affecting community development. It especially limits the use of this soil for sanitary facilities and building site development.

Capability subclass: IIIe.

15A—Derroc cobbly sandy loam, 0 to 2 percent slopes, frequently flooded. This soil is deep, nearly level, and well drained. It is on flood plains in the Shenandoah Valley. Areas are commonly long and winding and follow the course of the adjacent streams. Slope ranges from 0 to 2 percent.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 3 inches, dark brown cobbly sandy loam

Subsoil:
3 to 12 inches, yellowish brown very cobbly sandy loam
12 to 37 inches, yellowish brown extremely cobbly sandy loam

Substratum:
37 to 46 inches, yellowish brown very cobbly loamy sand
46 to 65 inches, yellowish brown, mottled very cobbly sandy loam

Included with this soil in mapping are small areas of Gladehill soils. These soils are in the same landscape positions as the Derroc soil. They have fewer rock fragments throughout the surface layer and subsoil than the Derroc soil. They make up about 15 percent of this unit.

Important soil properties—

Permeability: Rapid
Available water capacity: Low
Surface runoff: Slow
Erosion potential: Low
Organic matter content: Low to high
Natural fertility: Low or medium
Soil reaction: Very strongly acid or strongly acid
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: Frequent, very brief

Most areas of this soil are used as woodland. A few areas are used for pasture.

This soil is poorly suited to cultivated crops. The cobblestones interfere with tillage. Some areas are frequently covered by floodwater from the adjacent streams.

This soil is moderately well suited to pasture and poorly suited to hay. Establishing and maintaining a mixture of grasses and legumes is difficult because of the cobblestones, which interfere with tillage. The cobblestones also limit the use of hay-gathering equipment. Proper stocking rates, rotation of grazing among pastures, deferred grazing, and applications of lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on this soil is moderately high. The estimated production for northern red oak is 288 board feet per acre. Seeds and seedlings survive and grow well if competing vegetation is controlled.

The flooding is a major hazard affecting most types of community development.

Capability subclass: IIw.

16B—Edom silty clay loam, 2 to 7 percent slopes. This soil is very deep, gently sloping, and well drained. It is on the summits and side slopes of hills, knolls, and ridges in the Shenandoah Valley. Areas are irregularly shaped and range from about 3 to 100 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 3 inches, dark brown silty clay loam
3 to 7 inches, dark brown, mottled silty clay loam

Subsoil:
7 to 18 inches, yellowish red clay
18 to 34 inches, yellowish red, mottled clay

Substratum:
34 to 65 inches, yellowish red, mottled very channery silty clay

Included with this soil in mapping are Carbo and Chilhowie soils. These soils are in landscape positions similar to those of the Edom soil. They are shallower over bedrock than the Edom soil. Included soils make up about 10 percent of this unit.

Important soil properties—

Permeability: Moderately slow or moderate
Available water capacity: Low
Surface runoff: Medium
Erosion potential: Medium
Organic matter content: Low to moderate
Natural fertility: High
Soil reaction: Strongly acid to mildly alkaline in the surface layer and upper part of the subsoil; moderately acid to mildly alkaline in the lower part of the subsoil and in the substratum
Depth to bedrock: 40 to more than 60 inches
Shrink-swell potential: Moderate
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are farmed. A few areas are wooded.

This soil is well suited to cultivated crops. Tilth can be maintained or improved by incorporating organic residue into the plow layer and by cultivating when the moisture content of the soil is optimum for tillage. The potential for erosion is a management concern. Conservation tillage, cover crops, and a cropping system that includes grasses and legumes minimize crusting, increase the rate of water infiltration, and help to control runoff and erosion. Crops respond well to applications of lime and fertilizer.

This soil is well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotating grazing among pastures, deferring grazing, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on this soil is moderate. The estimated production for northern red oak is 288 board feet per acre. Seeds and seedlings survive and grow well if competing vegetation is controlled.

The restricted permeability, the moderate shrink-swell potential, the clayey subsoil, and low strength limit the use of this soil for community development. The restricted permeability is a limitation on sites for septic tank absorption fields. The low strength and the moderate shrink-swell potential limit the use of this soil for roadfill, local roads and streets, and dwellings. The clayey subsoil limits the use of this soil for trench type sanitary landfills, daily cover for landfills, and shallow excavations.

Capability subclass: IIe.

16C—Edom silty clay loam, 7 to 15 percent slopes. This soil is very deep, strongly sloping, and well drained. It is on the side slopes of hills and ridges in the Shenandoah Valley. Areas are irregularly shaped and range from about 3 to 60 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 3 inches, dark brown silty clay loam
3 to 7 inches, dark brown, mottled silty clay loam

Subsoil:
7 to 18 inches, yellowish red clay
18 to 34 inches, yellowish red, mottled clay

Substratum:
34 to 65 inches, yellowish red, mottled very channery silty clay

Included with this soil in mapping are Carbo and Chilhowie soils. These soils are in landscape positions similar to those of the Edom soil. They are shallower over bedrock than the Edom soil. Included soils make up about 10 percent of this unit.

Important soil properties—

Permeability: Moderately slow or moderate
Available water capacity: Low
Surface runoff: Rapid
Erosion potential: High
Organic matter content: Low to moderate
Natural fertility: High
Soil reaction: Strongly acid to mildly alkaline in the surface layer and upper part of the subsoil; moderately acid to mildly alkaline in the lower part of the subsoil and in the substratum
Depth to bedrock: 40 to more than 60 inches
Shrink-swell potential: Moderate
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are farmed. A few areas are wooded.

This soil is moderately well suited to cultivated crops. Tilth can be maintained or improved by incorporating organic residue into the plow layer and by cultivating when the moisture content of the soil is optimum for tillage. The potential for erosion is a management concern. Conservation tillage, cover crops, and a cropping system that includes grasses and legumes minimize crusting, increase the rate of water infiltration, and help to control runoff and erosion. Crops respond well to applications of lime and fertilizer.

This soil is well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotating grazing

among pastures, deferring grazing, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on this soil is moderately high. The estimated production for northern red oak is 288 board feet per acre. Seeds and seedlings survive and grow well if competing vegetation is controlled.

The restricted permeability, the slope, low strength, the moderate shrink-swell potential, and the clayey subsoil limit the use of this soil for community development. The restricted permeability of the subsoil is a limitation on sites for septic tank absorption fields. The low strength and the moderate shrink-swell potential limit the use of this soil for roadfill and local roads and streets. The slope and the moderate shrink-swell potential are limitations on sites for dwellings. The clayey subsoil limits the use of this soil for trench type sanitary landfills and daily cover for landfills.

Capability subclass: IIIe.

17B—Endcav silt loam, 2 to 7 percent slopes. This soil is deep, gently sloping, and well drained. It is on the summits and side slopes of hills and ridges in the Shenandoah Valley. Areas are irregularly shaped and range from about 3 to 100 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 8 inches, dark brown silt loam

Subsoil:
8 to 16 inches, yellowish brown silty clay
16 to 22 inches, strong brown clay
22 to 33 inches, dark brown clay
33 to 58 inches, yellowish brown clay

Included with this soil in mapping are Carbo, Chilhowie, and Frederick soils. These soils are in landscape positions similar to those of the Endcav soil. The Carbo and Chilhowie soils are shallower over bedrock than the Endcav soil. The Frederick soils have a redder subsoil than the Endcav soil. Also included are areas of rock outcrop. Included areas make up about 10 percent of this unit.

Important soil properties—

Permeability: Slow
Available water capacity: Moderate
Surface runoff: Medium
Erosion potential: Medium
Organic matter content: Low
Natural fertility: High
Soil reaction: Strongly acid to neutral in the surface layer and upper part of the subsoil; moderately acid to moderately alkaline in the lower part of the subsoil
Depth to bedrock: 40 to 60 inches
Shrink-swell potential: High
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are farmed. A few areas are wooded.

This soil is well suited to cultivated crops. The surface layer is friable and can be easily tilled when moist but breaks into clods if tilled when too dry or too moist. Tilth can be maintained or improved by incorporating organic material into the plow layer and by cultivating when the moisture content of the soil is optimum for tillage. The potential for erosion is a management concern. Conservation tillage, cover crops, and a cropping system that includes grasses and legumes minimize crusting, increase the rate of water infiltration, and help to control runoff and erosion. Crops respond well to applications of lime and fertilizer.

This soil is well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotating grazing among pastures, deferring grazing, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on this soil is moderately high. The estimated production for northern red oak is 290 board feet per acre. Seeds and seedlings survive and grow well if competing vegetation is controlled.

The slow permeability, low strength, the high shrink-swell potential, and the clayey subsoil limit the use of this soil for community development. The slow permeability and the high content of clay in the subsoil are limitations on sites for septic tank absorption fields and shallow excavations. The low strength and the high shrink-swell potential limit the use of this soil for roadfill and local roads and streets. The high shrink-swell potential also is a limitation on sites for dwellings. The clayey subsoil limits the use of this soil for trench type sanitary landfills and daily cover for landfills. The depth to bedrock limits the use of this soil as a site for trench and area landfills and shallow excavations.

Capability subclass: IIe.

17C—Endcav silt loam, 7 to 15 percent slopes. This soil is deep, strongly sloping, and well drained. It is on the side slopes of hills and ridges in the Shenandoah Valley. Areas are irregularly shaped and range from about 3 to 70 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 8 inches, dark brown silt loam

Subsoil:
8 to 16 inches, yellowish brown silty clay
16 to 22 inches, strong brown clay
22 to 33 inches, dark brown clay
33 to 58 inches, yellowish brown clay

Included with this soil in mapping are Carbo, Chilhowie, and Frederick soils. These soils are in landscape positions similar to those of the Endcav soil. The Carbo and Chilhowie soils are shallower over bedrock than the Endcav soil. The Frederick soils have a redder subsoil than the Endcav soil. Also included are rock outcrop and soils that have steeper slopes than the Endcav soil. Included areas make up about 25 percent of this unit.

Important soil properties—

Permeability: Slow
Available water capacity: Moderate
Surface runoff: Rapid
Erosion potential: High
Organic matter content: Low
Natural fertility: High
Soil reaction: Strongly acid to neutral in the surface layer and upper part of the subsoil; moderately acid to moderately alkaline in the lower part of the subsoil
Depth to bedrock: 40 to 60 inches
Shrink-swell potential: High
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are farmed. A few areas are wooded.

This soil is moderately well suited to cultivated crops. The surface layer is friable and can be easily tilled when moist but breaks into clods if tilled when too dry or too moist. Tilth can be maintained or improved by incorporating organic material into the plow layer and by cultivating when the moisture content of the soil is optimum for tillage. The potential for erosion is a major management concern. Conservation tillage, cover crops, and a cropping system that includes grasses and legumes minimize crusting, increase the rate of water infiltration, and help to control runoff and erosion. Crops respond well to applications of lime and fertilizer.

This soil is moderately well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotating grazing among pastures, deferring grazing, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on this soil is moderately high. The estimated production for northern red oak is 290 board feet per acre. Seeds and seedlings survive and grow well if competing vegetation is controlled.

The slow permeability, low strength, the high shrink-swell potential, and the clayey subsoil limit the use of this soil for community development. The slow permeability and the high content of clay in the subsoil are limitations on sites for septic tank absorption fields and shallow excavations. The low strength and the high shrink-swell potential limit the use of this soil for roadfill and local roads and streets. The high shrink-swell potential also is a limitation on sites for dwellings. The clayey subsoil limits the use of this soil for trench type sanitary landfills and daily cover for landfills. The depth to bedrock limits the use of this soil for trench and area landfills and shallow excavations.

Capability subclass: IIIe.

17D—Endcav silt loam, 15 to 25 percent slopes. This soil is deep, moderately steep, and well drained. It is on the side slopes of hills and ridges in the Shenandoah Valley. Areas are irregularly shaped and range from about 3 to 50 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 8 inches, dark brown silt loam

Subsoil:
8 to 16 inches, yellowish brown silty clay
16 to 22 inches, strong brown clay
22 to 33 inches, dark brown clay
33 to 58 inches, yellowish brown clay

Included with this soil in mapping are Carbo, Chilhowie, and Frederick soils. These soils are in landscape positions similar to those of the Endcav soil. The Carbo and Chilhowie soils are shallower over bedrock than the Endcav soil. The Frederick soils have a redder subsoil than the Endcav soil. Also included are rock outcrop and soils that have steeper slopes than the Endcav soil. Included areas make up about 25 percent of this unit.

Important soil properties—

Permeability: Slow
Available water capacity: Moderate
Surface runoff: Very rapid
Erosion potential: High

Organic matter content: Low
Natural fertility: High
Soil reaction: Strongly acid to neutral in the surface layer and upper part of the subsoil; moderately acid to moderately alkaline in the lower part of the subsoil
Depth to bedrock: 40 to 60 inches
Shrink-swell potential: High
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are used for pasture. A few areas are wooded.

This soil is poorly suited to cultivated crops. The potential for erosion is a major management concern. Conservation tillage, cover crops, and a cropping system that includes grasses and legumes minimize crusting, increase the rate of water infiltration, and help to control runoff and erosion. Crops respond well to applications of lime and fertilizer.

This soil is moderately well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotating grazing among pastures, deferring grazing, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on this soil is moderately high. The estimated production for northern red oak is 290 board feet per acre on north aspects and 280 board feet per acre on south aspects. Seeds and seedlings survive and grow well if competing vegetation is controlled. The slope limits the use of logging equipment. Roads should be constructed on the contour to reduce the hazard of erosion.

The slope, the slow permeability, low strength, the high shrink-swell potential, and the clayey subsoil limit the use of this soil for community development. The slow permeability of the subsoil and the slope are limitations on sites for septic tank absorption fields and shallow excavations. The low strength, the slope, and the high shrink-swell potential limit the use of this soil for roadfill and local roads and streets. The slope and the high shrink-swell potential are limitations on sites for dwellings. The clayey subsoil limits the use of this soil for trench type sanitary landfills and daily cover for landfills. The slope and the depth to bedrock limit the use of this soil for trench and area landfills.

Capability subclass: IVe.

18B—Endcav silt loam, 2 to 7 percent slopes, rocky. This soil is deep, well drained, and gently sloping. It is on the summits and side slopes of hills and ridges in the Shenandoah Valley. Areas are commonly long and winding and range from about 5 to 70 acres. Outcrops of limestone bedrock about 100 to 300 feet apart cover up to 2 percent of the surface.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 8 inches, dark brown silt loam

Subsoil:
8 to 16 inches, yellowish brown silty clay
16 to 22 inches, strong brown clay
22 to 33 inches, dark brown clay
33 to 58 inches, yellowish brown clay

Included with this soil in mapping are Carbo and Chilhowie soils. These soils are in landscape positions similar to those of the Endcav soil. They are shallower over bedrock than the Endcav soil. Included soils make up about 20 percent of this unit.

Important soil properties—

Permeability: Slow
Available water capacity: Moderate
Surface runoff: Medium
Erosion potential: Medium
Organic matter content: Low
Natural fertility: High
Soil reaction: Strongly acid to neutral in the surface layer and upper part of the subsoil; moderately acid to moderately alkaline in the lower part of the subsoil
Depth to bedrock: 40 to 60 inches
Shrink-swell potential: High
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are used for pasture. A few areas are cultivated, and the rest is woodland.

This soil is well suited to cultivated crops. The rock outcrop, however, interferes with tillage. The surface layer is friable and can be easily tilled when moist but breaks into clods if tilled when too dry or too moist. Tilth can be maintained or improved by incorporating organic material into the plow layer and by cultivating when the moisture content of the soil is optimum for tillage. The potential for erosion is a management concern. Conservation tillage, cover crops, and a cropping system that includes grasses and legumes minimize crusting, increase the rate of water infiltration, and help to control runoff and erosion. Crops respond well to applications of lime and fertilizer.

This soil is well suited to pasture and hay. The rock outcrop, however, interferes with tillage and other equipment operations. Establishing and maintaining a

mixture of grasses and legumes, using proper stocking rates, rotating grazing among pastures, deferring grazing, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on this soil is moderately high. The estimated production for northern red oak is 290 board feet per acre. Seeds and seedlings survive and grow well if competing vegetation is controlled.

The slow permeability, low strength, the high shrink-swell potential, the rock outcrop, and the clayey subsoil limit the use of this soil for community development. The slow permeability and the high content of clay in the subsoil are limitations on sites for septic tank absorption fields and shallow excavations. The low strength and the high shrink-swell potential limit the use of this soil for roadfill and local roads and streets. The high shrink-swell potential also is a limitation on sites for dwellings. The clayey subsoil limits the use of this soil for trench type sanitary landfills and daily cover for landfills. The depth to bedrock limits the use of this soil for trench and area landfills and shallow excavations.

Capability subclass: IIe.

18C—Endcav silt loam, 7 to 15 percent slopes, rocky. This soil is deep, well drained, and strongly sloping. It is on the side slopes of hills and ridges in the Shenandoah Valley. Areas are commonly long and winding and range from about 5 to 70 acres. Outcrops of limestone bedrock about 100 to 300 feet apart cover up to 2 percent of the surface.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 8 inches, dark brown silt loam

Subsoil:
8 to 16 inches, yellowish brown silty clay
16 to 22 inches, strong brown clay
22 to 33 inches, dark brown clay
33 to 58 inches, yellowish brown clay

Included with this soil in mapping are Carbo and Chilhowie soils. These soils are in landscape positions similar to those of the Endcav soil. They are shallower over bedrock than the Endcav soil. Included soils make up about 20 percent of this unit.

Important soil properties—

Permeability: Slow
Available water capacity: Moderate
Surface runoff: Rapid
Erosion potential: High
Organic matter content: Low
Natural fertility: High
Soil reaction: Strongly acid to neutral in the surface layer and upper part of the subsoil; moderately acid to moderately alkaline in the lower part of the subsoil
Depth to bedrock: 40 to 60 inches
Shrink-swell potential: High
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are used for pasture. A few areas are cultivated, and the rest is woodland.

This soil is moderately well suited to cultivated crops. The rock outcrop, however, interferes with tillage. The surface layer is friable and can be easily tilled when moist but breaks into clods if tilled when too dry or too moist. Tilth can be maintained or improved by incorporating organic material into the plow layer and by cultivating when the moisture content of the soil is optimum for tillage. The potential for erosion is a management concern. Conservation tillage, cover crops, and a cropping system that includes grasses and legumes minimize crusting, increase water infiltration, and help to control runoff and erosion. Crops respond well to applications of lime and fertilizer.

This soil is moderately well suited to pasture and hay. The rock outcrop, however, interferes with tillage and other equipment operations. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotating grazing among pastures, deferring grazing, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on this soil is moderately high. The estimated production for northern red oak is 290 board feet per acre. Seeds and seedlings survive and grow well if competing vegetation is controlled.

The slow permeability, low strength, the high shrink-swell potential, the rock outcrop, and the clayey subsoil limit the use of this soil for community development. The slow permeability and the high content of clay in the subsoil are limitations on sites for septic tank absorption fields and shallow excavations. The low strength and the high shrink-swell potential limit the use of this soil for roadfill and local roads and streets. The high shrink-swell potential also is a limitation on sites for dwellings. The clayey subsoil limits the use of this soil for trench type sanitary landfills and daily cover for landfills. The depth to bedrock limits the use of this soil for trench and area landfills and shallow excavations.

Capability subclass: IIIe.

19D—Frederick gravelly silt loam, 15 to 35 percent slopes. This soil is very deep, moderately steep and steep, and well drained. It is on the side slopes of hills and ridges in the Shenandoah Mountains. Areas are generally long and winding and range from about 10 to 50 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 4 inches, dark brown gravelly silt loam

Subsoil:
4 to 7 inches, yellow silt loam
7 to 16 inches, yellowish red, mottled silty clay loam
16 to 36 inches, red, mottled clay
36 to 47 inches, yellowish red, mottled clay
47 to 65 inches, mottled clay

Included with this soil in mapping are the well drained Gilpin, Laidig, and Wallen soils. These soils are mostly along the boundaries of the mapped areas. The Gilpin and Wallen soils are shallower over bedrock than the Frederick soil. The Laidig soils have less clay in the subsoil than the Frederick soil. Included soils make up about 15 percent of this unit.

Important soil properties—

Permeability: Moderate
Available water capacity: Moderate
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low
Natural fertility: Low
Soil reaction: Very strongly acid to moderately acid
Depth to bedrock: More than 60 inches
Shrink-swell potential: High
Depth to a seasonal high water table: More than 72 inches
Flooding: None

All areas of this soil are wooded. The potential productivity for trees on this soil is moderately high on the north aspects and moderate on the south aspects. The estimated production for northern red oak is 280 board feet per acre on north aspects and 270 board feet per acre on south aspects. The slope and the high content of clay in the soil limit some forestry management practices and logging activities. Logging roads should be constructed on the contour to minimize the erosion hazard. Equipment use is restricted in the steeper areas during wet periods. This soil is managed mostly for yellow poplar and a variety of oaks. Thinning tree stands, clearcutting, and removing insect- or disease-infested trees increase potential timber production.

The slope limits the use of this soil for recreational development, especially for use as playgrounds and picnic and camp areas. It is a moderate limitation affecting the development of paths and trails.

Capability subclass: VIe.

20B—Frederick and Poplimento silt loams, 2 to 7 percent slopes. These are very deep, gently sloping, well drained soils on the summits and shoulders of knolls, hills, and ridges in the Shenandoah Valley. Areas are generally long and winding and range from about 3 to 150 acres. Some consist mostly of Frederick soil, some mostly of Poplimento soil, and some of both. This unit is about 45 percent Frederick soil, 30 percent Poplimento soil, and 25 percent other soils. The Frederick and Poplimento soils were mapped together because they have no major differences affecting use and management.

A typical profile of the Frederick soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 4 inches, dark brown silt loam

Subsoil:
4 to 7 inches, yellow silt loam
7 to 16 inches, yellowish red, mottled silty clay loam
16 to 36 inches, red, mottled clay
36 to 47 inches, yellowish red, mottled clay
47 to 65 inches, mottled clay

A typical profile of the Poplimento soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 8 inches, dark brown silt loam

Subsoil:
8 to 12 inches, yellowish brown silt loam
12 to 23 inches, strong brown silty clay
23 to 44 inches, strong brown, mottled clay
44 to 54 inches, yellowish brown, mottled clay
54 to 62 inches, reddish yellow silty clay loam

Included with these soils in mapping are Endcav and Timberville soils. The Endcav soils are in the slightly lower, nearly level areas. The Timberville soils are at the head of drainageways, along narrow drainageways, and in depressions. Also included are soils that are severely eroded and have a surface layer of silty clay loam.

Important properties of the Frederick soil—

Permeability: Moderate
Available water capacity: Moderate
Surface runoff: Medium
Erosion potential: Medium

Organic matter content: Low
Natural fertility: Low
Soil reaction: Very strongly acid to moderately acid
Depth to bedrock: More than 60 inches
Shrink-swell potential: High
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Important properties of the Poplimento soil—

Permeability: Moderately slow
Available water capacity: Moderate
Surface runoff: Medium
Erosion potential: Medium
Organic matter content: Low
Natural fertility: Medium
Soil reaction: Very strongly acid to slightly acid
Depth to bedrock: More than 60 inches
Shrink-swell potential: High
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of these soils are farmed. A small acreage is used for orchards or woodland.

These soils are well suited to cultivated crops. They are well suited to fruit crops if air drainage is adequate (fig. 3). The potential for erosion is a major management concern. Conservation tillage and crop rotations that include grasses and legumes help to control runoff and erosion and conserve moisture. Tilth is good and can be maintained by cultivating only at the proper moisture content. Crops respond well to applications of lime and fertilizer.

These soils are well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, rotating grazing among pastures, deferring grazing, controlling weeds, using proper stocking rates, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on these soils is moderately high. The estimated production for northern red oak is 288 board feet per acre. The high content of clay limits the use of logging equipment during wet periods. Controlling plant competition reduces the seedling mortality rate.

The restricted permeability, low strength, the high content of clay, and the high shrink-swell potential are limitations affecting building site development and sanitary facilities.

Capability subclass: IIe.

20C—Frederick and Poplimento silt loams, 7 to 15 percent slopes. These are very deep, strongly sloping, well drained soils on the side slopes of knolls, hills, and ridges in the Shenandoah Valley. Areas are generally long and winding and range from about 3 to 150 acres. Some consist mostly of Frederick soil, some mostly of Poplimento soil, and some of both. This unit is about 45 percent Frederick soil, 30 percent Poplimento soil, and 25 percent other soils. The Frederick and Poplimento soils were mapped together because they have no major differences affecting use and management.

A typical profile of the Frederick soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 4 inches, dark brown silt loam

Subsoil:
4 to 7 inches, yellow silt loam
7 to 16 inches, yellowish red, mottled silty clay loam
16 to 36 inches, red, mottled clay
36 to 47 inches, yellowish red, mottled clay
47 to 65 inches, mottled clay

A typical profile of the Poplimento soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 8 inches, dark brown silt loam

Subsoil:
8 to 12 inches, yellowish brown silt loam
12 to 23 inches, strong brown silty clay
23 to 44 inches, strong brown, mottled clay
44 to 54 inches, yellowish brown, mottled clay
54 to 62 inches, reddish yellow silty clay loam

Included with these soils in mapping are Endcav and Timberville soils. The Endcav soils are in the slightly lower, gently sloping areas. The Timberville soils are at the head of drainageways, along narrow drainageways, and in depressions. Also included are soils that are severely eroded and have a surface layer of silty clay loam.

Important properties of the Frederick soil—

Permeability: Moderate
Available water capacity: Moderate
Surface runoff: Rapid
Erosion potential: High
Organic matter content: Low
Natural fertility: Low
Soil reaction: Very strongly acid to moderately acid
Depth to bedrock: More than 60 inches
Shrink-swell potential: High
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Figure 3.—A vineyard in an area of Frederick and Poplimento silt loams, 2 to 7 percent slopes.

Important properties of the Poplimento soil—

Permeability: Moderately slow
Available water capacity: Moderate
Surface runoff: Rapid
Erosion potential: High
Organic matter content: Low
Natural fertility: Medium
Soil reaction: Very strongly acid to slightly acid
Depth to bedrock: More than 60 inches
Shrink-swell potential: High
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of these soils are farmed. A small acreage is used for orchards or woodland.

These soils are moderately well suited to cultivated crops. They are well suited to fruit crops if air drainage is adequate. The potential for erosion is a major management concern. Conservation tillage and crop rotations that include grasses and legumes help to

control runoff and erosion and conserve moisture. Tilth is good and can be maintained by cultivating only at the proper moisture content. Crops respond well to applications of lime and fertilizer.

These soils are well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, rotating grazing among pastures, deferring grazing, controlling weeds, using proper stocking rates, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on these soils is moderately high. The estimated production for northern red oak is 288 board feet per acre. The high content of clay limits the use of logging equipment during wet periods. Controlling plant competition reduces the seedling mortality rate.

The restricted permeability, low strength, the high content of clay, the high shrink-swell potential, and the slope are limitations affecting building site development, sanitary facilities, and most recreational uses.

Capability subclass: IIIe.

20D—Frederick and Poplimento silt loams, 15 to 25 percent slopes. These are very deep, moderately steep, well drained soils on the side slopes of hills and ridges in the Shenandoah Valley. Areas are generally long and winding and range from about 3 to 50 acres. Some consist mostly of Frederick soil, some mostly of Poplimento soil, and some of both. The total acreage of the unit is about 45 percent Frederick soil, 30 percent Poplimento soil, and 25 percent other soils. The Frederick and Poplimento soils were mapped together because they have no major differences affecting use and management.

A typical profile of the Frederick soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 4 inches, dark brown silt loam

Subsoil:
4 to 7 inches, yellow silt loam
7 to 16 inches, yellowish red, mottled silty clay loam
16 to 36 inches, red, mottled clay
36 to 47 inches, yellowish red, mottled clay
47 to 65 inches, mottled clay

A typical profile of the Poplimento soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 8 inches, dark brown silt loam

Subsoil:
8 to 12 inches, yellowish brown silt loam
12 to 23 inches, strong brown silty clay
23 to 44 inches, strong brown, mottled clay
44 to 54 inches, yellowish brown, mottled clay
54 to 62 inches, reddish yellow silty clay loam

Included with these soils in mapping are Endcav and Timberville soils. The Endcav soils are in the slightly lower areas. The Timberville soils are at the head of drainageways and along narrow drainageways. Also included are soils that are severely eroded and have a surface layer of silty clay loam.

Important properties of the Frederick soil—

Permeability: Moderate
Available water capacity: Moderate
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low
Natural fertility: Low
Soil reaction: Very strongly acid to moderately acid
Depth to bedrock: More than 60 inches
Shrink-swell potential: High
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Important properties of the Poplimento soil—

Permeability: Moderately slow
Available water capacity: Moderate
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low
Natural fertility: Medium
Soil reaction: Very strongly acid to slightly acid
Depth to bedrock: More than 60 inches
Shrink-swell potential: High
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of these soils are used for pasture and hay. A small acreage is used for cultivated crops, orchards, or woodland.

Because of the slope, these soils are poorly suited to cultivated crops. They are well suited to fruit crops if air drainage is adequate. The potential for erosion is a major management concern. If cultivated crops are grown, conservation tillage and crop rotations that include grasses and legumes are needed to help control runoff and erosion and conserve moisture. Tilth is good and can be maintained by cultivating only at the proper moisture content. Crops respond well to applications of lime and fertilizer.

These soils are moderately well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, rotating grazing among pastures,

deferring grazing, controlling weeds, using proper stocking rates, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on these soils is moderately high. The estimated production for northern red oak is 288 board feet per acre on north aspects and 278 board feet per acre on south aspects. The high content of clay limits the use of logging equipment, especially during wet periods. Controlling plant competition reduces the seedling mortality rate.

The restricted permeability, low strength, the high content of clay, the high shrink-swell potential, and the slope are limitations affecting building site development, sanitary facilities, and most recreational uses.

Capability subclass: IVe.

21B—Frederick and Poplimento gravelly silt loams, 2 to 7 percent slopes. These are very deep, gently sloping, well drained soils on the broad summits and shoulders of hills and ridges in the Shenandoah Valley. Areas are generally long and winding and range from about 3 to 150 acres. Some consist mostly of Frederick soil, some mostly of Poplimento soil, and some of both. The total acreage of the unit is about 45 percent Frederick soil, 30 percent Poplimento soil, and 25 percent other soils. The Frederick and Poplimento soils were mapped together because they have no major differences affecting use and management.

A typical profile of the Frederick soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 4 inches, dark brown gravelly silt loam

Subsoil:
4 to 7 inches, yellow silt loam
7 to 16 inches, yellowish red, mottled silty clay loam
16 to 36 inches, red, mottled clay
36 to 47 inches, yellowish red, mottled clay
47 to 65 inches, mottled clay

A typical profile of the Poplimento soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 8 inches, dark brown gravelly silt loam

Subsoil:
8 to 12 inches, yellowish brown silt loam
12 to 23 inches, strong brown silty clay
23 to 44 inches, strong brown, mottled clay
44 to 54 inches, yellowish brown, mottled clay
54 to 62 inches, reddish yellow silty clay loam

Included with these soils in mapping are Endcav and Timberville soils. The Endcav soils are in the slightly lower, nearly level areas. The Timberville soils are at the head of drainageways, along narrow drainageways, and in depressions. Also included are soils that are severely eroded and have a surface layer of silty clay loam.

Important properties of the Frederick soil—

Permeability: Moderate
Available water capacity: Moderate
Surface runoff: Medium
Erosion potential: Medium
Organic matter content: Low
Natural fertility: Low
Soil reaction: Very strongly acid to moderately acid
Depth to bedrock: More than 60 inches
Shrink-swell potential: High
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Important properties of the Poplimento soil—

Permeability: Moderately slow
Available water capacity: Moderate
Surface runoff: Medium
Erosion potential: Medium
Organic matter content: Low
Natural fertility: Medium
Soil reaction: Very strongly acid to slightly acid
Depth to bedrock: More than 60 inches
Shrink-swell potential: High
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of these soils are farmed. A small acreage is used for orchards or woodland.

These soils are well suited to cultivated crops. Tilth is good, but in some areas the large number of gravel-sized rock fragments in the surface layer interferes with planting and tillage. The potential for erosion is a management concern. Conservation tillage and crop rotations that include grasses and legumes help to control runoff and erosion and conserve moisture. Returning crop residue to the soil and cultivating only at the proper moisture content help to maintain or improve tilth. Crops respond well to applications of lime and fertilizer.

These soils are well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, rotating grazing among pastures, deferring grazing, controlling weeds, using proper stocking rates, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on these soils is moderately high. The estimated production for northern

red oak is 288 board feet per acre. The high content of clay limits the use of logging equipment during wet periods. Controlling plant competition reduces the seedling mortality rate.

The restricted permeability, low strength, the high content of clay, and the high shrink-swell potential of these soils are limitations affecting building site development and sanitary facilities. The gravel-sized rock fragments in the surface layer limit the use of these soils for lawns and recreational development.

Capability subclass: IIe.

21C—Frederick and Poplimento gravelly silt loams, 7 to 15 percent slopes. These are very deep, strongly sloping, well drained soils on the side slopes of knolls, hills, and ridges in the Shenandoah Valley. Areas are generally long and winding and range from about 3 to 150 acres. Some consist mostly of Frederick soil, some mostly of Poplimento soil, and some of both. The total acreage of the unit is about 45 percent Frederick soil, 30 percent Poplimento soil, and 25 percent other soils. The Frederick and Poplimento soils were mapped together because they have no major differences affecting use and management.

A typical profile of the Frederick soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 4 inches, dark brown gravelly silt loam

Subsoil:
4 to 7 inches, yellow silt loam
7 to 16 inches, yellowish red, mottled silty clay loam
16 to 36 inches, red, mottled clay
36 to 47 inches, yellowish red, mottled clay
47 to 65 inches, mottled clay

A typical profile of the Poplimento soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 8 inches, dark brown gravelly silt loam

Subsoil:
8 to 12 inches, yellowish brown silt loam
12 to 23 inches, strong brown silty clay
23 to 44 inches, strong brown, mottled clay
44 to 54 inches, yellowish brown, mottled clay
54 to 62 inches, reddish yellow silty clay loam

Included with these soils in mapping are Endcav and Timberville soils. The Endcav soils are in the slightly lower, gently sloping areas. The Timberville soils are at the head of drainageways, along narrow drainageways, and in depressions. Also included are soils that are severely eroded and have a surface layer of silty clay loam.

Important properties of the Frederick soil—

Permeability: Moderate
Available water capacity: Moderate
Surface runoff: Rapid
Erosion potential: High
Organic matter content: Low
Natural fertility: Low
Soil reaction: Very strongly acid to moderately acid
Depth to bedrock: More than 60 inches
Shrink-swell potential: High
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Important properties of the Poplimento soil—

Permeability: Moderately slow
Available water capacity: Moderate
Surface runoff: Rapid
Erosion potential: High
Organic matter content: Low
Natural fertility: Medium
Soil reaction: Very strongly acid to slightly acid
Depth to bedrock: More than 60 inches
Shrink-swell potential: High
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of these soils are farmed. A small acreage is used for orchards or woodland.

These soils are moderately well suited to cultivated crops. They are well suited to fruit crops if air drainage is adequate. Tilth is good, but in some areas the large number of gravel-sized rock fragments in the surface layer interferes with planting and tillage. The potential for erosion is a major management concern. Conservation tillage and crop rotations that include grasses and legumes reduce the runoff rate, help to control erosion, and conserve moisture. Returning crop residue to the soil and cultivating only at the proper moisture content help to maintain or improve tilth. Crops respond well to applications of lime and fertilizer.

These soils are well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, rotating grazing among pastures, deferring grazing, controlling weeds, using proper stocking rates, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on these soils is moderately high. The estimated production for northern red oak is 288 board feet per acre. The high content of clay limits the use of logging equipment during wet periods. Controlling plant competition reduces the seedling mortality rate.

The restricted permeability, low strength, the high content of clay, the high shrink-swell potential, and the slope of these soils are limitations affecting building site development and sanitary facilities. The gravel-sized rock fragments in the surface layer and the slope limit the use of these soils for lawns and recreational development.

Capability subclass: IIIe.

21D—Frederick and Poplimento gravelly silt loams, 15 to 25 percent slopes. These are very deep, moderately steep, well drained soils on the side slopes of hills and ridges in the Shenandoah Valley. Areas are generally long and winding and range from about 3 to 150 acres. Some consist mostly of Frederick soil, some mostly of Poplimento soil, and some of both. The total acreage of the unit is about 45 percent Frederick soil, 30 percent Poplimento soil, and 25 percent other soils. The Frederick and Poplimento soils were mapped together because they have no major differences affecting use and management.

A typical profile of the Frederick soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 4 inches, dark brown gravelly silt loam

Subsoil:
4 to 7 inches, yellow silt loam
7 to 16 inches, yellowish red, mottled silty clay loam
16 to 36 inches, red, mottled clay
36 to 47 inches, yellowish red, mottled clay
47 to 65 inches, mottled clay

A typical profile of the Poplimento soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 8 inches, dark brown gravelly silt loam

Subsoil:
8 to 12 inches, yellowish brown silt loam
12 to 23 inches, strong brown silty clay
23 to 44 inches, strong brown, mottled clay
44 to 54 inches, yellowish brown, mottled clay
54 to 62 inches, reddish yellow silty clay loam

Included with these soils in mapping are Endcav and Timberville soils. The Endcav soils are in the slightly lower areas adjacent to the Frederick and Poplimento soils. The Timberville soils are at the head of drainageways and along narrow drainageways. Also included are soils that are severely eroded and have a surface layer of silty clay loam.

Important properties of the Frederick soil—

Permeability: Moderate
Available water capacity: Moderate
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low
Natural fertility: Low
Soil reaction: Very strongly acid to moderately acid
Depth to bedrock: More than 60 inches
Shrink-swell potential: High
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Important properties of the Poplimento soil—

Permeability: Moderately slow
Available water capacity: Moderate
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low
Natural fertility: Medium
Soil reaction: Very strongly acid to slightly acid
Depth to bedrock: More than 60 inches
Shrink-swell potential: High
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of these soils are used for pasture and hay. A small acreage is used for cultivated crops, orchards, or woodland.

Because of the slope, these soils are poorly suited to cultivated crops. The potential for erosion is the major management concern. The large number of gravel-sized rock fragments in the surface layer interferes with planting and tillage. If cultivated crops are grown, conservation tillage and crop rotations that include grasses and legumes are needed to help control runoff and erosion and conserve moisture. Returning crop residue to the soil and cultivating only at the proper moisture content help to maintain or improve tilth. Crops respond well to applications of lime and fertilizer.

These soils are moderately well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, rotating grazing among pastures, deferring grazing, controlling weeds, using proper stocking rates, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on these soils is moderately high. The estimated production for northern red oak is 288 board feet per acre on north aspects and 278 board feet per acre on south aspects. The high content of clay limits the use of logging equipment during wet periods. Controlling plant competition reduces the seedling mortality rate.

The restricted permeability, low strength, the high

content of clay, the gravel content, the high shrink-swell potential, and the slope are limitations affecting building site development, sanitary facilities, and most recreational uses.

Capability subclass: IVe.

21E—Frederick and Poplimento gravelly silt loams, 25 to 35 percent slopes. These are very deep, steep, well drained soils on the side slopes of ridges in the Shenandoah Valley. Areas are generally long and winding and range from about 3 to 200 acres. Some consist mostly of Frederick soil, some mostly of Poplimento soil, and some of both. The total acreage of the unit is about 45 percent Frederick soil, 30 percent Poplimento soil, and 25 percent other soils. The Frederick and Poplimento soils were mapped together because they have no major differences affecting use and management.

A typical profile of the Frederick soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 4 inches, dark brown gravelly silt loam

Subsoil:
4 to 7 inches, yellow silt loam
7 to 16 inches, yellowish red, mottled silty clay loam
16 to 36 inches, red, mottled clay
36 to 47 inches, yellowish red, mottled clay
47 to 65 inches, mottled clay

A typical profile of the Poplimento soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 8 inches, dark brown gravelly silt loam

Subsoil:
8 to 12 inches, yellowish brown silt loam
12 to 23 inches, strong brown silty clay
23 to 44 inches, strong brown, mottled clay
44 to 54 inches, yellowish brown, mottled clay
54 to 62 inches, reddish yellow silty clay loam

Included with these soils in mapping are Endcav and Timberville soils. The Endcav soils are in the slightly lower areas adjacent to the Frederick and Poplimento soils. The Timberville soils are at the head of drainageways and along narrow drainageways. Also included are soils that are severely eroded and have a surface layer of silty clay loam.

Important properties of the Frederick soil—

Permeability: Moderate
Available water capacity: Moderate
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low
Natural fertility: Low
Soil reaction: Very strongly acid to moderately acid
Depth to bedrock: More than 60 inches
Shrink-swell potential: High
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Important properties of the Poplimento soil—

Permeability: Moderately slow
Available water capacity: Moderate
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low
Natural fertility: Medium
Soil reaction: Very strongly acid to slightly acid
Depth to bedrock: More than 60 inches
Shrink-swell potential: High
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are used for pasture or woodland. A small acreage is used for cultivated crops or orchards.

Because of the slope, these soils are unsuited to cultivated crops. The potential for erosion is the major management concern. If cultivated crops are grown, conservation tillage and crop rotations that include grasses and legumes are needed to help control runoff and erosion and conserve moisture. Returning crop residue to the soil and cultivating only at the proper moisture content help to maintain or improve tilth. Crops respond well to applications of lime and fertilizer.

These soils are moderately well suited to pasture. Establishing and maintaining a mixture of grasses and legumes, rotating grazing among pastures, deferring grazing, controlling weeds, using proper stocking rates, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on these soils is moderately high. The estimated production for northern red oak is 288 board feet per acre on north aspects and 278 board feet per acre on south aspects. The high content of clay limits the use of logging equipment during wet periods. Controlling plant competition reduces the seedling mortality rate.

The restricted permeability, low strength, the high content of clay, the gravel content, the high shrink-swell potential, and the slope are the major limitations affecting building site development, sanitary facilities, and most recreational uses.

Capability subclass: VIe.

22B—Frederick and Poplimento silt loams, 2 to 7 percent slopes, rocky. These are very deep, gently sloping, well drained soils on the broad summits and shoulders of hills and ridges in the Shenandoah Valley. Areas are long and winding and range from about 3 to 50 acres. Outcrops of limestone about 100 to 300 feet apart cover up to 2 percent of the surface. Some areas consist mostly of Frederick soil, some mostly of Poplimento soil, and some of both. The total acreage of the unit is about 45 percent Frederick soil, 30 percent Poplimento soil, and 25 percent other soils and rock outcrop. The Frederick and Poplimento soils were mapped together because they have no major differences affecting use and management.

A typical profile of the Frederick soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 4 inches, dark brown silt loam

Subsoil:
4 to 7 inches, yellow silt loam
7 to 16 inches, yellowish red, mottled silty clay loam
16 to 36 inches, red, mottled clay
36 to 47 inches, yellowish red, mottled clay
47 to 65 inches, mottled clay

A typical profile of the Poplimento soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 8 inches, dark brown silt loam

Subsoil:
8 to 12 inches, yellowish brown silt loam
12 to 23 inches, strong brown silty clay
23 to 44 inches, strong brown, mottled clay
44 to 54 inches, yellowish brown, mottled clay
54 to 62 inches, reddish yellow silty clay loam

Included with these soils in mapping are Endcav and Timberville soils. The Endcav soils are in the slightly lower, nearly level areas. The Timberville soils are at the head of drainageways, along narrow drainageways, and in depressions. Also included are soils that are severely eroded and have a surface layer of silty clay loam.

Important properties of the Frederick soil—

Permeability: Moderate
Available water capacity: Moderate
Surface runoff: Medium
Erosion potential: Medium
Organic matter content: Low
Natural fertility: Low
Soil reaction: Very strongly acid to moderately acid
Depth to bedrock: More than 60 inches
Shrink-swell potential: High
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Important properties of the Poplimento soil—

Permeability: Moderately slow
Available water capacity: Moderate
Surface runoff: Medium
Erosion potential: Medium
Organic matter content: Low
Natural fertility: Medium
Soil reaction: Very strongly acid to slightly acid
Depth to bedrock: More than 60 inches
Shrink-swell potential: High
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of these soils are farmed. A small acreage is used as woodland and a small acreage for orchards.

These soils are moderately well suited to cultivated crops. The surface layer is friable and can be easily tilled. The rock outcrop, however, interferes with seedbed preparation, cultivation, and harvesting activities. The potential for erosion is a management concern. Conservation tillage and crop rotations that include grasses and legumes help to control runoff and erosion and conserve moisture. Tilth can be improved or maintained by cultivating only at the proper moisture content. Crops respond well to applications of lime and fertilizer.

These soils are well suited to pasture and hay. The rock outcrop, however, interferes with mowing. Establishing and maintaining a mixture of grasses and legumes, rotating grazing among pastures, deferring grazing, controlling weeds, using proper stocking rates, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on these soils is moderately high. The estimated production for northern red oak is 288 board feet per acre. The high content of clay limits the use of logging equipment during wet periods. Controlling plant competition reduces the seedling mortality rate.

The rock outcrop, the restricted permeability, low strength, the high content of clay, and the high shrink-swell potential are limitations affecting building site development and sanitary facilities.

Capability subclass: IIe.

22C—Frederick and Poplimento silt loams, 7 to 15 percent slopes, rocky. These are very deep, strongly

sloping, well drained soils on the side slopes of knolls, hills, and ridges in the Shenandoah Valley. Areas are long and winding and range from about 3 to 50 acres. Outcrops of limestone about 100 to 300 feet apart cover up to 2 percent of the surface. Some areas consist mostly of Frederick soil, some mostly of Poplimento soil, and some of both. The total acreage of the unit is about 45 percent Frederick soil, 30 percent Poplimento soil, and 25 percent other soils and rock outcrop. The Frederick and Poplimento soils were mapped together because they have no major differences affecting use and management.

A typical profile of the Frederick soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 4 inches, dark brown silt loam

Subsoil:
4 to 7 inches, yellow silt loam
7 to 16 inches, yellowish red, mottled silty clay loam
16 to 36 inches, red, mottled clay
36 to 47 inches, yellowish red, mottled clay
47 to 65 inches, mottled clay

A typical profile of the Poplimento soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 8 inches, dark brown silt loam

Subsoil:
8 to 12 inches, yellowish brown silt loam
12 to 23 inches, strong brown silty clay
23 to 44 inches, strong brown, mottled clay
44 to 54 inches, yellowish brown, mottled clay
54 to 62 inches, reddish yellow silty clay loam

Included with these soils in mapping are Endcav and Timberville soils. The Endcav soils are in the slightly lower, gently sloping areas. The Timberville soils are at the head of drainageways, along narrow drainageways, and in depressions. Also included are soils that are severely eroded and have a surface layer of silty clay loam.

Important properties of the Frederick soil—

Permeability: Moderate
Available water capacity: Moderate
Surface runoff: Rapid
Erosion potential: High
Organic matter content: Low
Natural fertility: Low
Soil reaction: Very strongly acid to moderately acid
Depth to bedrock: More than 60 inches
Shrink-swell potential: High
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Important properties of the Poplimento soil—

Permeability: Moderately slow
Available water capacity: Moderate
Surface runoff: Rapid
Erosion potential: High
Organic matter content: Low
Natural fertility: Medium
Soil reaction: Very strongly acid to slightly acid
Depth to bedrock: More than 60 inches
Shrink-swell potential: High
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of these soils are used for cultivated crops, pasture, or hay. A small acreage is used as woodland and a small acreage for orchards.

These soils are moderately well suited to cultivated crops. The surface layer is friable and can be easily tilled. The rock outcrop, however, interferes with seedbed preparation, cultivation, and harvesting activities. The potential for erosion is a management concern. Conservation tillage and crop rotations that include grasses and legumes help to control runoff and erosion and conserve moisture. Tilth can be improved or maintained by cultivating only at the proper moisture content. Crops respond well to applications of lime and fertilizer.

These soils are well suited to pasture and hay. The rock outcrop, however, interferes with mowing. Establishing and maintaining a mixture of grasses and legumes, rotating grazing among pastures, deferring grazing, controlling weeds, using proper stocking rates, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on these soils is moderately high. The estimated production for northern red oak is 288 board feet per acre. The high content of clay limits the use of logging equipment during wet periods. Controlling plant competition reduces the seedling mortality rate.

The restricted permeability, low strength, the high content of clay, the high shrink-swell potential, the slope, and the rock outcrop limit the use of these soils for building site development, sanitary facilities, and recreational development.

Capability subclass: IIIe.

22D—Frederick and Poplimento silt loams, 15 to 25 percent slopes, rocky. These are very deep, moderately steep, well drained soils on the side slopes

of hills and ridges in the Shenandoah Valley. Areas are long and winding and range from about 3 to 35 acres. Outcrops of limestone about 100 to 300 feet apart cover up to 2 percent of the surface. Some areas consist mostly of Frederick soil, some mostly of Poplimento soil, and some of both. The total acreage of the unit is about 45 percent Frederick soil, 30 percent Poplimento soil, and 25 percent other soils and rock outcrop. The Frederick and Poplimento soils were mapped together because they have no major differences affecting use and management.

A typical profile of the Frederick soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 4 inches, dark brown silt loam

Subsoil:
4 to 7 inches, yellow silt loam
7 to 16 inches, yellowish red, mottled silty clay loam
16 to 36 inches, red, mottled clay
36 to 47 inches, yellowish red, mottled clay
47 to 65 inches, mottled clay

A typical profile of the Poplimento soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 8 inches, dark brown silt loam

Subsoil:
8 to 12 inches, yellowish brown silt loam
12 to 23 inches, strong brown silty clay
23 to 44 inches, strong brown, mottled clay
44 to 54 inches, yellowish brown, mottled clay
54 to 62 inches, reddish yellow silty clay loam

Included with these soils in mapping are Endcav and Timberville soils. The Endcav soils are in the slightly lower areas adjacent to the Frederick and Poplimento soils. The Timberville soils are at the head of drainageways and along narrow drainageways. Also included are soils that are severely eroded and have a surface layer of silty clay loam.

Important properties of the Frederick soil—

Permeability: Moderate
Available water capacity: Moderate
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low
Natural fertility: Low
Soil reaction: Very strongly acid to moderately acid
Depth to bedrock: More than 60 inches
Shrink-swell potential: High
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Important properties of the Poplimento soil—

Permeability: Moderately slow
Available water capacity: Moderate
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low
Natural fertility: Medium
Soil reaction: Very strongly acid to slightly acid
Depth to bedrock: More than 60 inches
Shrink-swell potential: High
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of these soils are used for pasture and hay. A small acreage is used for cultivated crops, woodland, or orchards.

Because of the slope and the rock outcrop, these soils are poorly suited to cultivated crops. The potential for erosion is the major management concern. If cultivated crops are grown, conservation tillage and crop rotations that include grasses and legumes are needed to help control runoff and erosion and conserve moisture. Tilth can be improved or maintained by cultivating only at the proper moisture content. Crops respond well to applications of lime and fertilizer.

These soils are moderately well suited to pasture and hay. The rock outcrop, however, interferes with mowing. Establishing and maintaining a mixture of grasses and legumes, rotating grazing among pastures, deferring grazing, controlling weeds, using proper stocking rates, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on these soils is moderately high. The estimated production for northern red oak is 288 board feet per acre on north aspects and 278 board feet per acre on south aspects. The high content of clay limits the use of logging equipment during wet periods. Controlling plant competition reduces the seedling mortality rate.

The slope, the restricted permeability, low strength, the high content of clay, the high shrink-swell potential, and the rock outcrop are limitations affecting building site development, sanitary facilities, and most recreational uses.

Capability subclass: IVe.

23C—Frederick and Poplimento silt loams, 2 to 15 percent slopes, very rocky. These are very deep, gently sloping to strongly sloping, well drained soils on

the side slopes of knolls, hills, and ridges in the Shenandoah Valley. Areas are long and winding and range from about 3 to 70 acres. Outcrops of limestone about 30 to 100 feet apart cover 2 to 10 percent of the surface. Some areas consist mostly of Frederick soil, some mostly of Poplimento soil, and some of both. The total acreage of the unit is about 45 percent Frederick soil, 30 percent Poplimento soil, and 25 percent other soils and rock outcrop. The Frederick and Poplimento soils were mapped together because they have no major differences affecting use and management.

A typical profile of the Frederick soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 4 inches, dark brown silt loam

Subsoil:
4 to 7 inches, yellow silt loam
7 to 16 inches, yellowish red, mottled silty clay loam
16 to 36 inches, red, mottled clay
36 to 47 inches, yellowish red, mottled clay
47 to 65 inches, mottled clay

A typical profile of the Poplimento soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 8 inches, dark brown silt loam

Subsoil:
8 to 12 inches, yellowish brown silt loam
12 to 23 inches, strong brown silty clay
23 to 44 inches, strong brown, mottled clay
44 to 54 inches, yellowish brown, mottled clay
54 to 62 inches, reddish yellow silty clay loam

Included with these soils in mapping are Endcav and Timberville soils. The Endcav soils are in the slightly lower, nearly level areas. The Timberville soils are at the head of drainageways, along narrow drainageways, and in depressions. Also included are soils that are severely eroded and have a surface layer of silty clay loam and areas where the rock outcrops are more closely spaced.

Important properties of the Frederick soil—

Permeability: Moderate
Available water capacity: Moderate
Surface runoff: Medium or rapid
Erosion potential: Medium
Organic matter content: Low
Natural fertility: Low
Soil reaction: Very strongly acid to moderately acid
Depth to bedrock: More than 60 inches
Shrink-swell potential: High
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Important properties of the Poplimento soil—

Permeability: Moderately slow
Available water capacity: Moderate
Surface runoff: Medium or rapid
Erosion potential: Medium
Organic matter content: Low
Natural fertility: Medium
Soil reaction: Very strongly acid to slightly acid
Depth to bedrock: More than 60 inches
Shrink-swell potential: High
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of these soils are used for pasture. The rest are used as woodland.

These soils are poorly suited to cultivated crops. The potential for erosion and the rock outcrop, which interferes with seedbed preparation, cultivation, and harvesting activities, are major management concerns. Conservation tillage and crop rotations that include grasses and legumes help to control runoff and erosion and conserve moisture. Tilth can be improved or maintained by cultivating only at the proper moisture content. Crops respond well to applications of lime and fertilizer.

These soils are moderately well suited to pasture and hay. The rock outcrop, however, interferes with mowing. Establishing and maintaining a mixture of grasses and legumes, rotating grazing among pastures, deferring grazing, using proper stocking rates, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on these soils is moderately high. The estimated production for northern red oak is 288 board feet per acre. The high content of clay limits the use of logging equipment during wet periods. Controlling plant competition reduces the seedling mortality rate.

The restricted permeability, the slope, the rock outcrop, low strength, the high content of clay, and the high shrink-swell potential are limitations affecting building site development, sanitary facilities, and recreational development.

Capability subclass: VIs.

23D—Frederick and Poplimento silt loams, 15 to 35 percent slopes, very rocky. These are very deep, moderately steep or steep, well drained soils on the

side slopes of ridges in the Shenandoah Valley. Areas are long and winding and range from about 3 to 70 acres. Outcrops of limestone about 30 to 100 feet apart cover 2 to 10 percent of the surface. Some areas consist mostly of Frederick soil, some mostly of Poplimento soil, and some of both. The total acreage of the unit is about 45 percent Frederick soil, 30 percent Poplimento soil, and 25 percent other soils and rock outcrop. The Frederick and Poplimento soils were mapped together because they have no major differences affecting use and management.

A typical profile of the Frederick soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 4 inches, dark brown silt loam

Subsoil:
4 to 7 inches, yellow silt loam
7 to 16 inches, yellowish red, mottled silty clay loam
16 to 36 inches, red, mottled clay
36 to 47 inches, yellowish red, mottled clay
47 to 65 inches, mottled clay

A typical profile of the Poplimento soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 8 inches, dark brown silt loam

Subsoil:
8 to 12 inches, yellowish brown silt loam
12 to 23 inches, strong brown silty clay
23 to 44 inches, strong brown, mottled clay
44 to 54 inches, yellowish brown, mottled clay
54 to 62 inches, reddish yellow silty clay loam

Included with these soils in mapping are Endcav and Timberville soils. The Endcav soils are in the slightly lower, sloping areas adjacent to the Frederick and Poplimento soils. The Timberville soils are at the head of drainageways and along narrow drainageways. Also included are soils that are severely eroded and have a surface layer of silty clay loam and areas where the rock outcrops are more closely spaced.

Important properties of the Frederick soil—

Permeability: Moderate
Available water capacity: Moderate
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low
Natural fertility: Low
Soil reaction: Very strongly acid to moderately acid
Depth to bedrock: More than 60 inches
Shrink-swell potential: High
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Important properties of the Poplimento soil—

Permeability: Moderately slow
Available water capacity: Moderate
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low
Natural fertility: Medium
Soil reaction: Very strongly acid to moderately acid
Depth to bedrock: More than 60 inches
Shrink-swell potential: High
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of these soils are used for pasture. The rest are used as woodland.

These soils are not suited to cultivated crops. The potential for erosion and the rock outcrop, which interferes with seedbed preparation, cultivation, and harvesting activities, are major management concerns.

These soils are moderately well suited to pasture and hay. The rock outcrop, however, interferes with mowing. Establishing and maintaining a mixture of grasses and legumes, rotating grazing among pastures, deferring grazing, using proper stocking rates, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on these soils is moderately high. The estimated production for northern red oak is 288 board feet per acre on north aspects and 278 board feet per acre on south aspects. The slope and a high content of clay limit the use of logging equipment during wet periods. Controlling plant competition reduces the seedling mortality rate.

The slope and the rockiness are limitations affecting community development, sanitary facilities, and most recreational uses.

Capability subclass: VIs.

24B—Gainesboro-Berks complex, 2 to 7 percent slopes. These are moderately deep, gently sloping, well drained soils on the summits and shoulders of hills and ridges in the Shenandoah Valley. They occur as areas so intermingled that it was not practical to map them separately. This map unit consists of about 45 percent Gainesboro soil, 40 percent Berks soil, and 15 percent other soils. Areas commonly are long and winding. They range from about 3 to 25 acres.

A typical profile of the Gainesboro soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 7 inches, dark reddish brown channery silt loam

Subsoil:
7 to 15 inches, reddish brown channery silty clay loam
15 to 24 inches, reddish brown very channery silty clay loam

Substratum:
24 to 30 inches, reddish brown extremely channery silty clay loam
30 inches, hard, red shale and fine-grained sandstone bedrock

A typical profile of the Berks soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 7 inches, yellowish brown channery silt loam

Subsoil:
7 to 16 inches, yellowish brown very channery silt loam
16 to 33 inches, yellowish brown extremely channery silt loam

Substratum:
33 to 37 inches, yellowish brown extremely channery silt loam
37 inches, hard, acid shale bedrock

Included with these soils in mapping are Weikert soils. These included soils are in landscape positions similar to those of the Gainesboro and Berks soils. They are shallower over bedrock than the Gainesboro and Berks soils.

Important properties of the Gainesboro soil—

Permeability: Moderate or moderately rapid
Available water capacity: Low
Surface runoff: Medium
Erosion potential: Medium
Organic matter content: Low
Natural fertility: Low
Soil reaction: Extremely acid to slightly acid
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Important properties of the Berks soil—

Permeability: Moderate
Available water capacity: Very low
Surface runoff: Medium
Erosion potential: Medium
Organic matter content: Low
Natural fertility: Low or medium
Soil reaction: Very strongly acid or strongly acid
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of these soils are used for pasture or woodland. Other small areas are used for cultivated crops.

These soils are well suited to cultivated crops. The potential for erosion is a management concern. Crop growth and yields may be limited by the low or very low available water capacity. Conservation tillage and crop rotations that include grasses and legumes help to control runoff and erosion and conserve moisture. Tilth is fair. It can be improved by incorporating crop residue into the surface layer and by cultivating only at the proper moisture content. Crops respond well to applications of lime and fertilizer.

These soils are well suited to pasture and hay. Plant growth and yields may be limited by the low or very low available water capacity. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotating grazing among pastures, deferring grazing, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on these soils is moderately high. The estimated production for northern red oak is 280 board feet per acre. These soils are managed mostly for pine. The estimated production for Virginia pine is 120 cubic feet, or 664 board feet, per acre on the Gainesboro soil and 107 cubic feet, or 592 board feet, per acre on the Berks soil. The survival of seeds and seedlings is affected by the low or very low available water capacity.

The depth to bedrock is the major limitation affecting community development. It especially limits the use of these soils as sites for sanitary facilities, such as septic tank absorption fields and trench and area sanitary landfills. The small stones are a limitation affecting daily cover for landfills and most recreational uses.

Capability subclass: IIe.

24C—Gainesboro-Berks complex, 7 to 15 percent slopes. These are moderately deep, strongly sloping, well drained soils on the side slopes of hills and ridges in the Shenandoah Valley. They occur as areas so intermingled that it was not practical to map them

separately. This map unit consists of about 45 percent Gainesboro soil, 40 percent Berks soil, and 15 percent other soils. Areas commonly are long and winding. They range from about 3 to 50 acres.

A typical profile of the Gainesboro soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 7 inches, dark reddish brown channery silt loam

Subsoil:
7 to 15 inches, reddish brown channery silty clay loam
15 to 24 inches, reddish brown very channery silty clay loam

Substratum:
24 to 30 inches, reddish brown extremely channery silty clay loam
30 inches, hard, red shale and fine-grained sandstone bedrock

A typical profile of the Berks soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 7 inches, yellowish brown channery silt loam

Subsoil:
7 to 16 inches, yellowish brown very channery silt loam
16 to 33 inches, yellowish brown extremely channery silt loam

Substratum:
33 to 37 inches, yellowish brown extremely channery silt loam
37 inches, hard, acid shale bedrock

Included with these soils in mapping are Weikert soils. These included soils are in landscape positions similar to those of the Gainesboro and Berks soils. They are shallower over bedrock than the Gainesboro and Berks soils.

Important properties of the Gainesboro soil—

Permeability: Moderate or moderately rapid
Available water capacity: Low
Surface runoff: Medium
Erosion potential: Medium
Organic matter content: Low
Soil reaction: Extremely acid to slightly acid
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Important properties of the Berks soil—

Permeability: Moderate
Available water capacity: Very low
Surface runoff: Rapid
Erosion potential: Medium
Organic matter content: Low
Natural fertility: Low or medium
Soil reaction: Very strongly acid or strongly acid
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of these soils are used for pasture or woodland. Other small areas are used for cultivated crops.

These soils are moderately well suited to cultivated crops. The potential for erosion is a management concern. Crop growth and yields may be limited by the low or very low available water capacity. Conservation tillage and crop rotations that include grasses and legumes help to control runoff and erosion and conserve moisture. Tilth is fair. It can be improved by incorporating crop residue into the surface layer and by cultivating only at the proper moisture content. Crops respond well to applications of lime and fertilizer.

These soils are well suited to pasture and hay. Plant growth and yields may be limited by the low or very low available water capacity. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotating grazing among pastures, deferring grazing, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on these soils is moderately high. The estimated production for northern red oak is 280 board feet per acre. These soils are managed mostly for pine. The estimated production for Virginia pine is 120 cubic feet, or 664 board feet, per acre on the Gainesboro soil and 107 cubic feet, or 592 board feet, per acre on the Berks soil. The survival of seeds and seedlings is affected by the low or very low available water capacity.

The depth to bedrock and the slope are the major limitations affecting community development. The depth to bedrock especially limits the use of these soils as sites for sanitary facilities, such as septic tank absorption fields and trench and area sanitary landfills. The small stones limit the use of these soils as daily cover for landfills. The slope and the small stones are limitations affecting recreational development.

Capability subclass: IIIe.

24D—Gainesboro-Berks complex, 15 to 25 percent slopes. These are moderately deep, moderately steep, well drained soils on the side slopes of hills and ridges in the Shenandoah Valley. They occur as areas so intermingled that it was not practical to map them separately. This map unit consists of about 45 percent Gainesboro soil, 40 percent Berks soil, and 15 percent other soils. Areas commonly are long and winding. They range from about 3 to 55 acres.

A typical profile of the Gainesboro soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 7 inches, dark reddish brown channery silt loam

Subsoil:
7 to 15 inches, reddish brown channery silty clay loam
15 to 24 inches, reddish brown very channery silty clay loam

Substratum:
24 to 30 inches, reddish brown extremely channery silty clay loam
30 inches, hard, red shale and fine-grained sandstone bedrock

A typical profile of the Berks soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 7 inches, yellowish brown channery silt loam

Subsoil:
7 to 16 inches, yellowish brown very channery silt loam
16 to 33 inches, yellowish brown extremely channery silt loam

Substratum:
33 to 37 inches, yellowish brown extremely channery silt loam
37 inches, hard, acid shale bedrock

Included with these soils in mapping are Weikert soils. These included soils are in landscape positions similar to those of the Gainesboro and Berks soils. They are shallower over bedrock than the Gainesboro and Berks soils.

Important properties of the Gainesboro soil—

Permeability: Moderate or moderately rapid
Available water capacity: Low
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low
Natural fertility: Low
Soil reaction: Extremely acid to slightly acid
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Important properties of the Berks soil—

Permeability: Moderate
Available water capacity: Very low
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low
Natural fertility: Low or medium
Soil reaction: Very strongly acid or strongly acid
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of these soils are in woodland. Some small areas are used for pasture.

These soils are poorly suited to cultivated crops. The potential for erosion is the major management concern. Crop growth and yields are limited by the low or very low available water capacity. Conservation tillage and crop rotations that include grasses and legumes help to control runoff and erosion and conserve moisture. Tilth is fair. It can be improved by incorporating crop residue into the surface layer and by cultivating only at the proper moisture content. Crops respond well to applications of lime and fertilizer.

These soils are moderately well suited to pasture. Plant growth may be limited by the low or very low available water capacity. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotating grazing among pastures, deferring grazing, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on these soils is moderately high on north aspects and moderate on south aspects. The estimated production for northern red oak is 280 board feet per acre on north aspects and 235 board feet per acre on south aspects. These soils are managed mostly for pine. The estimated production for Virginia pine on north aspects is 120 cubic feet, or 664 board feet, per acre on the Gainesboro soil and 107 cubic feet, or 592 board feet, per acre on the Berks soil. The estimated production for Virginia pine on south aspects is 107 cubic feet, or 592 board feet, per acre on the Gainesboro soil and 90 cubic feet, or 510 board feet, per acre on the Berks soil. The survival of seeds and seedlings is affected by the low or very low

available water capacity of these soils.

The slope and the depth to bedrock are the major limitations affecting community development. They especially limit the use of these soils as sites for septic tank absorption fields and trench and area sanitary landfills. The slope also limits recreational development.

Capability subclass: IVe.

24E—Gainesboro-Berks complex, 25 to 35 percent slopes. These are moderately deep, steep, well drained soils on the side slopes of hills and ridges in the Shenandoah Valley. They occur as areas so intermingled that it was not practical to map them separately. This map unit consists of about 45 percent Gainesboro soil, 40 percent Berks soil, and 15 percent other soils. Areas commonly are long and winding. They range from about 3 to 40 acres.

A typical profile of the Gainesboro soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 7 inches, dark reddish brown channery silt loam

Subsoil:
7 to 15 inches, reddish brown channery silty clay loam
15 to 24 inches, reddish brown very channery silty clay loam

Substratum:
24 to 30 inches, reddish brown extremely channery silty clay loam
30 inches, hard, red shale and fine-grained sandstone bedrock

A typical profile of the Berks soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 7 inches, yellowish brown channery silt loam

Subsoil:
7 to 16 inches, yellowish brown very channery silt loam
16 to 33 inches, yellowish brown extremely channery silt loam

Substratum:
33 to 37 inches, yellowish brown extremely channery silt loam
37 inches, hard, acid shale bedrock

Included with these soils in mapping are Weikert soils. These included soils are in landscape positions similar to those of the Gainesboro and Berks soils. They are shallower over bedrock than the Gainesboro and Berks soils.

Important properties of the Gainesboro soil—

Permeability: Moderate or moderately rapid
Available water capacity: Low
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low
Natural fertility: Low
Soil reaction: Extremely acid to slightly acid
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Important properties of the Berks soil—

Permeability: Moderate
Available water capacity: Very low
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low
Natural fertility: Low or medium
Soil reaction: Very strongly acid or strongly acid
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of these soils are used for woodland. Some small areas are used for pasture.

These soils are not suited to cultivated crops. The potential for erosion is the major management concern. Crop growth and yields are limited by the low or very low available water capacity. If cultivated crops are grown, conservation tillage practices and crop rotations that include grasses and legumes are needed to reduce runoff, control erosion, and conserve moisture. Crops respond well to applications of lime and fertilizer.

These soils are moderately well suited to pasture. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotating grazing among pastures, deferring grazing, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on these soils is moderately high on north aspects and moderate on south aspects. The estimated production for northern red oak is 280 board feet per acre on north aspects and 235 board feet per acre on south aspects. These soils are managed mostly for pine. The estimated production for Virginia pine on north aspects is 120 cubic feet, or 664 board feet, per acre on the Gainesboro soil and 107 cubic feet, or 592 board feet, per acre on the Berks soil. The estimated production for Virginia pine on south

aspects is 107 cubic feet, or 592 board feet, per acre on the Gainesboro soil and 90 cubic feet, or 510 board feet, per acre on the Berks soil. The survival of seeds and seedlings is affected by the low or very low available water capacity of these soils.

The slope and the depth to bedrock are the major limitations affecting community development. They especially limit the use of these soils as sites for septic tank absorption fields and trench and area sanitary landfills. The slope also limits recreational development.

Capability subclass: VIe.

25B—Gilpin silt loam, 2 to 7 percent slopes. This soil is moderately deep, gently sloping, and well drained. It is on the summits and shoulders of hills and ridges in the Shenandoah Valley. Areas commonly are long and winding. They range from about 3 to 45 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 3 inches, dark yellowish brown silt loam

Subsoil:
3 to 10 inches, strong brown channery silt loam
10 to 19 inches, strong brown channery silty clay loam
19 to 26 inches, strong brown very channery silty clay loam

Substratum:
26 inches, fractured shale bedrock

Included with this soil in mapping are Berks, Trappist, and Weikert soils. These soils are in landscape positions similar to those of the Gilpin soil. The Berks soils have more rock fragments than the Gilpin soil, and the Trappist soils have a higher content of clay. The Weikert soils are shallower over bedrock than the Gilpin soil. Included soils make up about 20 percent of this unit.

Important soil properties—

Permeability: Moderate
Available water capacity: Low
Surface runoff: Medium
Erosion potential: Medium
Organic matter content: Low to moderate
Natural fertility: Low
Soil reaction: Extremely acid to strongly acid
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are used for pasture. Some small areas are used for cultivated crops or are wooded.

This soil is well suited to cultivated crops. The potential for erosion is a management concern. The soil is often droughty during the summer. Tilth is good and can be maintained by cultivating only at the proper moisture content. Crops respond well to applications of lime and fertilizer, but growth and yields are often limited by the low available water capacity. Conservation tillage and crop rotations that include grasses and legumes help to control runoff and erosion and conserve moisture.

This soil is well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotating grazing among pastures, deferring grazing, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on this soil is moderately high. The estimated production for northern red oak is 288 board feet per acre. Seeds and seedlings survive and grow well if competing vegetation is controlled.

The depth to bedrock is a limitation affecting community development. It especially limits the use of this soil as a site for septic tank absorption fields, shallow excavations, and dwellings with basements. The potential for frost action is a limitation on sites for local roads and streets.

Capability subclass: IIe.

25C—Gilpin silt loam, 7 to 15 percent slopes. This soil is moderately deep, strongly sloping, and well drained. It is on the side slopes of hills and ridges in the Shenandoah Valley. Areas commonly are long and winding. They range from about 3 to 70 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 3 inches, dark yellowish brown silt loam

Subsoil:
3 to 10 inches, strong brown channery silt loam
10 to 19 inches, strong brown channery silty clay loam
19 to 26 inches, strong brown very channery silty clay loam

Substratum:
26 inches, fractured shale bedrock

Included with this soil in mapping are Berks, Trappist, and Weikert soils. These soils are in landscape positions similar to those of the Gilpin soil. The Berks

soils have more rock fragments than the Gilpin soil, and the Trappist soils have a higher content of clay in the subsoil. The Weikert soils are shallower over bedrock than the Gilpin soil. Included soils make up about 20 percent of this unit.

Important soil properties—

Permeability: Moderate
Available water capacity: Low
Surface runoff: Rapid
Erosion potential: High
Organic matter content: Low to moderate
Natural fertility: Low
Soil reaction: Extremely acid to strongly acid
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are used for pasture. Some small areas are used for cultivated crops or are wooded.

This soil is moderately well suited to cultivated crops. The potential for erosion is a management concern. The soil is often droughty during the summer. Tilth is good and can be maintained by cultivating only at the proper moisture content. Crops respond well to applications of lime and fertilizer, but growth and yields are often limited by the low available water capacity. Conservation tillage and crop rotations that include grasses and legumes help to control runoff and erosion and conserve moisture.

This soil is well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotating grazing among pastures, deferring grazing, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on this soil is moderately high. The estimated production for northern red oak is 288 board feet per acre. Seeds and seedlings survive and grow well if competing vegetation is controlled.

The depth to bedrock and the slope are limitations affecting community development. They especially limit the use of this soil as a site for septic tank absorption fields, shallow excavations, and dwellings with basements. The slope and the potential for frost action are limitations on sites for local roads and streets.

Capability subclass: IIIs.

25D—Gilpin silt loam, 15 to 25 percent slopes. This soil is moderately deep, moderately steep, and well drained. It is on the side slopes of hills and ridges in the Shenandoah Valley. Areas commonly are long and winding. They range from about 3 to 40 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 3 inches, dark yellowish brown silt loam

Subsoil:
3 to 10 inches, strong brown channery silt loam
10 to 19 inches, strong brown channery silty clay loam
19 to 26 inches, strong brown very channery silty clay loam

Substratum:
26 inches, fractured shale bedrock

Included with this soil in mapping are Berks and Weikert soils. These soils are in landscape positions similar to those of the Gilpin soil. They have more rock fragments in the solum than the Gilpin soil. Also, the Weikert soils are shallower over bedrock. Included soils make up about 20 percent of this unit.

Important soil properties—

Permeability: Moderate
Available water capacity: Low
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low to moderate
Natural fertility: Low
Soil reaction: Extremely acid to strongly acid
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are used for pasture. Some small areas are wooded.

This soil is poorly suited to cultivated crops. The potential for erosion and the low available water capacity are the major management concerns. The soil is often droughty during the summer. If cultivated crops are grown, conservation tillage and crop rotations that include grasses and legumes are needed to reduce the runoff rate, control erosion, and conserve moisture.

This soil is moderately well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotating grazing among pastures, deferring grazing, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on this soil is moderately high. The estimated production for northern red oak is 288 board feet per acre on north aspects and

278 board feet per acre on south aspects. Seeds and seedlings survive and grow well if competing vegetation is controlled.

The slope and the depth to bedrock limit the use of this soil for sanitary facilities and building site development. The slope also is a limitation affecting recreational development.

Capability subclass: IVe.

26C—Gilpin channery silt loam, 2 to 15 percent slopes. This soil is moderately deep, gently sloping to strongly sloping, and well drained. It is on the summits and side slopes of hills and ridges in the foothills and mountains. Areas commonly are broad and irregularly shaped. They range from about 5 to 75 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 3 inches, dark yellowish brown channery silt loam

Subsoil:
3 to 10 inches, strong brown channery silt loam
10 to 19 inches, strong brown channery silty clay loam
19 to 26 inches, strong brown very channery silty clay loam

Substratum:
26 inches, fractured shale bedrock

Included with this soil in mapping are the well drained Jefferson, Laidig, and Sequoia soils. These soils are in landscape positions similar to those of the Gilpin soil. The Jefferson soils are deeper over bedrock than the Gilpin soil. The Laidig soils have a fragipan at a depth of 30 to 50 inches. The Sequoia soils are 20 to 40 inches deep over weathered shale and more than 60 inches deep over hard bedrock. Included soils make up about 20 percent of this unit.

Important soil properties—

Permeability: Moderate
Available water capacity: Low
Surface runoff: Medium or rapid
Erosion potential: Medium
Organic matter content: Low to moderate
Natural fertility: Low
Soil reaction: Extremely acid to strongly acid
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas are wooded. Some areas are used for cultivated crops or pasture.

This soil is moderately well suited to cultivated crops. The potential for erosion is a management concern. The soil is often droughty during the growing season. Tilth is good and can be maintained by cultivating only at the proper moisture content. Crops respond well to applications of lime and fertilizer, but growth and yields are often limited by the low available water capacity. Conservation tillage and crop rotations that include grasses and legumes help to control runoff and erosion and conserve moisture.

This soil is moderately well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotating grazing among pastures, deferring grazing, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on this soil is moderately high. The estimated production for northern red oak is 288 board feet per acre. Seeds and seedlings survive and grow well if competing vegetation is controlled.

The depth to bedrock, the slope, and the potential for frost action limit the use of this soil for community development, especially for sanitary facilities and building site development. The slope and the small stones are limitations affecting most recreational uses, especially campgrounds, picnic areas, and playgrounds.

Capability subclass: IIIe.

26D—Gilpin channery silt loam, 15 to 35 percent slopes. This soil is moderately deep, strongly sloping to steep, and well drained. It is on the side slopes of hills and ridges in the mountains. Areas commonly are broad and irregularly shaped. They range from about 5 to 150 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 3 inches, dark yellowish brown channery silt loam

Subsoil:
3 to 10 inches, strong brown channery silt loam
10 to 19 inches, strong brown channery silty clay loam
19 to 26 inches, strong brown very channery silty clay loam

Substratum:
26 inches, fractured shale bedrock

Included with this soil in mapping are the well drained Berks, Jefferson, Laidig, and Weikert soils.

Berks and Weikert soils are in landscape positions similar to those of the Gilpin soil. They have more rock fragments in the solum than the Gilpin soil. The Weikert soils have bedrock at a depth of less than 20 inches. The Jefferson and Laidig soils are in colluvial positions adjacent to the Gilpin soil. They are deeper over bedrock than the Gilpin soil. The Laidig soils have a fragipan at a depth of 30 to 50 inches. Included soils make up about 20 percent of this unit.

Important soil properties—

Permeability: Moderate
Available water capacity: Low
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low to moderate
Natural fertility: Low
Soil reaction: Extremely acid to strongly acid
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas are wooded. Some small areas are used for pasture.

This soil is not suited to cultivated crops. The potential for erosion is the major management concern. The soil is often droughty during the growing season. If cultivated crops are grown, conservation tillage and crop rotations that include grasses and legumes are needed to reduce the runoff rate, control erosion, and conserve moisture.

This soil is moderately well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotating grazing among pastures, deferring grazing, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on this soil is moderately high. The estimated production for northern red oak is 288 board feet per acre on north aspects and 278 board feet per acre on south aspects. Seeds and seedlings survive and grow well if competing vegetation is controlled.

The depth to bedrock and the slope limit the use of this soil for community development, especially for sanitary facilities and building site development. The slope and the small stones are limitations affecting most recreational uses, especially campgrounds, picnic areas, and playgrounds.

Capability subclass: VIe.

27C—Gilpin channery silt loam, 7 to 15 percent slopes, stony. This soil is moderately deep, strongly sloping, and well drained. It is on the side slopes of foothills along the mountains. Areas commonly are broad and irregularly shaped. They range from about 5 to 30 acres. Large stones about 10 to 24 inches in diameter and about 24 to 75 feet apart cover up to 1 percent of the surface.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 3 inches, dark yellowish brown channery silt loam

Subsoil:
3 to 10 inches, strong brown channery silt loam
10 to 19 inches, strong brown channery silty clay loam
19 to 26 inches, strong brown very channery silty clay loam

Substratum:
26 inches, fractured shale bedrock

Included with this soil in mapping are the well drained Berks, Jefferson, Laidig, and Weikert soils. The Berks and Weikert soils are in landscape positions similar to those of the Gilpin soil. They have more rock fragments in the solum than the Gilpin soil. The Weikert soils also have bedrock at a depth of less than 20 inches. The Jefferson and Laidig soils are in colluvial positions adjacent to the Gilpin soil. They are deeper over bedrock than the Gilpin soil. The Laidig soils have a fragipan at a depth of 30 to 50 inches. Included soils make up about 20 percent of this unit.

Important soil properties—

Permeability: Moderate
Available water capacity: Low
Surface runoff: Rapid
Erosion potential: High
Organic matter content: Low to moderate
Natural fertility: Low
Soil reaction: Extremely acid to strongly acid
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are used as woodland.

This soil is moderately well suited to cultivated crops. The potential for erosion is a management concern. The soil is often droughty during the growing season. The large stones on the surface interfere with tillage. Tilth is good and can be maintained by cultivating only at the proper moisture content. Crops respond well to applications of lime and fertilizer, but growth and yields

are often limited by the low available water capacity. If cultivated crops are grown, conservation tillage practices and crop rotations that include grasses and legumes are needed to reduce the runoff rate, control erosion, and conserve moisture.

This soil is moderately well suited to pasture and hay. The large stones on the surface, however, may interfere with mowing. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotating grazing among pastures, deferring grazing, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on this soil is moderately high. The estimated production for northern red oak is 288 board feet per acre. Seeds and seedlings survive and grow well if competing vegetation is controlled; however, growth may be limited by the low available water capacity.

The depth to bedrock, the slope, and the potential for frost action limit the use of this soil for community development. The depth to bedrock and the slope limit the use of the soil for sanitary facilities and building site development. The potential for frost action and the slope are limitations affecting local roads and streets. The large stones on the surface limit the use of the soil for most recreational uses, especially campgrounds, picnic areas, and playgrounds.

Capability subclass: IVs.

27D—Gilpin channery silt loam, 15 to 25 percent slopes, stony. This soil is moderately deep, moderately steep, and well drained. It is on the side slopes of foothills along the mountains. Areas commonly are broad and irregularly shaped. They range from about 5 to 70 acres. Large stones about 10 to 24 inches in diameter and about 24 to 75 feet apart cover up to 1 percent of the surface.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 3 inches, dark yellowish brown channery silt loam

Subsoil:
3 to 10 inches, strong brown channery silt loam
10 to 19 inches, strong brown channery silty clay loam
19 to 26 inches, strong brown very channery silty clay loam

Substratum:
26 inches, fractured shale bedrock

Included with this soil in mapping are the well drained Berks, Jefferson, Laidig, and Weikert soils. The Berks and Weikert soils are in landscape positions similar to those of the Gilpin soil. They have more rock fragments in the solum than the Gilpin soil. The Weikert soils are less than 20 inches to bedrock. The Jefferson and Laidig soils are in colluvial positions adjacent to the Gilpin soil. They are deeper over bedrock than the Gilpin soil. The Laidig soils have a fragipan at a depth of 30 to 50 inches. Included soils make up about 20 percent of this unit.

Important soil properties—

Permeability: Moderate
Available water capacity: Low
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low to moderate
Natural fertility: Low
Soil reaction: Extremely acid to strongly acid
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are used as woodland.

This soil is poorly suited to cultivated crops. The potential for erosion is the major management concern. The soil is often droughty during the growing season. The large stones on the surface interfere with tillage. Tilth is good and can be maintained by cultivating only at the proper moisture content. Crops respond well to applications of lime and fertilizer, but growth and yields are often limited by the low available water capacity. If cultivated crops are grown, conservation tillage practices and crop rotations that include grasses and legumes are needed to reduce the runoff rate, control erosion, and conserve moisture.

This soil is moderately well suited to pasture and hay. The large stones on the surface, however, may interfere with mowing. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotating grazing among pastures, deferring grazing, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on this soil is moderately high. The estimated production for northern red oak is 288 board feet per acre on north aspects and 278 board feet per acre on south aspects. Seeds and seedlings survive and grow well on north aspects if competing vegetation is controlled; however, growth may be limited by the low available water capacity. The seedling mortality rate increases on south aspects.

The depth to bedrock and the slope limit the use of this soil for community development, especially for

sanitary facilities and building site development. The slope is a limitation affecting most recreational uses, especially campgrounds, picnic areas, and playgrounds.

Capability subclass: VIs.

27E—Gilpin channery silt loam, 25 to 35 percent slopes, stony. This soil is moderately deep, steep, and well drained. It is on the side slopes of foothills along the mountains. Areas commonly are broad and irregularly shaped. They range from about 5 to 40 acres. Large stones about 10 to 24 inches in diameter and about 24 to 75 feet apart cover up to 1 percent of the surface.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 3 inches, dark yellowish brown channery silt loam

Subsoil:
3 to 10 inches, strong brown channery silt loam
10 to 19 inches, strong brown channery silty clay loam
19 to 26 inches, strong brown very channery silty clay loam

Substratum:
26 inches, fractured shale bedrock

Included with this soil in mapping are the well drained Berks and Weikert soils. They are in landscape positions similar to those of the Gilpin soil. They have more rock fragments in the solum than the Gilpin soil. The Weikert soils are less than 20 inches deep over bedrock. Included soils make up about 10 percent of this unit.

Important soil properties—

Permeability: Moderate
Available water capacity: Low
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low to moderate
Natural fertility: Low
Soil reaction: Extremely acid to strongly acid
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are used as woodland.

This soil is not suited to cultivated crops. The potential for erosion is the major management concern. The soil is often droughty during the growing season. The large stones on the surface interfere with tillage.

This soil is moderately well suited to pasture. The large stones on the surface may interfere with pasture maintenance. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotating grazing among pastures, deferring grazing, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on this soil is moderately high. The estimated production for northern red oak is 288 board feet per acre on north aspects and 278 board feet per acre on south aspects. Seeds and seedlings survive and grow well on north aspects if competing vegetation is controlled; however, growth may be limited by the low available water capacity. The seedling mortality rate increases on south aspects.

The depth to bedrock and the slope limit the use of this soil for community development, especially for sanitary facilities and building site development. The slope is a limitation affecting most recreational uses, especially campgrounds, picnic areas, and playgrounds.

Capability subclass: VIIs.

28C—Gilpin channery silt loam, 2 to 15 percent slopes, very stony. This soil is moderately deep, gently sloping to strongly sloping, and well drained. It is on the summits and side slopes of hills and ridges in the mountains. Areas commonly are broad and irregularly shaped. They range from about 5 to 75 acres. Stones about 10 to 24 inches in diameter cover up to 3 percent of the surface.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 3 inches, dark yellowish brown channery silt loam

Subsoil:
3 to 10 inches, strong brown channery silt loam
10 to 19 inches, strong brown channery silty clay loam
19 to 26 inches, strong brown very channery silty clay loam

Substratum:
26 inches, fractured shale bedrock

Included with this soil in mapping are the well drained Jefferson, Laidig, and Sequoia soils. These soils are in landscape positions similar to those of the Gilpin soil. The Jefferson soils are deeper over bedrock than the Gilpin soil. The Laidig soils have a fragipan at a depth of 30 to 50 inches. The Sequoia soils are 20 to 40 inches deep over weathered shale and more than 60 inches deep over hard bedrock. Included soils make up about 20 percent of this unit.

Important soil properties—

Permeability: Moderate
Available water capacity: Low
Surface runoff: Medium or rapid
Erosion potential: Medium
Organic matter content: Low to moderate
Natural fertility: Low
Soil reaction: Extremely acid to strongly acid
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are used as woodland. Because of the large stones on the surface, this soil is unsuitable for farming.

The potential productivity for trees on this soil is moderately high. The estimated production for northern red oak is 288 board feet per acre. Seeds and seedlings survive and grow well if competing vegetation is controlled.

The depth to bedrock, the slope, and the potential for frost action limit the use of this soil for community development, especially for sanitary facilities and building site development. The large stones on the surface are a limitation affecting most recreational uses.

This soil is fairly suited to woodland wildlife habitat. It is poorly suited to openland wildlife habitat because of the depth to bedrock, the low available water capacity, and the large stones on the surface.

Capability subclass: VIIs.

28D—Gilpin channery silt loam, 15 to 35 percent slopes, very stony. This soil is moderately deep, moderately steep or steep, and well drained. It is on the side slopes of hills and ridges in the mountains. Areas commonly are broad and irregularly shaped. They range from about 5 to 100 acres. Stones about 10 to 24 inches in diameter cover up to 3 percent of the surface.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 3 inches, dark yellowish brown channery silt loam

Subsoil:
3 to 10 inches, strong brown channery silt loam
10 to 19 inches, strong brown channery silty clay loam
19 to 26 inches, strong brown very channery silty clay loam

Substratum:
26 inches, fractured shale bedrock

Included with this soil in mapping are the well drained Jefferson, Laidig, and Sequoia soils. These soils are in landscape positions similar to those of the Gilpin soil. The Jefferson soils are deeper over bedrock than the Gilpin soil. The Laidig soils have a fragipan at a depth of 30 to 50 inches. The Sequoia soils are 20 to 40 inches deep over weathered shale and more than 60 inches deep over hard bedrock. Included soils make up about 20 percent of this unit.

Important soil properties—

Permeability: Moderate
Available water capacity: Low
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low to moderate
Natural fertility: Low
Soil reaction: Extremely acid to strongly acid
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are used as woodland. Because of the large stones on the surface and the slope, this soil is unsuitable for farming.

The potential productivity for trees on this soil is moderately high. The estimated production for northern red oak is 288 board feet per acre on north aspects and 278 board feet per acre on south aspects. Seeds and seedlings survive and grow well on north aspects if competing vegetation is controlled. The seeding mortality rate increases on south aspects.

The slope, the depth to bedrock, and the potential for frost action limit the use of this soil for community development, especially for sanitary facilities and building site development.

This soil is fairly suited to woodland wildlife habitat. It is poorly suited to openland wildlife habitat because of the depth to bedrock, the low available water capacity, and the large stones on the surface.

Capability subclass: VIIe.

28E—Gilpin channery silt loam, 35 to 55 percent slopes, very stony. This soil is moderately deep, steep to very steep, and well drained. It is on the sides of ridges in the mountains. Areas commonly are broad and irregularly shaped. They range from about 5 to 100 acres. Stones about 10 to 24 inches in diameter cover up to 3 percent of the surface.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 3 inches, dark yellowish brown channery silt loam

Subsoil:
3 to 10 inches, strong brown channery silt loam
10 to 19 inches, strong brown channery silty clay loam
19 to 26 inches, strong brown very channery silty clay loam

Substratum:
26 inches, fractured shale bedrock

Included with this soil in mapping are the well drained Jefferson, Laidig, and Sequoia soils. These soils are in landscape positions similar to those of the Gilpin soil. The Jefferson soils are deeper over bedrock than the Gilpin soil. The Laidig soils have a fragipan at a depth of 30 to 50 inches. The Sequoia soils are 20 to 40 inches deep over weathered shale and more than 60 inches deep over hard bedrock. Included soils make up about 20 percent of this unit.

Important soil properties—

Permeability: Moderate
Available water capacity: Low
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low to moderate
Natural fertility: Low
Soil reaction: Extremely acid to strongly acid
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are used as woodland. Because of the large stones on the surface and the slope, this soil is unsuitable for farming.

The potential productivity for trees on this soil is moderately high. The estimated production for northern red oak is 288 board feet per acre on north aspects and 278 board feet per acre on south aspects. Seeds and seedlings survive and grow well on north aspects if competing vegetation is controlled. The seedling mortality rate increases on south aspects.

The slope limits the use of this soil for sanitary facilities and building site development.

This soil is fairly suited to woodland wildlife habitat. It is poorly suited to openland wildlife habitat because of the depth to bedrock, the low available water capacity, and the large stones on the surface.

Capability subclass: VIIe.

29A—Gladehill fine sandy loam, 0 to 2 percent slopes, occasionally flooded. This soil is deep, nearly level, and well drained. It is on flood plains in the Shenandoah Valley. Areas commonly are long and winding and follow the course of the adjacent streams. They range from 5 to 75 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 10 inches, very dark grayish brown fine sandy loam

Subsoil:
10 to 33 inches, dark brown fine sandy loam

Substratum:
33 to 62 inches, dark brown fine sandy loam

Included with this soil in mapping are Broadway soils. These soils are in landscape positions similar to those of the Gladehill soil. They contain more sand throughout the solum than the Gladehill soil. Also included are sandy soils in scoured areas and on levees adjacent to the streams. Included soils make up about 20 percent of this unit.

Important soil properties—

Permeability: Moderate or moderately rapid
Available water capacity: Moderate
Surface runoff: Slow
Erosion potential: Low
Organic matter content: Low to moderate
Natural fertility: High
Soil reaction: Medium acid to neutral in the solum; strongly acid to neutral in the substratum
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: 42 to 72 inches
Flooding: Occasional, very brief or brief

Most areas of this soil are used as woodland. The rest are used for pasture or cropland.

This soil is well suited to cultivated crops. Tilth is good. The flooding damages the crops or limits the use of machinery in some years. Crops respond well to applications of fertilizer and lime. Conservation tillage, cover crops, and a cropping system that includes grasses and legumes increase the organic matter content of the surface layer and maintain tilth. Crop residue should be kept on the surface or incorporated into the plow layer.

This soil is well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotating grazing among pastures, deferring grazing, controlling weeds, and applying fertilizer can increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on this soil is very high. The estimated production for yellow poplar is 681 board feet per acre.

The flooding is the major hazard affecting community development. It limits the use of this soil as a site for septic tank absorption fields, shallow excavations, dwellings, and small commercial buildings. It also is a hazard in camp areas and playgrounds.

Capability class: I.

30A—Guyan silt loam, 0 to 2 percent slopes, rarely flooded. This soil is deep, nearly level, and somewhat poorly drained. It is on low stream terraces in the Shenandoah Valley. Areas commonly are long and winding and follow the course of the adjacent streams. They range from 3 to 75 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 7 inches, dark brown silt loam

Subsoil:
7 to 14 inches, yellowish brown silt loam
14 to 22 inches, brownish gray, mottled silt loam
22 to 31 inches, light brownish gray, mottled silty clay loam
31 to 36 inches, light brownish gray, mottled clay loam

Substratum:
36 to 54 inches, gray, mottled silty clay loam
54 to 62 inches, light yellowish brown, mottled silty clay loam

Included with this soil in mapping are the moderately well drained Coursey soils and the poorly drained Purdy soils. The Coursey soils are in the slightly higher areas. The Purdy soils are in the lower areas. Included soils make up about 15 percent of this unit.

Important soil properties—

Permeability: Moderate
Available water capacity: High
Surface runoff: Very slow
Erosion potential: Low
Organic matter content: Low to moderate
Natural fertility: Low
Soil reaction: Strongly acid to neutral in the surface layer; very strongly acid or strongly acid in the subsoil and substratum
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: 6 to 18 inches
Flooding: Rare, very brief

Most areas of this soil are used for pasture. Some small areas are used for cultivated crops or hay.

This soil is poorly suited to cultivated crops. The seasonal wetness and the flooding interfere with cultivation and harvest. If cultivated crops are grown, conservation tillage and crop rotations that include grasses and legumes can help to control erosion and maintain tilth.

This soil is moderately well suited to pasture. Alfalfa commonly is short lived because of the wetness. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotating grazing among pastures, deferring grazing, controlling weeds, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on this soil is moderately high. The estimated production for yellow poplar is 510 board feet per acre.

The seasonal high water table and the flooding limit the use of this soil for community development. The seasonal high water table is a limitation on sites for septic tank absorption fields, sewage lagoons, and sanitary landfills. The high water table and the flooding are limitations affecting building site development. The low strength and the potential for frost action limit the use of this soil as a site for local roads and streets.

Capability subclass: IVw.

31B—Jefferson sandy loam, 2 to 7 percent slopes. This soil is very deep, gently sloping, and well drained. It is on the benches and foot slopes of ridges in the Massanutten and Shenandoah Mountains. Areas commonly are irregularly shaped. They range from about 10 to 100 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 1 inch, very dark gray sandy loam

Subsoil:
1 to 15 inches, yellowish brown sandy loam
15 to 24 inches, strong brown gravelly sandy clay loam
24 to 48 inches, strong brown sandy clay loam

Substratum:
48 to 72 inches, mottled extremely gravelly sandy clay loam

Included with this soil in mapping are the well drained Gilpin and Laidig soils. These soils are in landscape positions similar to those of the Jefferson soil. The Gilpin soils are shallower over bedrock than the Jefferson soil. The Laidig soils have a fragipan. Included soils make up about 25 percent of this unit.

Important soil properties—

Permeability: Moderately rapid
Available water capacity: Moderate
Surface runoff: Medium
Erosion potential: Medium
Organic matter content: Low to high
Natural fertility: Low
Soil reaction: Very strongly acid or strongly acid
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are used as woodland. A few areas are used for cultivated crops or pasture.

This soil is well suited to cultivated crops. The potential for erosion is a management concern. Conservation tillage and crop rotations that include grasses and legumes help to control runoff and erosion and conserve moisture. Returning crop residue to the soil and cultivating only at the proper moisture content help to maintain and improve tilth. Crops respond well to applications of lime and fertilizer.

This soil is well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, rotating grazing among pastures, deferring grazing, controlling weeds, using proper stocking rates, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on this soil is high. The estimated production for shortleaf pine is 100 cubic feet, or 550 board feet, per acre.

This soil is well suited to community development and recreational uses. Seepage limits the use of this soil for sewage lagoons and trench and area landfills.

Capability subclass: IIe.

31C—Jefferson sandy loam, 7 to 15 percent slopes. This soil is very deep, strongly sloping, and well drained. It is on the benches and foot slopes of ridges in the Massanutten and Shenandoah Mountains. Areas commonly are irregularly shaped. They range from about 3 to 50 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 1 inch, very dark gray sandy loam

Subsoil:
1 to 15 inches, yellowish brown sandy loam
15 to 24 inches, strong brown gravelly sandy clay loam
24 to 48 inches, strong brown sandy clay loam

Substratum:
48 to 72 inches, mottled extremely gravelly sandy clay loam

Included with this soil in mapping are the well drained Gilpin and Laidig soils. These soils are in landscape positions similar to those of the Jefferson soil. The Gilpin soils are shallower over bedrock than the Jefferson soil. The Laidig soils have a fragipan. Included soils make up about 25 percent of this unit.

Important soil properties—

Permeability: Moderately rapid
Available water capacity: Moderate
Surface runoff: Rapid
Erosion potential: Medium
Organic matter content: Low to high
Natural fertility: Low
Soil reaction: Very strongly acid or strongly acid
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are used as woodland. A few areas are used for cultivated crops or pasture.

This soil is moderately well suited to cultivated crops. The potential for erosion is a management concern. Conservation tillage and crop rotations that include grasses and legumes help to control runoff and erosion and conserve moisture. Returning crop residue to the soil and cultivating only at the proper moisture content help to maintain and improve tilth. Crops respond well to applications of lime and fertilizer.

This soil is moderately well suited to pasture. Establishing and maintaining a mixture of grasses and legumes, rotating grazing among pastures, deferring grazing, controlling weeds, using proper stocking rates, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on this soil is high. The estimated production for shortleaf pine is 100 cubic feet, or 550 board feet, per acre.

The slope is a limitation affecting community development and recreational uses. Seepage limits the

use of this soil for sewage lagoons and trench and area landfills.

Capability subclass: IIIe.

32C—Jefferson sandy loam, 2 to 15 percent slopes. This soil is very deep, gently sloping to strongly sloping, and well drained. It is on the benches and foot slopes of ridges in the Massanutten and Shenandoah Mountains. Areas commonly are irregularly shaped. They range from about 10 to 25 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 1 inch, very dark gray sandy loam

Subsoil:
1 to 15 inches, yellowish brown sandy loam
15 to 24 inches, strong brown gravelly sandy clay loam
24 to 48 inches, strong brown sandy clay loam

Substratum:
48 to 72 inches, mottled extremely gravelly sandy clay loam

Included with this soil in mapping are the well drained Gilpin and Laidig soils. These soils are in landscape positions similar to those of the Jefferson soil. They are shallower over bedrock than the Jefferson soil. The Laidig soils have a fragipan. Included soils make up about 25 percent of this unit.

Important soil properties—

Permeability: Moderately rapid
Available water capacity: Moderate
Surface runoff: Medium or rapid
Erosion potential: Medium
Organic matter content: Low to high
Natural fertility: Low
Soil reaction: Very strongly acid or strongly acid
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are forested.

This soil is moderately well suited to cultivated crops. The potential for erosion is a management concern. Conservation tillage and crop rotations that include grasses and legumes help to control runoff and erosion and conserve moisture.

This soil is moderately well suited to pasture. Establishing and maintaining a mixture of grasses and legumes, rotating grazing among pastures, deferring grazing, controlling weeds, using proper stocking rates, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on this soil is high. The estimated production for shortleaf pine is 100 cubic feet, or 550 board feet, per acre.

The slope is the main limitation affecting community development and most recreational uses, especially campgrounds, picnic areas, and playgrounds.

Capability subclass: IIIe.

32D—Jefferson sandy loam, 15 to 35 percent slopes. This soil is very deep, moderately steep or steep, and well drained. It is on the benches and foot slopes of ridges in the Massanutten and Shenandoah Mountains. Areas commonly are irregularly shaped. They range from about 10 to 75 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 1 inch, very dark gray sandy loam

Subsoil:
1 to 15 inches, yellowish brown sandy loam
15 to 24 inches, strong brown gravelly sandy clay loam
24 to 48 inches, strong brown sandy clay loam

Substratum:
48 to 72 inches, mottled extremely gravelly sandy clay loam

Included with this soil in mapping are the well drained Gilpin and Laidig soils. The Gilpin soils are in the higher areas. They are shallower over bedrock than the Jefferson soil. The Laidig soils are in landscape positions similar to those of the Jefferson soil. They have a fragipan 30 to 50 inches from the surface. Included soils make up about 25 percent of this unit.

Important soil properties—

Permeability: Moderately rapid
Available water capacity: Moderate
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low to high
Natural fertility: Low
Soil reaction: Very strongly acid or strongly acid
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are forested.

This soil is poorly suited to cultivated crops. The potential for erosion is the major management concern. Conservation tillage and crop rotations that include grasses and legumes help to control runoff and erosion and conserve moisture.

This soil is moderately well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, rotating grazing among pastures, deferring grazing, controlling weeds, using proper stocking rates, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on this soil is high on north aspects and moderately high on south aspects. The estimated production for shortleaf pine is 100 cubic feet, or 550 board feet, per acre on north aspects and 78 cubic feet, or 432 board feet, per acre on south aspects.

The slope is the main limitation affecting community development and most recreational uses. It limits the use of this soil for campgrounds, picnic areas, and playgrounds. It is also a limitation on sites for sanitary facilities and building site development.

Capability subclass: VIe.

33C—Jefferson sandy loam, 2 to 15 percent slopes, very stony. This soil is very deep, gently sloping to strongly sloping, and well drained. It is on the sides of ridges in the Massanutten and Shenandoah Mountains. Areas commonly are broad and irregularly shaped. They range from about 10 to 100 acres. Large stones about 10 to 24 inches in diameter and about 3 to 24 feet apart cover up to 3 percent of the surface.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 1 inch, very dark gray sandy loam

Subsoil:
1 to 15 inches, yellowish brown sandy loam
15 to 24 inches, strong brown gravelly sandy clay loam
24 to 48 inches, strong brown sandy clay loam

Substratum:
48 to 72 inches, mottled extremely gravelly sandy clay loam

Included with this soil in mapping are the well drained Gilpin and Laidig soils. These soils are in landscape positions similar to those of the Jefferson soil. The Gilpin soils are shallower over bedrock than the Jefferson soil. The Laidig soils have a fragipan. Included soils make up about 25 percent of this unit.

Important soil properties—

Permeability: Moderately rapid
Available water capacity: Moderate
Surface runoff: Medium or rapid
Erosion potential: Medium
Organic matter content: Low to high
Natural fertility: Low
Soil reaction: Very strongly acid or strongly acid
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are forested. Because of the large stones on the surface, this soil is unsuitable for farming.

The potential productivity for trees on this soil is high. The estimated production for shortleaf pine is 100 cubic feet, or 550 board feet, per acre. The large stones on the surface limit the use of woodland equipment.

The slope is the main limitation affecting community development. The slope and the large stones are limitations affecting most recreational uses.

Capability subclass: VIIs.

33D—Jefferson sandy loam, 15 to 35 percent slopes, very stony. This soil is very deep, moderately steep or steep, and well drained. It is on the sides of ridges in the Massanutten and Shenandoah Mountains. Areas commonly are broad and irregularly shaped. They range from about 10 to 100 acres. Large stones about 10 to 24 inches in diameter and about 3 to 24 feet apart cover up to 3 percent of the surface.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 1 inch, very dark gray sandy loam

Subsoil:
1 to 15 inches, yellowish brown sandy loam
15 to 24 inches, strong brown gravelly sandy clay loam
24 to 48 inches, strong brown sandy clay loam

Substratum:
48 to 72 inches, mottled extremely gravelly sandy clay loam

Included with this soil in mapping are the well drained Gilpin and Laidig soils. The Gilpin soils are in the higher areas. They are shallower over bedrock than the Jefferson soil. The Laidig soils are in landscape positions similar to those of the Jefferson soil. The

Laidig soils have a fragipan 30 to 50 inches below the surface. Included soils make up about 25 percent of this unit.

Important soil properties—

Permeability: Moderately rapid
Available water capacity: Moderate
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low to high
Natural fertility: Low
Soil reaction: Very strongly acid or strongly acid
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are forested. Because of the slope and the large stones on the surface, this soil is unsuitable for farming.

The potential productivity for trees is high on the north aspects and moderately high on south aspects. The estimated production for shortleaf pine is 100 cubic feet, or 550 board feet, per acre on north aspects and 78 cubic feet, or 432 board feet, per acre on south aspects. The large stones on the surface limit the use of woodland equipment.

The slope is the main limitation affecting community development. The slope and the large stones are limitations affecting most recreational uses.

Capability subclass: VIIe.

33E—Jefferson sandy loam, 35 to 55 percent slopes, very stony. This soil is very deep, steep to very steep, and well drained. It is on the sides of ridges in the Massanutten and Shenandoah Mountains. Areas commonly are broad and irregularly shaped. They range from about 10 to 75 acres. Large stones about 10 to 24 inches in diameter and about 3 to 24 feet apart cover up to 3 percent of the surface.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 1 inch, very dark gray sandy loam

Subsoil:
1 to 15 inches, yellowish brown sandy loam
15 to 24 inches, strong brown gravelly sandy clay loam
24 to 48 inches, strong brown sandy clay loam

Substratum:
48 to 72 inches, mottled extremely gravelly sandy clay loam

Included with this soil in mapping are the well drained Gilpin and Laidig soils. The Gilpin soils are in the higher areas. They are shallower over bedrock than the Jefferson soil. The Laidig soils are on landscape positions similar to those of the Jefferson soil. They have a fragipan 30 to 50 inches below the surface. Included soils make up about 25 percent of this unit.

Important soil properties—

Permeability: Moderately rapid
Available water capacity: Moderate
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low to high
Natural fertility: Low
Soil reaction: Very strongly acid or strongly acid
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are forested. Because of the slope and the large stones, this soil is unsuitable for farming.

The potential productivity for trees on this soil is high on north aspects and moderately high on south aspects. The estimated production for shortleaf pine is 100 cubic feet, or 550 board feet, per acre on north aspects and 78 cubic feet, or 432 board feet, per acre on south aspects. The large stones on the surface limit the use of woodland equipment.

The slope is the main limitation affecting community development. The slope and the large stones are limitations affecting most recreational uses.

Capability subclass: VIIe.

34B—Laidig channery loam, 2 to 7 percent slopes. This soil is very deep, gently sloping, and well drained. It is on colluvial fans, at the concave head of drainageways, and on toe slopes in the foothills of the mountains. Areas are long and winding and range from about 3 to 100 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 2 inches, dark grayish brown channery loam

Subsoil:
2 to 30 inches, yellowish brown channery loam
30 to 65 inches, brittle, yellowish brown and strong brown, mottled channery loam

Included with this soil in mapping are the well drained Berks, Gilpin, Jefferson, and Weikert soils. The

Berks, Gilpin, and Weikert soils are on uplands adjacent to the Laidig soil and on the side slopes of long drainageways that cross the colluvial areas. The Jefferson soils are in landscape positions similar to those of the Laidig soil. They do not have a fragipan. Also included are stony soils and moderately well drained soils that have a fragipan at a depth of less than 30 inches. Included soils make up about 25 percent of this unit.

Important soil properties—

Permeability: Moderate or moderately rapid above the fragipan; moderately slow in the fragipan
Available water capacity: Low
Surface runoff: Medium
Erosion potential: Medium
Organic matter content: Low to moderate
Natural fertility: Low
Soil reaction: Extremely acid to strongly acid
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: 30 to 48 inches
Flooding: None

Most areas of this soil are used for pasture or woodland. The remainder is cultivated.

This soil is well suited to cultivated crops. The potential for erosion is a management concern. Conservation tillage and crop rotations that include grasses and legumes help to control runoff and erosion and conserve moisture. Crop residue should be kept on the surface or incorporated into the plow layer to maintain tilth.

This soil is well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotating grazing among pastures, deferring grazing, controlling weeds, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on this soil is moderately high. The estimated production for northern red oak is 288 board feet per acre. The soil has few limitations affecting woodland management and logging activities. Operating heavy equipment when the soil is too wet, however, can result in surface disturbance and increase the hazard of erosion. Seedlings survive and grow well.

The moderately slow permeability in the fragipan and the perched seasonal high water table limit the use of this soil for community development, especially for sanitary facilities and building sites. The potential for frost action and low strength limit the use of this soil for local roads and streets. The soil is well suited to most recreational uses.

Capability subclass: IIe.

34C—Laidig channery loam, 7 to 15 percent slopes. This soil is very deep, strongly sloping, and well drained. It is on colluvial fans, at the concave head of drainageways, and on toe slopes in the foothills of the mountains. Areas are long and winding and range from about 3 to 75 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 2 inches, dark grayish brown channery loam

Subsoil:
2 to 30 inches, yellowish brown channery loam
30 to 65 inches, brittle, yellowish brown and strong brown, mottled channery loam

Included with this soil in mapping are the well drained Berks, Gilpin, Jefferson, and Weikert soils. The Berks, Gilpin, and Weikert soils are on uplands adjacent to the Laidig soil and on the side slopes of long drainageways that cross the colluvial areas. The Jefferson soils are in landscape positions similar to those of the Laidig soil. They do not have a fragipan. Also included are stony and very stony soils and moderately well drained soils that have a fragipan at a depth of less than 30 inches. Included soils make up about 25 percent of this unit.

Important soil properties—

Permeability: Moderate or moderately rapid above the fragipan; moderately slow in the fragipan
Available water capacity: Low
Surface runoff: Medium
Erosion potential: Medium
Organic matter content: Low to moderate
Natural fertility: Low
Soil reaction: Extremely acid to strongly acid
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: 30 to 48 inches
Flooding: None

Most areas of this soil are used as woodland or pasture. The remainder is cultivated.

This soil is moderately well suited to cultivated crops. The potential for erosion is a major management concern. Conservation tillage and crop rotations that include grasses and legumes help to control runoff and erosion and conserve moisture. Crop residue should be

kept on the surface or incorporated into the plow layer to maintain tilth.

This soil is moderately well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotating grazing among pastures, deferring grazing, controlling weeds, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on this soil is moderately high. The estimated production for northern red oak is 288 board feet per acre. The soil has few limitations affecting woodland management and logging activities. Operating heavy equipment when the soil is too wet, however, can result in surface disturbance and increase the hazard of erosion.

The moderately slow permeability in the fragipan, the perched seasonal high water table, and the slope limit the use of this soil for community development, especially for sanitary facilities and building sites. The slope, the potential for frost action, and low strength limit the use of this soil for local roads and streets. The slope is a limitation affecting recreational uses, such as campgrounds, picnic areas, and playgrounds.

Capability subclass: IIIe.

35C—Laidig channery loam, 2 to 15 percent slopes. This soil is very deep, gently sloping to strongly sloping, and well drained. It is on colluvial fans, at the concave head of drainageways, and on toe slopes in the foothills of the mountains. Areas are long and winding and range from about 10 to 50 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 2 inches, dark grayish brown channery loam

Subsoil:
2 to 30 inches, yellowish brown channery loam
30 to 65 inches, brittle, yellowish brown and strong brown, mottled channery loam

Included with this soil in mapping are the well drained Berks, Gilpin, and Jefferson soils. The Berks and Gilpin soils are on uplands adjacent to the Laidig soil and on the side slopes of long drainageways that cross the colluvial areas. The Jefferson soils are in landscape positions similar to those of the Laidig soil. They do not have a fragipan. Also included are stony soils and moderately well drained soils that have a fragipan at a depth of less than 30 inches. Included soils make up about 25 percent of this unit.

Important soil properties—

Permeability: Moderate or moderately rapid above the fragipan; moderately slow in the fragipan
Available water capacity: Low
Surface runoff: Medium or rapid
Erosion potential: Medium
Organic matter content: Low to moderate
Natural fertility: Low
Soil reaction: Extremely acid to strongly acid
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: 30 to 48 inches
Flooding: None

Most areas of this soil are used as woodland.

This soil is moderately well suited to cultivated crops. The potential for erosion is a management concern. Conservation tillage and crop rotations that include grasses and legumes help to control runoff and erosion and conserve moisture.

This soil is moderately well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotating grazing among pastures, deferring grazing, controlling weeds, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on this soil is moderately high. The estimated production for northern red oak is 288 board feet per acre. This soil has few limitations affecting woodland management and logging activities. Operating heavy equipment when the soil is too wet, however, can result in surface disturbance and increase the hazard of erosion.

The moderately slow permeability in the fragipan, the perched seasonal high water table, and the slope limit the use of this soil for community development, especially for sanitary facilities and building sites. The slope, the potential for frost action, and low strength limit the use of this soil for local roads and streets. The slope is a limitation affecting recreational uses, such as campgrounds, picnic areas, and playgrounds.

Capability subclass: IIIe.

35D—Laidig channery loam, 15 to 35 percent slopes. This soil is very deep, moderately steep or steep, and well drained. It is on colluvial fans, at the concave head of drainageways, and on foot slopes in the foothills of the mountains. Areas are long and winding and range from about 10 to 50 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 2 inches, dark grayish brown channery loam

Subsoil:
2 to 30 inches, yellowish brown channery loam
30 to 65 inches, brittle, yellowish brown and strong brown, mottled channery loam

Included with this soil in mapping are the well drained Berks, Gilpin, Jefferson, and Weikert soils. The Berks, Gilpin, and Weikert soils are on uplands adjacent to the Laidig soil and on the side slopes of long drainageways that cross the colluvial areas. The Jefferson soils are in landscape positions similar to those of the Laidig soil. They do not have a fragipan. Also included are stony and very stony soils and moderately well drained soils that have a fragipan at a depth of less than 30 inches. Included soils make up about 25 percent of this unit.

Important soil properties—

Permeability: Moderate or moderately rapid above the fragipan; moderately slow in the fragipan
Available water capacity: Low
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low to moderate
Natural fertility: Low
Soil reaction: Extremely acid to strongly acid
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: 30 to 48 inches
Flooding: None

Most areas of this soil are used as woodland. The soil is not suited to farming because of the slope.

The potential productivity for trees on this soil is moderately high. The estimated production for northern red oak is 288 board feet per acre on north aspects and 278 board feet per acre on south aspects. The slope is the major limitation affecting woodland management and logging activities. Operating heavy equipment when the soil is too wet can result in surface disturbance and increase the hazard of erosion.

This soil is fairly well suited to use as habitat for openland wildlife and woodland wildlife.

The slope is a limitation affecting community development and recreational uses.

Capability subclass: VIe.

36B—Laidig channery loam, 2 to 7 percent slopes, stony. This soil is very deep, gently sloping, and well drained. It is on colluvial fans, at the concave head of drainageways, and on toe slopes in the foothills of the mountains. Stones about 10 to 24 inches in diameter and about 24 to 80 feet apart cover up to 0.1 percent of the surface. Areas are long and winding and range from about 3 to 100 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 2 inches, dark grayish brown channery loam

Subsoil:
2 to 30 inches, yellowish brown channery loam
30 to 65 inches, brittle, yellowish brown and strong brown, mottled channery loam

Included with this soil in mapping are the well drained Berks, Gilpin, Jefferson, and Weikert soils. The Berks, Gilpin, and Weikert soils are on uplands adjacent to the Laidig soil and on the side slopes of long drainageways that cross the colluvial areas. The Jefferson soils are in landscape positions similar to those of the Laidig soil. They do not have a fragipan. Also included are stony soils, soils that have a fragipan at a depth of less than 30 inches, and soils that are moderately well drained. Included soils make up about 25 percent of this unit.

Important soil properties—

Permeability: Moderate or moderately rapid above the fragipan; moderately slow in the fragipan
Available water capacity: Low
Surface runoff: Medium
Erosion potential: Medium
Organic matter content: Low to moderate
Natural fertility: Low
Soil reaction: Extremely acid to strongly acid
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: 30 to 48 inches
Flooding: None

All areas of this soil are used for pasture or woodland.

This soil is moderately well suited to cultivated crops. The potential for erosion is a management concern. The stones on the surface interfere with tillage. The soil is droughty during the growing season. Conservation tillage and crop rotations that include grasses and legumes help to control runoff and erosion and conserve moisture. Crop residue should be kept on the surface or incorporated into the plow layer to maintain tilth.

This soil is moderately well suited to pasture and hay. The stones on the surface interfere with pasture maintenance and mowing. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotating grazing among pastures, deferring grazing, controlling weeds, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on this soil is moderately high. The estimated production for northern red oak is 288 board feet per acre. The soil has few limitations affecting woodland management and logging activities. Operating heavy equipment when the soil is

too wet, however, can result in surface disturbance and increase the hazard of erosion.

The moderately slow permeability in the fragipan and the perched seasonal high water table limit the use of this soil for community development, especially for sanitary facilities and building sites. The potential for frost action and low strength are limitations affecting local roads and streets. The large stones limit the use of this soil for lawns and landscaping, golf fairways, and playgrounds.

Capability subclass: IIIs.

36C—Laidig channery loam, 7 to 15 percent slopes, stony. This soil is very deep, strongly sloping, and well drained. It is on colluvial fans, at the concave head of drainageways, and on toe slopes in the foothills of the mountains. Areas are long and winding and range from about 3 to 150 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 2 inches, dark grayish brown channery loam

Subsoil:
2 to 30 inches, yellowish brown channery loam
30 to 65 inches, brittle, yellowish brown and strong brown, mottled channery loam

Included with this soil in mapping are the well drained Berks, Gilpin, Jefferson, and Weikert soils. The Berks, Gilpin, and Weikert soils are on uplands adjacent to the Laidig soil and on the side slopes of long drainageways that cross the colluvial areas. The Jefferson soils are in landscape positions similar to those of the Laidig soil. They do not have a fragipan. Also included are stony soils and moderately well drained soils that have a fragipan at a depth of less than 30 inches. Included soils make up about 25 percent of this unit.

Important soil properties—

Permeability: Moderate or moderately rapid above the fragipan; moderately slow in the fragipan
Available water capacity: Low
Surface runoff: Rapid
Erosion potential: Medium
Organic matter content: Low to moderate
Natural fertility: Low
Soil reaction: Extremely acid to strongly acid
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: 30 to 48 inches
Flooding: None

All areas of this soil are used for pasture or woodland. Because of the slope and the large stones on the surface, this soil is poorly suited to cultivated crops. The potential for erosion is a major management concern. If cultivated crops are grown, conservation tillage and crop rotations that include grasses and legumes help to control runoff and erosion and conserve moisture. Crop residue should be kept on the surface or incorporated into the plow layer to maintain tilth.

This soil is moderately well suited to pasture and hay. The large stones on the surface interfere with pasture maintenance and mowing. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotating grazing among pastures, deferring grazing, controlling weeds, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on this soil is moderately high. The estimated production for northern red oak is 288 board feet per acre. The soil has few limitations affecting woodland management and logging activities. Operating heavy equipment when the soil is too wet, however, can result in surface disturbance and increase the hazard of erosion.

The moderately slow permeability in the fragipan and the perched seasonal high water table limit the use of this soil for community development, especially for sanitary facilities and building sites. The slope, low strength, and the potential for frost action limit the use of this soil for local roads and streets. The slope and the large stones are limitations affecting recreational uses, such as camp areas, picnic areas, and playgrounds.

Capability subclass: IVs.

37C—Laidig channery loam, 2 to 15 percent slopes, very stony. This soil is very deep, gently sloping to strongly sloping, and well drained. It is on colluvial fans, at the concave head of drainageways, and on toe slopes in the foothills of the mountains. Areas are long and winding and range from about 5 to 100 acres. Stones about 10 to 24 inches in diameter and about 3 to 24 feet apart cover up to 3 percent of the surface.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 2 inches, dark grayish brown channery loam

Subsoil:
2 to 30 inches, yellowish brown channery loam
30 to 65 inches, brittle, yellowish brown and strong brown, mottled channery loam

Included with this soil in mapping are Berks, Jefferson, and Gilpin soils. The Berks and Gilpin soils are in the higher areas. The Jefferson soils are in landscape positions similar to those of the Laidig soil. They do not have a fragipan. Also included are extremely stony soils, soils that have fewer stones on the surface than the Laidig soil, and moderately well drained soils that have a fragipan at a depth of less than 30 inches. Included soils make up about 15 percent of this unit.

Important soil properties—

Permeability: Moderate or moderately rapid above the fragipan; moderately slow in the fragipan
Available water capacity: Low
Surface runoff: Medium or rapid
Erosion potential: Medium
Organic matter content: Low to moderate
Natural fertility: Low
Soil reaction: Extremely acid to strongly acid
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: 30 to 48 inches
Flooding: None

Most areas of this soil are used as woodland. A small acreage is used for pasture.

This soil is not suited to cultivated crops. Because of the large stones on the surface, only light machinery and hand tools can be used. Other limitations are the shallow rooting depth, the low available water capacity, the acidity, the low natural fertility, and the high content of rock fragments.

This soil is poorly suited to pasture and is not suited to hay. The large stones on the surface, the low available water capacity, the acidity, and the low natural fertility are limitations affecting establishing and maintaining pastures. The large stones on the surface especially limit the use of machinery. In areas that are used for pasture, using proper stocking rates, rotating grazing among pastures, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on this soil is moderately high. The estimated production for northern red oak is 288 board feet per acre. The surface stones and prolonged wet periods limit woodland management and logging activities.

The moderately slow permeability in the fragipan, the perched seasonal high water table, the slope, and the high content of large stones on the surface are limitations affecting community development. The slope, low strength, and the potential for frost action limit the use of this soil for local roads and streets. The large stones and the slope are limitations affecting lawns, golf fairways, and recreational uses, such as campgrounds, picnic areas, and playgrounds.

Capability subclass: VIIs.

37D—Laidig channery loam, 15 to 35 percent slopes, very stony. This soil is very deep, moderately steep or steep, and well drained. It is on colluvial fans, at the concave head of drainageways, and on foot slopes in the foothills of the mountains. Areas are long and winding and range from about 5 to 100 acres. Stones about 10 to 24 inches in diameter and about 3 to 24 feet apart cover up to 3 percent of the surface.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 2 inches, dark grayish brown channery loam

Subsoil:
2 to 30 inches, yellowish brown channery loam
30 to 65 inches, brittle, yellowish brown and strong brown, mottled channery loam

Included with this soil in mapping are Berks, Gilpin, and Jefferson soils. The Berks and Gilpin soils are on uplands. The Jefferson soils are in landscape positions similar to those of the Laidig soil. They do not have a fragipan. Also included are soils that have more stones on the surface than the Laidig soils, soils that have fewer stones on the surface, and moderately well drained soils that have a fragipan at a depth of less than 30 inches. Included soils make up about 10 percent of this unit.

Important soil properties—

Permeability: Moderate or moderately rapid above the fragipan; moderately slow in the fragipan
Available water capacity: Low
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low to moderate
Natural fertility: Low
Soil reaction: Extremely acid to strongly acid
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: 30 to 48 inches
Flooding: None

Most areas of this soil are used as woodland. Because of the slope and the large stones on the surface, this soil is unsuited to farming.

The potential productivity for trees on this soil is moderately high. The estimated production for northern

red oak is 288 board feet per acre on north aspects and 278 board feet per acre on south aspects. The large stones on the surface, the slope, and prolonged wet periods limit woodland management and logging activities.

Because of the large stones on the surface and the slope, this soil generally is poorly suited to use as habitat for openland wildlife and only fairly well suited to use as habitat for woodland wildlife.

The slope is a limitation affecting community development. The slope and the large stones are limitations affecting recreational uses, such as campgrounds, picnic areas, and playgrounds.

Capability subclass: VIIe.

37E—Laidig channery loam, 35 to 55 percent slopes, very stony. This soil is very deep, steep to very steep, and well drained. It is on colluvial fans, at the concave head of drainageways, and on the side slopes of hills and ridges in the mountains. Areas are broad, irregularly shaped, and winding. They range from about 5 to 200 acres. Stones more than 15 inches long, about 10 to 24 inches in diameter, and about 3 to 24 feet apart cover up to 3 percent of the surface.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 2 inches, dark grayish brown channery loam

Subsoil:
2 to 30 inches, yellowish brown channery loam
30 to 65 inches, brittle, yellowish brown and strong brown, mottled channery loam

Included with this soil in mapping are Berks, Gilpin, and Jefferson soils. The Berks and Gilpin soils are on uplands. The Jefferson soils are in landscape positions similar to those of the Laidig soil. They do not have a fragipan. Also included are soils that have more stones on the surface than the Laidig soil, soils that have fewer stones on the surface, and moderately well drained soils that have a fragipan at a depth of less than 30 inches. Included soils make up about 15 percent of this unit.

Important soil properties—

Permeability: Moderate or moderately rapid above the fragipan; moderately slow in the fragipan
Available water capacity: Low
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low to moderate
Natural fertility: Low
Soil reaction: Extremely acid to strongly acid
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: 30 to 48 inches
Flooding: None

Most areas of this soil are used as woodland. Because of the slope and the large stones on the surface, this soil is unsuited to farming.

The potential productivity for trees on this soil is moderately high. The estimated production for northern red oak is 288 board feet per acre on north aspects and 278 board feet per acre on south aspects. The large stones on the surface, the slope, and prolonged wet periods limit woodland management and logging activities.

Because of the large stones on the surface and the slope, this soil generally is poorly suited to use as a habitat for openland wildlife and only fairly well suited to use as a habitat for woodland wildlife.

The slope limits the use of this soil for community development. The slope and the large stones are limitations affecting recreational development.

Capability subclass: VIIe.

38B—Lehew and Gainesboro soils, 2 to 7 percent slopes. These are moderately deep, gently sloping, well drained soils on the broad summits and shoulders of hills and ridges in the southwestern part of the county. Areas are long and winding and range from about 10 to 75 acres. Some consist mostly of Lehew soil, some mostly of Gainesboro soil, and some of both. The total acreage of this unit is about 45 percent Lehew soil, 30 percent Gainesboro soil, and 25 percent other soils. The Lehew and Gainesboro soils were mapped together because they have no major differences affecting use and management.

A typical profile of the Lehew soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 2 inches, dark gray channery loam
2 to 4 inches, dark brown channery loam

Subsoil:
4 to 12 inches, reddish brown channery fine sandy loam
12 to 20 inches, reddish brown very channery fine sandy loam

Substratum:
20 to 24 inches, reddish brown very channery fine sandy loam
24 inches, sandstone bedrock

A typical profile of the Gainesboro soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 7 inches, dark reddish brown channery silt loam

Subsoil:
7 to 15 inches, reddish brown channery silty clay loam
15 to 24 inches, reddish brown very channery silty clay loam

Substratum:
24 to 30 inches, reddish brown extremely channery silty clay loam
30 inches, hard, red shale and fine-grained sandstone bedrock

Included with these soils in mapping are Berks and Wallen soils. These included soils are in landscape positions similar to those of the Lehew and Gainesboro soils. They have a yellowish brown subsoil. Also included are reddish brown channery soils that are shallow over bedrock.

Important properties of the Lehew soil—

Permeability: Moderately rapid or rapid
Available water capacity: Very low
Surface runoff: Medium
Erosion potential: Medium
Organic matter content: Low to moderate
Natural fertility: Low or medium
Soil reaction: Very strongly acid or strongly acid
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Important properties of the Gainesboro soil—

Permeability: Moderate or moderately rapid
Available water capacity: Low
Surface runoff: Medium
Erosion potential: Medium
Organic matter content: Low
Natural fertility: Low
Soil reaction: Extremely acid to slightly acid
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

About half of the acreage of this map unit is farmed. The rest is wooded.

These soils are well suited to cultivated crops. The low or very low available water capacity, the medium potential for erosion, and the acidity are the major management concerns. Conservation tillage, cover crops, a cropping system that includes grasses and legumes, and the incorporation of crop residue into the soil help to increase or maintain the content of organic matter, improve or maintain tilth, minimize crusting, and increase the rate of water infiltration. Crops respond well to applications of lime and fertilizer.

This unit is well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, rotating grazing among pastures, using proper stocking rates, deferring grazing, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees is moderate on the Lehew soil and moderately high on the Gainesboro soil. The estimated production for northern red oak is 250 board feet per acre on the Lehew soil and 280 board feet per acre on the Gainesboro soil. The survival of seeds and seedlings is limited by the low or very low available water capacity and the high content of rock fragments.

The depth to bedrock limits the use of these soils for community development, especially for building sites and sanitary facilities. The small stones and low or very low available water capacity are limitations affecting lawns and landscaping and golf fairways. The small stones limit the use of these soils for camp areas, picnic areas, and playgrounds.

Capability subclass: IIe.

38C—Lehew and Gainesboro soils, 7 to 15 percent slopes. These are moderately deep, strongly sloping, well drained soils on the side slopes and nose slopes of hills and ridges in the southwestern part of the county. Areas are long and winding and range from about 10 to 150 acres. Some consist mostly of Lehew soil, some mostly of Gainesboro soil, and some of both. The total acreage of this unit is about 45 percent Lehew soil, 30 percent Gainesboro soil, and 25 percent other soils. The Lehew and Gainesboro soils were mapped together because they have no major differences affecting use and management.

A typical profile of the Lehew soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 2 inches, dark gray channery loam
2 to 4 inches, dark brown channery loam

Subsoil:
4 to 12 inches, reddish brown channery fine sandy loam
12 to 20 inches, reddish brown very channery fine sandy loam

Substratum:
20 to 24 inches, reddish brown very channery fine sandy loam
24 inches, sandstone bedrock

A typical profile of the Gainesboro soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 7 inches, dark reddish brown channery silt loam

Subsoil:
7 to 15 inches, reddish brown channery silty clay loam
15 to 24 inches, reddish brown very channery silty clay loam

Substratum:
24 to 30 inches, reddish brown extremely channery silty clay loam
30 inches, hard, red shale and fine-grained sandstone bedrock

Included with these soils in mapping are Berks and Wallen soils. These included soils are in landscape positions similar to those of the Lehew and Gainesboro soils. They have a yellowish brown subsoil. Also included are reddish brown channery soils that are shallow over bedrock.

Important properties of the Lehew soil—

Permeability: Moderately rapid or rapid
Available water capacity: Very low
Surface runoff: Rapid
Erosion potential: Medium
Organic matter content: Low to moderate
Natural fertility: Low or medium
Soil reaction: Very strongly acid or strongly acid
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Important properties of the Gainesboro soil—

Permeability: Moderate or moderately rapid
Available water capacity: Low
Surface runoff: Rapid
Erosion potential: High
Organic matter content: Low
Natural fertility: Low
Soil reaction: Extremely acid to slightly acid
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

These soils are used for cultivated crops, pasture, or woodland.

These soils are moderately well suited to cultivated crops. The low or very low available water capacity, the slope, and the acidity are the major management concerns. Conservation tillage, cover crops, a cropping system that includes grasses and legumes, and the incorporation of crop residue into the soil increase the content of organic matter, maintain tilth, minimize crusting, and increase the rate of water infiltration. Crops respond well to applications of lime and fertilizer.

This unit is moderately well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, rotating grazing among pastures, using proper stocking rates, deferring grazing, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees is moderate on the Lehew soil and moderately high on the Gainesboro soil. The estimated production for northern red oak is 250 board feet per acre on the Lehew soil and 280 board feet per acre on the Gainesboro soil. The survival of seeds and seedlings is limited by the low or very low available water capacity and the high content of rock fragments.

The slope and the depth to bedrock limit the use of these soils for community development, especially for building sites and sanitary facilities. The depth to bedrock, the slope, and low strength are limitations affecting local roads and streets. The small stones and the slope limit the use of this soil for camp areas, picnic areas, and playgrounds.

Capability subclass: IIIe.

38D—Lehew and Gainesboro soils, 15 to 25 percent slopes. These are moderately deep, steep, well drained soils on the side slopes of hills and ridges in the southwestern part of the county. Areas are long and winding and range from about 10 to 175 acres. Some consist mostly of Lehew soil, some mostly of Gainesboro soil, and some of both. The total acreage of this unit is about 45 percent Lehew soil, 30 percent Gainesboro soil, and 25 percent other soils. The Lehew and Gainesboro soils were mapped together because they have no major differences affecting use and management.

A typical profile of the Lehew soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 2 inches, dark gray channery loam
2 to 4 inches, dark brown channery loam

Subsoil:
4 to 12 inches, reddish brown channery fine sandy loam
12 to 20 inches, reddish brown very channery fine sandy loam

Substratum:
20 to 24 inches, reddish brown very channery fine sandy loam
24 inches, sandstone bedrock

A typical profile of the Gainesboro soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 7 inches, dark reddish brown channery silt loam

Subsoil:
7 to 15 inches, reddish brown channery silty clay loam
15 to 24 inches, reddish brown very channery silty clay loam

Substratum:
24 to 30 inches, reddish brown extremely channery silty clay loam
30 inches, hard, red shale and fine-grained sandstone bedrock

Included with these soils in mapping are Wallen soils. These included soils occur along the crest of the ridges. Also included are reddish brown channery soils that are shallow over bedrock.

Important properties of the Lehew soil—

Permeability: Moderately rapid or rapid
Available water capacity: Very low
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low to moderate
Natural fertility: Low or medium
Soil reaction: Very strongly acid or strongly acid
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Important properties of the Gainesboro soil—

Permeability: Moderate or moderately rapid
Available water capacity: Low
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low
Natural fertility: Low
Soil reaction: Extremely acid to slightly acid
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Nearly all areas of these soils are used as woodland. A few areas are used for pasture.

These soils are poorly suited to cultivated crops or hay. The low or very low available water capacity, the acidity, and the slope limit the use of these soils for cultivated crops.

These soils are moderately well suited to pasture. The low or very low available water capacity, the acidity, and the potential for erosion are the major management concerns. Establishing and maintaining a mixture of grasses and legumes, rotating grazing among pastures, using proper stocking rates, deferring grazing, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures and help to control erosion. Applying lime will offset the acidity of these soils.

The potential productivity for trees is moderate on north and south aspects in areas of the Lehew soil and moderately high on north aspects and moderate on south aspects in areas of the Gainesboro soil. On north aspects the estimated production for northern red oak is 250 board feet per acre on the Lehew soil and 280 board feet per acre on the Gainesboro soil. On south aspects it is 204 board feet per acre on the Lehew soil and 235 board feet per acre on the Gainesboro soil. The survival of seeds and seedlings is limited by the low or very low available water capacity and the high content of rock fragments.

The slope and the depth to bedrock limit the use of these soils for community development, especially for building sites and sanitary facilities. The slope is a limitation affecting camp areas, picnic areas, and playgrounds.

Capability subclass: IVe.

38E—Lehew and Gainesboro soils, 25 to 35 percent slopes. These are moderately deep, steep, well drained soils on the side slopes of hills and ridges in the southwestern part of the county. Areas are long and winding and range from about 10 to 150 acres. Some consist mostly of Lehew soil, some mostly of Gainesboro soil, and some of both. The total acreage of this unit is about 45 percent Lehew soil, 30 percent Gainesboro soil, and 25 percent other soils. The Lehew and Gainesboro soils were mapped together because they have no major differences affecting use and management.

A typical profile of the Lehew soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 2 inches, dark gray channery loam
2 to 4 inches, dark brown channery loam

Subsoil:
4 to 12 inches, reddish brown channery fine sandy loam
12 to 20 inches, reddish brown very channery fine sandy loam

Substratum:
20 to 24 inches, reddish brown very channery fine sandy loam
24 inches, sandstone bedrock

A typical profile of the Gainesboro soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 7 inches, dark reddish brown channery silt loam

Subsoil:
7 to 15 inches, reddish brown channery silty clay loam
15 to 24 inches, reddish brown very channery silty clay loam

Substratum:
24 to 30 inches, reddish brown extremely channery silty clay loam
30 inches, hard, red shale and fine-grained sandstone bedrock

Included with these soils in mapping are Wallen soils. These included soils occur along the crest of the ridges. Also included are reddish brown channery soils that are shallow over bedrock.

Important properties of the Lehew soil—

Permeability: Moderately rapid or rapid
Available water capacity: Very low
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low to moderate
Natural fertility: Low or medium
Soil reaction: Very strongly acid or strongly acid
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Important properties of the Gainesboro soil—

Permeability: Moderate or moderately rapid
Available water capacity: Low
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low
Natural fertility: Low
Soil reaction: Extremely acid to slightly acid
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Nearly all areas of these soils are used as woodland. A few areas are used for pasture.

These soils are not suited to cultivated crops, hay, or pasture. The slope limits the safe operation of most farm equipment, and the soils are droughty during the growing season. The potential for erosion is a major management concern.

The potential productivity for trees is moderate on north and south aspects in areas of the Lehew soil and moderately high on north aspects and moderate on south aspects in areas of the Gainesboro soil. On north aspects the estimated production for northern red oak is 250 board feet per acre on the Lehew soil and 280 board feet per acre on the Gainesboro soil. On south aspects it is 204 board feet per acre on the Lehew soil and 235 board feet per acre on the Gainesboro soil. The survival of seeds and seedlings is limited by the low or very low available water capacity and the high content of rock fragments.

The slope and the depth to bedrock limit the use of these soils for community development, especially for building sites and sanitary facilities. The slope is a limitation affecting camp areas, picnic areas, playgrounds, and paths and trails.

Capability subclass: VIe.

39A—Massanetta silt loam, 0 to 2 percent slopes, occasionally flooded. This soil is very deep, nearly level, and moderately well drained. It is on flood plains in the Shenandoah Valley. Areas commonly are long and winding. They range from about 5 to 100 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 11 inches, very dark grayish brown silt loam

Subsoil:
11 to 22 inches, very dark gray silt loam
22 to 32 inches, very dark grayish brown loam
32 to 40 inches, dark grayish brown, mottled loam

Substratum:
40 to 62 inches, brown, mottled loam

Included with this soil in mapping are the well drained Broadway soils. These soils are in landscape positions similar to those of the Massanetta soil. They make up about 10 percent of the unit.

Important soil properties—

Permeability: Moderate
Available water capacity: Moderate
Surface runoff: Slow
Erosion potential: Low
Organic matter content: High
Natural fertility: High
Soil reaction: Mildly alkaline or moderately alkaline
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: 24 to 42 inches
Flooding: Occasional, very brief

Most areas of this soil are used for cultivated crops or pasture. The soil is well suited to cultivated crops. Seasonal wetness often delays tillage and planting in the spring, and the flooding occasionally damages the crops and results in reduced yields. Conservation tillage and crop rotations that include grasses and legumes help to control runoff and erosion and conserve moisture. Tilth is good and can be maintained by cultivating only at the proper moisture content. Crops respond well to applications of fertilizer. Lime generally is not needed.

This soil is well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotating grazing among pastures, deferring grazing, and applying fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on this soil is moderately high. The estimated production for northern red oak is 375 board feet per acre. Seeds and seedlings survive and grow well if plant competition is controlled.

The seasonal high water table and the flooding limit the use of this soil for community development, especially for sanitary facilities and building sites. The flooding is a hazard affecting local roads and streets, lawns and landscaping, and campgrounds. The wetness limits the use of this soil for picnic areas and playgrounds.

Capability subclass: IIw.

40D—Massanutten channery silt loam, 15 to 35 percent slopes. This soil is moderately deep, moderately steep or steep, and well drained. It is on the dissected side slopes of foothills in the mountains. Areas are long and winding and range from about 10 to 75 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 2 inches, dark gray channery silt loam

Subsoil:
2 to 4 inches, yellowish brown channery silt loam
4 to 11 inches, brown silt loam
11 to 21 inches, brown channery silt loam

Substratum:
21 to 24 inches, brown extremely channery silt loam
24 inches, sandstone bedrock

Included with this soil in mapping are the well drained Jefferson and Weikert soils. The Jefferson soils are on colluvial slopes near the boundary of the mapped areas. The Weikert soils are in landscape positions similar to those of the Massanutten soil. They have more rock fragments throughout than the Massanutten soil. They are less than 20 inches to bedrock. Also included are rock outcrop, soils that have slopes of less than 15 percent, and very stony soils at the head of drainageways. Included areas make up about 20 percent of this unit.

Important soil properties—

Permeability: Moderately rapid
Available water capacity: Low
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low
Natural fertility: Low
Soil reaction: Extremely acid to strongly acid
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are used as woodland. Because of the slope and the depth to bedrock, this soil is unsuitable for farming.

The potential productivity for trees on this soil is moderate on north and south aspects. The estimated production for northern red oak is 265 board feet per acre on north aspects and 210 board feet per acre on south aspects. Seedling survival and growth are often limited by the low available water capacity, the acidity, and the low natural fertility of the soil. The slope limits the safe operation of most woodland equipment. Establishing skid trails on the contour reduces the erosion hazard.

The depth to bedrock, the slope, and seepage limit the use of this soil for community development,

especially for sanitary facilities and building sites. The slope is a limitation affecting local roads and streets, lawns and landscaping, and recreational development.

Capability subclass: VIe.

40E—Massanutten channery silt loam, 35 to 55 percent slopes. This soil is moderately deep, very steep, and well drained. It is on the dissected side slopes of ridges in the mountains. Areas are long and winding and range from about 10 to 75 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 2 inches, dark gray channery silt loam

Subsoil:
2 to 4 inches, yellowish brown channery silt loam
4 to 11 inches, brown silt loam
11 to 21 inches, brown channery silt loam

Substratum:
21 to 24 inches, brown extremely channery silt loam
24 inches, sandstone bedrock

Included with this soil in mapping are the well drained Jefferson and Weikert soils. The Jefferson soils are mostly near the boundary of the mapped areas. The Weikert soils are in landscape positions similar to those of the Massanutten soil. They have more rock fragments throughout than the Massanutten soil. They are less than 20 inches deep over bedrock. Also included are rock outcrop and very stony soils at the head of drainageways. Included areas make up about 20 percent of this unit.

Important soil properties—

Permeability: Moderately rapid
Available water capacity: Low
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low
Natural fertility: Low
Soil reaction: Extremely acid to strongly acid
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

All areas of this soil are wooded and are in the George Washington National Forest. Because of the slope, the soil is unsuited to farming.

The potential productivity for trees on this soil is moderate on north and south aspects. The estimated production for northern red oak is 265 board feet per acre on north aspects and 210 board feet per acre on south aspects. Seedling survival and growth are often limited by the low available water capacity, the acidity, and the low natural fertility of the soil. The slope limits the safe operation of most woodland equipment. Establishing skid trails on the contour reduces the erosion hazard.

The slope, the depth to bedrock, and seepage are limitations affecting community development and most recreational uses. The slope limits the use of this soil as a site for local roads and streets.

Capability subclass: VIIe.

41D—Massanutten channery silt loam, 15 to 35 percent slopes, very stony. This soil is moderately deep, moderately steep or steep, and well drained. It is on the dissected side slopes of foothills in the mountains. Areas are long and winding and range from about 5 to 150 acres. Stones about 10 to 24 inches in diameter and about 3 to 24 feet apart cover up to 3 percent of the surface.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 2 inches, dark gray channery silt loam

Subsoil:
2 to 4 inches, yellowish brown channery silt loam
4 to 11 inches, brown silt loam
11 to 21 inches, brown channery silt loam

Substratum:
21 to 24 inches, brown extremely channery silt loam
24 inches, sandstone bedrock

Included with this soil in mapping are the well drained Jefferson and Weikert soils. The Jefferson soils are on colluvial slopes near the boundary of the mapped areas. The Weikert soils are in landscape positions similar to those of the Massanutten soil. They have more rock fragments throughout than the Massanutten soil. They are less than 20 inches deep over bedrock. Also included are rock outcrop, soils that have slopes of less than 15 percent, and extremely stony soils at the head of drainageways. Included areas make up about 20 percent of this unit.

Important soil properties—

Permeability: Moderately rapid
Available water capacity: Low
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low
Natural fertility: Low
Soil reaction: Extremely acid to strongly acid

Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are used as woodland. Because of the slope, the large stones, the acidity, and the low available water capacity, the soil is unsuitable for farming.

The potential productivity for trees on this soil is moderate on north and south aspects. The estimated production for northern red oak is 265 board feet per acre on north aspects and 210 board feet per acre on south aspects. Seedling survival and growth are often limited by the low available water capacity, the acidity, and the low natural fertility of the soil. The slope and the large stones on the surface severely restrict the use of woodland equipment.

The depth to bedrock, the slope, and the large stones on the surface are limitations affecting community development and most recreational uses. The slope limits the use of this soil for local roads and streets.

Capability subclass: VIIs.

41E—Massanutten channery silt loam, 35 to 55 percent slopes, very stony. This soil is moderately deep, very steep, and well drained. It is on the dissected side slopes of foothills in the mountains. Areas are long and winding and range from about 5 to 100 acres. Stones about 10 to 24 inches in diameter and about 3 to 24 feet apart cover up to 3 percent of the surface.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 2 inches, dark gray channery silt loam

Subsoil:
2 to 4 inches, yellowish brown channery silt loam
4 to 11 inches, brown silt loam
11 to 21 inches, brown channery silt loam

Substratum:
21 to 24 inches, brown extremely channery silt loam
24 inches, sandstone bedrock

Included with this soil in mapping are the well drained Jefferson and Weikert soils. The Jefferson soils are on colluvial slopes near the boundary of the mapped areas. The Weikert soils are in landscape positions similar to those of the Massanutten soil. They have more rock fragments throughout than the Massanutten soil. They are less than 20 inches deep over bedrock. Also included are rock outcrops, which are generally on ridgetops; soils that have slopes of more than 55 percent; and extremely stony soils at the head of drainageways. Included areas make up about 20 percent of this unit.

Important soil properties—

Permeability: Moderately rapid
Available water capacity: Low
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low
Natural fertility: Low
Soil reaction: Extremely acid to strongly acid
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

All areas of this soil are wooded and are in the George Washington National Forest. Because of the slope, the acidity, the low available water capacity, the depth to bedrock, and the large stones on the surface, the soil is unsuitable for farming.

The potential productivity for trees on this soil is moderate on north and south aspects. The estimated production for northern red oak is 265 board feet per acre on north aspects and 210 board feet per acre on south aspects. Seedling survival and growth are limited by the low available water capacity, the acidity, and the low natural fertility. The slope and the large stones on the surface severely restrict the use of woodland equipment.

The depth to bedrock, the slope, and the large stones on the surface are limitations affecting community development and most recreational uses. The slope limits the use of this soil for local roads and streets.

Capability subclass: VIIe.

42A—Maurertown silty clay loam, 0 to 2 percent slopes. This soil is very deep, nearly level, and poorly drained. It is on stream terraces and in slack-water areas along streams and intermittent drainageways. Areas of this soil commonly are long and winding. They range from about 3 to 100 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 6 inches, dark grayish brown silty clay loam

Subsoil:
6 to 13 inches, olive gray, mottled silty clay loam

13 to 27 inches, dark gray, mottled silty clay
27 to 43 inches, dark gray, mottled silty clay loam
43 to 65 inches, gray, mottled silty clay

Included with this soil in mapping are the moderately well drained Coursey and somewhat poorly drained Toms soils. The Coursey soils are in the higher positions on the landscape. The Toms soils are in landscape positions similar to those of the Maurertown soil. They have brighter colors in the upper part of the subsoil than the Maurertown soil. Included soils make up about 20 percent of this unit.

Important soil properties—

Permeability: Very slow
Available water capacity: Moderate
Surface runoff: Very slow
Erosion potential: Low
Organic matter content: Moderate
Natural fertility: High
Soil reaction: Moderately acid to neutral
Depth to bedrock: More than 60 inches
Shrink-swell potential: High
Depth to a seasonal high water table: 0 to 6 inches
Flooding: None

Most areas of this soil are used for pasture. Some small areas are used for hay. Because of the seasonal high water table and the high content of clay, undrained areas of this soil are poorly suited to cultivated crops.

This soil is moderately well suited to pasture. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotating grazing among pastures, deferring grazing, and applying fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on this soil is high. The estimated production for yellow poplar is 500 board feet per acre.

The seasonal high water table, the very slow permeability, and the high content of clay in the subsoil limit the use of this soil for community development, especially for sanitary facilities and building sites. Wetness is a limitation affecting local roads and streets.

Capability subclass: IVw.

43B—Moomaw fine sandy loam, 2 to 7 percent slopes. This soil is very deep, gently sloping, and moderately well drained. It is on stream terraces in the Shenandoah Valley. Areas are oval or long and winding. They range from about 3 to 40 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 8 inches, dark brown fine sandy loam

Subsoil:
8 to 18 inches, yellowish brown, mottled clay loam
18 to 65 inches, brittle, light yellowish brown and yellowish brown, mottled sandy clay loam

Included with this soil in mapping are the well drained Alonzville, moderately well drained Coursey, and well drained Unison soils. These soils are in landscape positions similar to those of the Moomaw soil. They do not have a fragipan. Included soils make up about 20 percent of this unit.

Important soil properties—

Permeability: Moderate above the fragipan; slow in the fragipan
Available water capacity: Moderate
Surface runoff: Medium
Erosion potential: Medium
Organic matter content: Moderate
Natural fertility: Low
Soil reaction: Very strongly acid or strongly acid
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: 18 to 36 inches
Flooding: None

Most areas of this soil are used for cultivated crops or pasture. A small acreage is used as woodland.

This soil is well suited to cultivated crops. The surface layer is friable and can be easily tilled. The shallow rooting depth, the acidity, and the low natural fertility, however, are limitations affecting plant growth and crop yields. The potential for erosion is a management concern. Conservation tillage and crop rotations that include grasses and legumes help to control runoff and erosion, conserve moisture, and maintain the content of organic matter in the surface layer. Crops respond well to applications of lime and fertilizer.

This soil is well suited to pasture and hay. The shallow rooting depth, the acidity, and the low natural fertility are limitations affecting plant growth and yields. Establishing and maintaining a mixture of grasses and legumes, rotating grazing among pastures, deferring grazing, controlling weeds, using proper stocking rates, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on this soil is moderately high. The estimated production for northern red oak is 280 board feet per acre. Seedlings survive and grow well if competing vegetation is controlled.

The slow permeability in the fragipan and the perched seasonal high water table limit the use of this soil for community development, especially for sanitary facilities and building sites. Low strength and the

wetness limit the use of this soil for local roads and streets. The wetness is a limitation affecting most recreational uses.

Capability subclass: IIe.

43C—Moomaw fine sandy loam, 7 to 15 percent slopes. This soil is deep, strongly sloping, and moderately well drained. It is on stream terraces and in strongly sloping areas between terrace levels in the Shenandoah Valley. Areas are oval or long and winding. They range from about 3 to 40 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 8 inches, dark brown fine sandy loam

Subsoil:
8 to 18 inches, yellowish brown, mottled clay loam
18 to 65 inches, brittle, light yellowish brown and yellowish brown, mottled sandy clay loam

Included with this soil in mapping are the well drained Alonzville, moderately well drained Coursey, and well drained Unison soils. These soils are in landscape positions similar to those of the Moomaw soil. They do not have a fragipan. Also included are soils that have slopes of more than 15 percent. Included soils make up about 20 percent of this unit.

Important soil properties—

Permeability: Moderate above the fragipan; slow in the fragipan
Available water capacity: Moderate
Surface runoff: Rapid
Erosion potential: High
Organic matter content: Moderate
Natural fertility: Low
Soil reaction: Very strongly acid or strongly acid
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: 18 to 36 inches
Flooding: None

Most areas of this soil are used for cultivated crops or pasture. A small acreage is used as woodland.

This soil is moderately well suited to cultivated crops. The surface layer is friable and can be easily tilled. The shallow rooting depth, the acidity, and the low natural fertility, however, are limitations affecting plant growth and crop yields. The potential for erosion is a major management concern. Conservation tillage and crop rotations that include grasses and legumes help to control runoff and erosion, conserve moisture, and maintain the content of organic matter in the surface layer. Crops respond well to applications of lime and fertilizer.

This soil is moderately well suited to pasture and hay. The shallow rooting depth, the acidity, and the low natural fertility are limitations affecting plant growth and yields. Establishing and maintaining a mixture of grasses and legumes, rotating grazing among pastures, deferring grazing, controlling weeds, using proper stocking rates, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on this soil is moderately high. The estimated production for northern red oak is 280 board feet per acre. Seedlings survive and grow well if competing vegetation is controlled.

The slow permeability in the fragipan, the perched seasonal high water table, and the slope limit the use of this soil for community development, especially for sanitary facilities and building sites. The slope, low strength, and the wetness are limitations on sites for local roads and streets. The wetness and the slope are limitations affecting most recreational uses.

Capability subclass: IIIe.

44B—Moomaw cobbly fine sandy loam, 2 to 7 percent slopes. This soil is deep, gently sloping, and moderately well drained. It is on stream terraces in the Shenandoah Valley. Areas are oval or long and winding. They range from about 3 to 70 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 8 inches, dark brown cobbly fine sandy loam

Subsoil:
8 to 18 inches, yellowish brown, mottled clay loam
18 to 65 inches, brittle, light yellowish brown and yellowish brown, mottled sandy clay loam

Included with this soil in mapping are the well drained Alonzville, moderately well drained Coursey, and well drained Unison soils. These soils are in landscape positions similar to those of the Moomaw soil. They do not have a fragipan. Included soils make up about 20 percent of this unit.

Important soil properties—

Permeability: Moderate above the fragipan; slow in the fragipan
Available water capacity: Moderate
Surface runoff: Medium
Erosion potential: Medium
Organic matter content: Moderate
Natural fertility: Low

Soil reaction: Very strongly acid or strongly acid
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: 18 to 36 inches
Flooding: None

Most areas of this soil are used for cultivated crops or pasture. A small acreage is used as woodland.

This soil is moderately well suited to cultivated crops. The shallow rooting depth, the acidity, and the low natural fertility are limitations affecting plant growth and crop yields. The cobblestones in the surface layer damage tillage equipment and interfere with planting and cultivating. The potential for erosion is a management concern. Conservation tillage and crop rotations that include grasses and legumes help to control runoff and erosion, conserve moisture, and maintain the content of organic matter in the surface layer. Crops respond well to applications of lime and fertilizer.

This soil is moderately well suited to pasture and hay. The shallow rooting depth, the acidity, and the low natural fertility are limitations affecting plant growth and yields. The cobblestones in the surface layer interfere with tillage and damage hay-gathering equipment. Establishing and maintaining a mixture of grasses and legumes, rotating grazing among pastures, deferring grazing, controlling weeds, using proper stocking rates, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on this soil is moderately high. The estimated production for northern red oak is 280 board feet per acre. Seedlings survive and grow well if competing vegetation is controlled.

The slow permeability in the fragipan, the perched seasonal high water table, and the cobblestones limit the use of this soil for community development, especially for sanitary facilities and building sites. The cobblestones are a limitation affecting lawns. Low strength and the wetness are limitations on sites for local roads and streets. The wetness is a limitation affecting most recreational uses.

Capability subclass: IIIs.

44C—Moomaw cobbly fine sandy loam, 7 to 15 percent slopes. This soil is deep, strongly sloping, and moderately well drained. It is on stream terraces in the Shenandoah Valley. Areas are oval or long and winding. They range from about 3 to 40 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 8 inches, dark brown cobbly fine sandy loam

Subsoil:
8 to 18 inches, yellowish brown, mottled clay loam
18 to 65 inches, brittle, light yellowish brown and yellowish brown, mottled sandy clay loam

Included with this soil in mapping are the well drained Alonzville, moderately well drained Coursey, and well drained Unison soils. These soils are in landscape positions similar to those of the Moomaw soil. They do not have a fragipan. Included soils make up about 20 percent of this unit.

Important soil properties—

Permeability: Moderate above the fragipan; slow in the fragipan
Available water capacity: Moderate
Surface runoff: Rapid
Erosion potential: High
Organic matter content: Moderate
Natural fertility: Low
Soil reaction: Very strongly acid or strongly acid
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: 18 to 36 inches
Flooding: None

Most areas of this soil are used for cultivated crops or pasture. A small acreage is used as woodland.

This soil is moderately well suited to cultivated crops. The shallow rooting depth, the acidity, and the low natural fertility are limitations affecting plant growth and crop yields. The potential for erosion is a major management concern. The cobblestones in the surface layer damage tillage equipment and interfere with planting and cultivating. The slope limits the safe operation of many types of farm equipment. Conservation tillage and crop rotations that include grasses and legumes help to control runoff and erosion, conserve moisture, and maintain the content of organic matter in the surface layer. Crops respond well to applications of lime and fertilizer.

This soil is moderately well suited to pasture and hay. The shallow rooting depth, the acidity, and the low natural fertility are limitations affecting plant growth and yields. The cobblestones in the surface layer interfere with tillage and damage hay-gathering equipment, and the slope limits the safe operation of equipment. Establishing and maintaining a mixture of grasses and legumes, rotating grazing among pastures, deferring grazing, controlling weeds, using proper stocking rates, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on this soil is moderately high. The estimated production for northern

red oak is 280 board feet per acre. Seedlings survive and grow well if competing vegetation is controlled.

The slow permeability in the fragipan, the perched seasonal high water table, the slope, and the cobblestones limit the use of this soil for community development, especially for sanitary facilities, building sites, and lawns and landscaping. The wetness, low strength, and the slope are limitations on sites for local roads and streets. The wetness and the cobbles are limitations affecting most recreational uses.

Capability subclass: IVs.

45A—Newmarc silt loam, 0 to 2 percent slopes, occasionally flooded. This soil is very deep, nearly level, and somewhat poorly drained. It is on flood plains in the Shenandoah Valley. Areas are long and winding and range from about 3 to 50 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 7 inches, dark brown silt loam

Subsoil:
7 to 14 inches, dark brown silt loam
14 to 24 inches, grayish brown, mottled silt loam
24 to 36 inches, dark grayish brown, mottled silt loam

Substratum:
36 to 62 inches, dark grayish brown, mottled loam

Included with this soil in mapping are Broadway and Nomberville soils. These soils are in the slightly higher positions on the landscape. Included soils make up about 15 percent of this unit.

Important soil properties—

Permeability: Moderate
Available water capacity: High
Surface runoff: Slow
Erosion potential: Low
Organic matter content: Low to moderate
Natural fertility: Medium
Soil reaction: Moderately acid to mildly alkaline
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: 6 to 18 inches
Flooding: Occasional

Most areas of this soil are used for pasture. A small acreage is cultivated, and some areas are wooded.

This soil is well suited to cultivated crops. The major management concerns are the wetness and the flooding, which interfere with seedbed preparation, planting, and harvesting. Also, the flooding damages crops and reduces yields in some years. The potential for erosion is low. Tilth is good. Conservation tillage, cover crops, a cropping system that includes grasses and legumes, and the incorporation of crop residue into the soil help to maintain the content of organic matter, maintain tilth, and minimize crusting. Crops respond well to applications of fertilizer, but lime is generally not needed.

This soil is well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, rotating grazing among pastures, deferring grazing, controlling weeds, using proper stocking rates, and applying fertilizer increases the productivity and carrying capacity of the pastures.

The potential productivity for trees on this soil is moderately high. The estimated production for pin oak is 325 board feet per acre. The wetness and the flooding limit the use of equipment for managing and harvesting timber.

The flooding and the seasonal high water table are the major limitations affecting community development and most recreational uses.

Capability subclass: IVw.

46A—Nomberville loam, 0 to 2 percent slopes, rarely flooded. This soil is very deep, nearly level, and well drained. It is on broad flood plains along the major streams in the Shenandoah Valley and is characterized by convex levees and concave scour channels. Areas are long and winding and range from about 5 to 60 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 13 inches, dark brown loam

Subsoil:
13 to 50 inches, dark brown silt loam

Substratum:
50 to 62 inches, dark brown gravelly loam

Included with this soil in mapping are the well drained Broadway and somewhat poorly drained Newmarc soils. The Broadway soils are in landscape positions similar to those of the Nomberville soil. They have carbonates at a depth of about 20 inches. The Newmarc soils are in slight depressions, scour channels, and slack-water areas adjacent to escarpments. Included soils make up about 20 percent of this unit.

Important soil properties—

Permeability: Moderate
Available water capacity: High

Surface runoff: Slow
Erosion potential: Low
Organic matter content: Moderate
Natural fertility: Medium
Soil reaction: Moderately acid to moderately alkaline
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: 36 to 72 inches
Flooding: Rare

All areas of this soil are used for cultivated crops or pasture.

This soil is well suited to cultivated crops. The surface layer is friable and can be easily tilled. The flooding occasionally damages the crops and limits the use of machinery. Crop yields can be increased by applying fertilizer, but lime is not needed. Conservation tillage conserves moisture and helps to control erosion. Row crops can be grown continuously on this soil.

This soil is well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, rotating grazing among pastures, deferring grazing, using proper stocking rates, and applying fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on this soil is high. The estimated production for yellow poplar is 660 board feet per acre.

The flooding is the major limitation affecting community development. It especially limits the use of this soil for sanitary facilities and building site development. It also is a limitation affecting camp areas and playgrounds.

Capability class: I.

47C—Opequon silty clay loam, 2 to 15 percent slopes, rocky. This soil is shallow, gently sloping to strongly sloping, and well drained. It is on the summits and side slopes of hills and ridges in the Shenandoah Valley. Rock outcrops about 100 to 300 feet apart make up about 2 percent of the surface. Individual areas of this unit are broad and long and range from about 3 to 80 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 3 inches, dark brown silty clay loam

Subsoil:
3 to 9 inches, strong brown silty clay loam
9 to 20 inches, red clay

Substratum:
20 inches, limestone bedrock

Included with this soil in mapping are Carbo and Chilhowie soils. These soils are in landscape positions similar to those of the Opequon soil. They are deeper over bedrock than the Opequon soil. Also included are soils that have slopes of more than 15 percent. Included soils make up about 20 percent of this unit.

Important soil properties—

Permeability: Moderately slow or moderate
Available water capacity: Low
Surface runoff: Medium or rapid
Erosion potential: Medium
Organic matter content: Low to moderate
Natural fertility: Low
Soil reaction: Moderately acid to mildly alkaline
Depth to bedrock: 12 to 20 inches
Shrink-swell potential: High
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are used for pasture. The rest are wooded.

This soil is moderately well suited to cultivated crops. The rock outcrop limits the use of farm machinery for seedbed preparation, cultivation, spraying, and harvesting. The potential for erosion is a management concern. Conservation tillage and crop rotations that include grasses and legumes help to control runoff and erosion and conserve moisture. Crop residue should be kept on the surface or incorporated into the plow layer to maintain tilth.

This soil is well suited to pasture. The rock outcrop limits the use of machinery for managing and improving pasture. Rotating grazing among pastures, using proper stocking rates, maintaining a mixture of grasses and legumes, deferring grazing, applying fertilizer, and controlling weeds increase the productivity and carrying capacity of the pastures.

The potential productivity of this soil for trees is moderate. The estimated production for northern red oak is 240 board feet per acre. The high content of clay limits the use of heavy equipment, especially during periods of extreme wetness. The soil is easily eroded when the surface is disturbed.

The depth to bedrock, the restricted permeability, and the high shrink-swell potential limit the use of this soil for community development, especially for building sites and sanitary facilities. The depth to bedrock, the high shrink-swell potential, and low strength are limitations affecting local roads and streets. The depth to bedrock is a limitation affecting most recreational uses.

Capability subclass: IVs.

48C—Opequon silty clay loam, 2 to 15 percent slopes, very rocky. This soil is shallow, gently sloping to strongly sloping, and well drained. It is on the summits and side slopes of hills and ridges in the Shenandoah Valley. Rock outcrops about 30 to 100 feet apart make up about 2 to 10 percent of the surface. Individual areas of this unit are broad and long and range from about 3 to 150 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 3 inches, dark brown silty clay loam

Subsoil:
3 to 9 inches, strong brown silty clay loam
9 to 20 inches, red clay

Substratum:
20 inches, limestone bedrock

Included with this soil in mapping are Carbo and Chilhowie soils. These soils are in landscape positions similar to those of the Opequon soil. They are deeper over bedrock than the Opequon soil. Also included are areas that have more than 10 percent rock outcrop. Included areas make up about 20 percent of this unit.

Important soil properties—

Permeability: Moderately slow or moderate
Available water capacity: Low
Surface runoff: Medium or rapid
Erosion potential: Medium
Organic matter content: Low to moderate
Natural fertility: Low
Soil reaction: Moderately acid to mildly alkaline
Depth to bedrock: 12 to 20 inches
Shrink-swell potential: High
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are used for pasture. The rest are wooded.

This soil is not suited to cultivated crops. The rock outcrop limits the use of farm machinery for seedbed preparation, cultivation, spraying, and harvesting.

This soil is poorly suited to pasture. The rock outcrop limits the use of machinery for managing and improving pasture. Rotating grazing among pastures, using proper stocking rates, maintaining a mixture of grasses and legumes, deferring grazing, applying fertilizer, and controlling weeds increase the productivity and carrying capacity of the pastures.

The potential productivity of this soil for trees is moderate. The estimated production for northern red oak is 240 board feet per acre. The high content of clay limits the use of heavy equipment, especially during periods of extreme wetness. The soil is easily eroded when the surface is disturbed. The rock outcrop limits the use of logging equipment.

The depth to bedrock, the high shrink-swell potential, and the rock outcrop limit the use of this soil for community development, especially for building sites and sanitary facilities. The depth to bedrock, the shrink-swell potential, and low strength are limitations on sites for local roads and streets. The depth to bedrock is a limitation affecting most recreational uses.

Capability subclass: VIs.

48D—Opequon silty clay loam, 15 to 25 percent slopes, very rocky. This soil is shallow, moderately steep, and well drained. It is on the side slopes of hills and ridges in the Shenandoah Valley. Rock outcrops about 30 to 100 feet apart make up about 2 to 10 percent of the surface. Individual areas of this unit are broad and long and range from about 3 to 100 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 3 inches, dark brown silty clay loam

Subsoil:
3 to 9 inches, strong brown silty clay loam
9 to 20 inches, red clay

Substratum:
20 inches, limestone bedrock

Included with this soil in mapping are Carbo and Chilhowie soils. These soils are in landscape positions similar to those of the Opequon soil. They are deeper over bedrock than the Opequon soil. Also included are areas that have more than 10 percent rock outcrop and areas where the slope is more than 25 percent. Included areas make up about 20 percent of this unit.

Important soil properties—

Permeability: Moderately slow or moderate
Available water capacity: Low
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low to moderate
Natural fertility: Low
Soil reaction: Moderately acid to mildly alkaline
Depth to bedrock: 12 to 20 inches
Shrink-swell potential: High
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are used for pasture. The rest are wooded.

This soil is not suited to cultivated crops. The rock outcrop limits the use of farm machinery for seedbed preparation, cultivation, spraying, and harvesting.

This soil is poorly suited to pasture. The rock outcrop limits the use of machinery for managing and improving pasture. Rotating grazing among pastures, using proper stocking rates, maintaining a mixture of grasses and legumes, deferring grazing, applying fertilizer, and controlling weeds increase the productivity and carrying capacity of the pastures.

The potential productivity of this soil for trees is moderate. The estimated production for northern red oak is 240 board feet per acre on north aspects and 180 board feet per acre on south aspects. The high content of clay limits the use of heavy equipment, especially during periods of extreme wetness. The soil is easily eroded when the surface is disturbed. The rock outcrop limits the use of logging equipment.

The slope, the depth to bedrock, the high shrink-swell potential, and the rock outcrop limit the use of this soil for community development, especially for building sites and sanitary facilities. The depth to bedrock and the slope are limitations affecting local roads and streets. The slope and the depth to bedrock are limitations affecting most recreational uses.

Capability subclass: VIs.

49—Pits and Dumps. This map unit consists of open excavations and dumps of waste material from areas where limestone, shale, or sandstone gravel has been mined. Pits make up about 60 percent of the unit and Dumps about 40 percent. Little or no vegetation grows in these areas, and water is in some areas.

The limestone pits are mostly near U.S. 11 in the Strasburg, Toms Brook, and Flat Rock Church areas. They range from about 3 to 300 acres. Material derived from these pits is used for road construction and is a source of lime for agriculture and for use in cement.

The shale pits are mostly in the eastern and western parts of the county. They range from about 2 to 10 acres. Shale from these pits is used as a source of material for road construction and fill on construction sites.

The gravel pits are mostly along the Shenandoah River. They range from about 2 to 10 acres. Gravel from these pits is a source of material for road construction.

Areas of this map unit are limited for most uses. Onsite investigation is needed to determine the suitability of any given site for a particular use.

Capability subclass: not assigned.

50A—Purdy silty clay loam, 0 to 2 percent slopes. This soil is very deep, nearly level, and poorly drained. It is on stream terraces and in slack-water areas along streams and intermittent drainageways. Areas of this soil commonly are long and winding. They range from about 3 to 100 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 6 inches, dark grayish brown silty clay loam

Subsoil:
6 to 11 inches, dark grayish brown, mottled silty clay loam
11 to 30 inches, dark gray, mottled silty clay
30 to 39 inches, very dark gray, mottled silty clay loam
39 to 51 inches, dark gray, mottled clay loam

Substratum:
51 to 65 inches, gray, mottled clay loam

Included with this soil in mapping are the moderately well drained Coursey and somewhat poorly drained Guyan soils. The Coursey soils are in the higher positions on the landscape. The Guyan soils are in landscape positions similar to those of the Purdy soil. They have brighter colors in the upper part of the subsoil than the Purdy soil and less clay in the subsoil. Included soils make up about 20 percent of this unit.

Important soil properties—

Permeability: Very slow or slow
Available water capacity: High
Surface runoff: Slow
Erosion potential: Low
Organic matter content: Moderate
Natural fertility: Low
Soil reaction: Extremely acid to strongly acid
Depth to bedrock: More than 60 inches
Shrink-swell potential: Moderate
Seasonal high water table: 12 inches above the surface to 12 inches below
Flooding: None

Most areas of this soil are used for pasture. Some small areas are used for hay.

Because of the seasonal high water table, the undrained areas of this soil are poorly suited to cultivated crops and pasture. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotating grazing among pastures, deferring grazing, and applying fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on this soil is moderately high. The estimated production for pin oak is 370 board feet per acre.

The seasonal high water table and the restricted permeability limit the use of this soil for community development, especially for sanitary facilities and building sites. The wetness, low strength, and the potential for frost action are limitations on sites for local roads and streets. The wetness and the restricted permeability are limitations affecting most recreational uses.

Capability subclass: IVw.

51D—Rock outcrop-Carbo complex, 2 to 25 percent slopes. This map unit consists of moderately deep, gently sloping to moderately steep, well drained Carbo soil and outcrops of limestone bedrock on the complex side slopes of hills and ridges in the Shenandoah Valley. The Carbo soil and the Rock outcrop occur as areas so intermingled that it was not practical to map them separately. This map unit is about 55 percent Rock outcrop, 35 percent Carbo soil, and 10 percent other soils. Areas are long and winding and range from about 5 to 100 acres. The outcrops are about 10 to 30 feet apart.

A typical profile of the Carbo soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 8 inches, yellowish brown silty clay loam

Subsoil:
8 to 18 inches, strong brown clay
18 to 37 inches, yellowish brown clay

Substratum:
37 inches, limestone bedrock

Included with this map unit in mapping are Endcav, Opequon, and Timberville soils. The Endcav and Opequon soils are in landscape positions similar to those of the Carbo soil. The Endcav soils are deeper over bedrock than the Carbo soil. The Opequon soils are shallower over bedrock than the Carbo soil. The Timberville soils are in depressions and along narrow drainageways.

Important properties of the Carbo soil—

Permeability: Slow
Available water capacity: Low
Surface runoff: Medium to very rapid
Erosion potential: Medium
Organic matter content: Low to moderate
Natural fertility: High
Soil reaction: Very strongly acid to mildly alkaline
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: High
Depth to a seasonal high water table: More than 72 inches
Flooding: None

About half of this map unit is pastured. The rest is used as woodland.

This map unit is not suited to cultivated crops. The Rock outcrop severely limits the use of machinery for seedbed preparation, cultivation, spraying, and harvesting.

This map unit is poorly suited to pasture (fig. 4). The Rock outcrop limits the use of machinery for managing and improving pasture. Maintaining a mixture of grasses and legumes, rotating grazing among pastures, using proper stocking rates, deferring grazing, and applying fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on the Carbo soil is moderate. The estimated production for northern red oak is 100 board feet per acre. The high content of clay limits the use of heavy equipment, especially during periods of extreme wetness. The Rock outcrop also limits the use of logging equipment.

The depth to bedrock, the slope, the high clay content, the high shrink-swell potential, low strength, the slow permeability of the subsoil, and the Rock outcrop are limitations affecting community development, local roads and streets, and most recreational uses.

Capability subclass: VIIs.

52F—Rock outcrop-Drall-Wallen complex, 15 to 70 percent slopes. This map unit consists of outcrops of bedrock and moderately steep to very steep Drall and Wallen soils on the sides of ridges in the Shenandoah and Massanutten Mountains. The Rock outcrop and the Drall and Wallen soils occur as areas so intermingled that it was not practical to map them separately. This unit is about 50 percent Rock outcrop, 25 percent excessively drained Drall soil, 15 percent somewhat excessively drained Wallen soil, and 10 percent other soils. Areas are mostly long and narrow and range from about 30 to 150 acres. Large stones cover about 10 to 50 percent of the surface in most areas.

A typical profile of the Drall soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 4 inches, grayish brown very channery loamy sand

Subsoil:
4 to 22 inches, light yellowish brown very channery loamy sand

Figure 4.—Pasture in an area of Rock outcrop-Carbo complex, 2 to 25 percent slopes.

Substratum:

22 to 42 inches, light yellowish brown extremely channery loamy sand

42 inches, hard quartzite bedrock

A typical profile of the Wallen soil has the following sequence of layers, textures, and colors—

Surface layer:

0 to 2 inches, very dark gray channery sandy loam

Subsoil:

2 to 7 inches, dark yellowish brown channery sandy loam

7 to 12 inches, yellowish brown channery sandy loam

12 to 25 inches, yellowish brown very channery sandy loam

Substratum:

25 to 35 inches, yellowish brown extremely channery sandy loam

35 inches, fractured sandstone bedrock

Included with this unit in mapping are the well drained Lehew soils. These included soils are in landscape positions similar to those of the Drall and

Wallen soils. They are shallower over bedrock than the Drall soil and have redder colors throughout the subsoil than the Wallen soil. Also included are soils that have stones covering less than 10 percent of the surface.

Important properties of the Drall soil—

Permeability: Rapid
Available water capacity: Low
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low
Natural fertility: Low
Soil reaction: Very strongly acid or strongly acid
Depth to bedrock: 40 to 60 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Important properties of the Wallen soil—

Permeability: Moderately rapid
Available water capacity: Very low
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low
Natural fertility: Low to moderate
Soil reaction: Very strongly acid to moderately acid
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

All areas of this map unit are used for woodland. This map unit is poorly suited to farming. The slope, the depth to bedrock, the Rock outcrop, and the stones on the surface are the major limitations.

The potential productivity for trees on both the Drall and Wallen soils is moderate on south aspects and moderately high on north aspects. The estimated production for northern red oak is 280 board feet per acre on the Drall soil and 240 board feet per acre on the Wallen soil. The most commonly grown trees are oak and Virginia pine. The outcrops of bedrock, the stones on the surface, the slope, and the low or very low available water capacity are limitations affecting forest management, harvest operations, and productivity. The outcrops of bedrock, the stones on the surface, and the slope especially limit the use of conventional woodland equipment. Seedling survival and growth are limited by the low or very low available water capacity, especially on south aspects. Logging roads and skid trails should be laid out on the contour to reduce the hazard of erosion.

This map unit is very poorly suited to openland and woodland wildlife habitat, mainly because of the outcrops of bedrock, the large stones on the surface, and the slope.

The Rock outcrop, the depth to bedrock, the large stones, and the slope are limitations affecting community development and most recreational uses.

Capability subclass: VIIs.

53C—Sequoia loam, 2 to 15 percent slopes. This soil is moderately deep, gently sloping to strongly sloping, and well drained. It is on the side slopes of hills and ridges in the mountains and valleys. Areas commonly are broad and irregularly shaped. They range from about 3 to 50 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 5 inches, yellowish brown loam

Subsoil:
5 to 13 inches, strong brown silty clay loam
13 to 23 inches, yellowish red clay
23 to 38 inches, yellowish brown, red, and yellowish red channery clay

Substratum:
38 inches, weathered shale

Included with this soil in mapping are the well drained Berks, Gilpin, and Weikert soils. The Berks and Gilpin soils are in landscape positions similar to those of the Sequoia soil. The Gilpin soils have less clay in the subsoil than the Sequoia soil. The Berks and Weikert soils have more rock fragments in the solum than the Sequoia soil. The Weikert soils are on the steeper slopes and are 10 to 20 inches deep over hard shale. Included soils make up about 25 percent of this unit.

Important soil properties—

Permeability: Moderately slow
Available water capacity: Low
Surface runoff: Medium or rapid
Erosion potential: Medium
Organic matter content: Low
Natural fertility: Low
Soil reaction: Very strongly acid or strongly acid
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Moderate
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas are wooded. Some areas are used for crops or pasture.

This soil is moderately well suited to cultivated crops. The potential for erosion is a major management concern. Conservation tillage, the use of cover crops, and crop rotations that include grasses and legumes help to control runoff and erosion.

This soil is moderately well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotating grazing among pastures, deferring grazing, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on this soil is moderately high. The estimated production for northern red oak is 280 board feet per acre. Seeds and seedlings survive and grow well if competing vegetation is controlled. Logging roads should be constructed on the contour to minimize the hazard of erosion.

The depth to bedrock, the slope, and the clayey subsoil limit the use of this soil for community development, especially for sanitary facilities and building sites. Low strength is a limitation affecting local roads and streets. The slope, the moderately slow permeability, and the depth to bedrock are limitations affecting most recreational uses.

Capability subclass: IIIe.

53D—Sequoia loam, 15 to 35 percent slopes. This soil is moderately deep, moderately steep or steep, and well drained. It is on the side slopes of hills and ridges in the mountains and valleys. Areas commonly are broad and irregularly shaped. They range from 3 to 80 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 5 inches, yellowish brown loam

Subsoil:
5 to 13 inches, strong brown silty clay loam
13 to 23 inches, yellowish red clay
23 to 38 inches, yellowish brown, red, and yellowish red channery clay

Substratum:
38 inches, weathered shale

Included with this soil in mapping are the well drained Berks, Gilpin, and Weikert soils. These soils are in landscape positions similar to those of the Sequoia soil. The Gilpin soils have less clay in the subsoil than the Sequoia soil, and the Berks and Weikert soils have a higher content of coarse fragments in the solum. The Weikert soils are 10 to 20 inches deep over hard shale. Included soils make up about 25 percent of this unit.

Important soil properties—

Permeability: Moderately slow
Available water capacity: Low
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low
Natural fertility: Low
Soil reaction: Very strongly acid or strongly acid
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Moderate
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas are wooded. Some areas are used for pasture.

This soil is not suited to cultivated crops. The slope and the potential for erosion are the major management concerns.

This soil is moderately well suited to pasture. The slope limits the use of machinery for managing and improving pasture. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotating grazing among pastures, deferring grazing, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on this soil is moderately high on north aspects and moderate on south aspects. The estimated production for northern red oak is 280 board feet per acre on north aspects and 240 board feet per acre on south aspects. Seeds and seedlings survive and grow well if competing vegetation is controlled. The slope and the high content of clay limit some forestry management practices and logging activities. Logging roads should be constructed on the contour to minimize the hazard of erosion. Equipment use may be restricted in the steeper areas, especially during wet periods.

The depth to bedrock, the slope, and the clayey subsoil limit the use of this soil for community development, especially for sanitary facilities and building sites. Low strength and the slope are limitations on sites for local roads and streets. The slope is a limitation affecting most recreational uses.

Capability subclass: VIe.

53E—Sequoia loam, 35 to 55 percent slopes. This soil is moderately deep, very steep, and well drained. It is on the sides of ridges in the mountains. Areas commonly are broad and irregularly shaped. They range from 3 to 25 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 5 inches, yellowish brown loam

Subsoil:
5 to 13 inches, strong brown silty clay loam
13 to 23 inches, yellowish red clay
23 to 38 inches, yellowish brown, red, and yellowish red channery clay

Substratum:
38 inches, weathered shale

Included with this soil in mapping are the well drained Berks, Gilpin, and Weikert soils. These soils are in landscape positions similar to those of the Sequoia soil. The Gilpin soils have less clay in the subsoil than the Sequoia soil, and the Berks and Weikert soils have a higher content of coarse fragments in the solum. The Weikert soils are 10 to 20 inches deep over hard shale. Included soils make up about 25 percent of this unit.

Important soil properties—

Permeability: Moderately slow
Available water capacity: Low
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low
Natural fertility: Low
Soil reaction: Very strongly acid or strongly acid
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Moderate
Depth to a seasonal high water table: More than 72 inches
Flooding: None

All areas of this soil are wooded and are in the George Washington National Forest.

This soil is not suited to cultivated crops. The slope and the potential for erosion are the major management concerns.

This soil is poorly suited to pasture. The slope limits the use of machinery for managing and improving pasture. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotating grazing among pastures, deferring grazing, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on this soil is moderately high on north aspects and moderate on south aspects. The estimated production for northern red oak is 280 board feet per acre on north aspects and 240 board feet per acre on south aspects. Seeds and seedlings survive and grow well if competing vegetation is controlled. The slope and the high content of clay limit some forestry management practices and logging activities. Logging roads should be constructed on the contour to minimize the hazard of erosion. Equipment use may be restricted in the steeper areas, especia'ly during wet periods.

The depth to bedrock, the slope, and the clayey subsoil limit the use of this soil for community development, especially for sanitary facilities and building sites. The slope and low strength are limitations on sites for local roads and streets. The slope is a limitation affecting most recreational uses.

Capability subclass: VIIe.

54B—Timberville silt loam, 2 to 7 percent slopes, frequently flooded. This soil is gently sloping, very deep, and well drained. It is on narrow to moderately broad upland drainageways and flood plains in the Shenandoah Valley. Areas are long and winding and range from about 5 to 30 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 3 inches, dark brown silt loam
3 to 8 inches, dark yellowish brown, mottled silt loam

Subsoil:
8 to 22 inches, yellowish brown gravelly silt loam
22 to 35 inches, strong brown silty clay
35 to 65 inches, strong brown gravelly clay

Included with this soil in mapping are the well drained Endcav, Frederick, and Poplimento soils. These soils are on toe slopes adjacent to the Timberville soil and in the slightly higher landscape positions. Also included are moderately well drained and somewhat poorly drained soils in slightly concave landscape positions. Included soils make up about 20 percent of this unit.

Important soil properties—

Permeability: Moderate
Available water capacity: High
Surface runoff: Medium
Erosion potential: Medium
Organic matter content: Low to moderate
Natural fertility: Low
Soil reaction: Very strongly acid to moderately acid
Depth to bedrock: More than 60 inches
Shrink-swell potential: Moderate
Depth to a seasonal high water table: More than 72 inches
Flooding: Frequent, very brief

Most areas of this soil are used for cultivated crops or pasture. The rest are used as woodland.

This soil is well suited to cultivated crops. The

flooding sometimes interferes with the use of equipment. The surface layer is friable and can be easily tilled. Crop yields can be increased by applying lime and fertilizer. The potential for erosion is a management concern. Conservation tillage helps to control runoff and erosion and conserves moisture. Row crops can be grown continuously on this soil.

This soil is well suited to pasture. Establishing and maintaining a mixture of grasses and legumes, rotating grazing among pastures, deferring grazing, controlling weeds, using proper stocking rates, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on this soil is moderately high. The estimated production for northern red oak is 290 board feet per acre. Seeds and seedlings survive and grow well if competing vegetation is controlled.

The flooding is a hazard affecting community development, especially building site development, sanitary facilities, and local roads and streets. It also is a hazard affecting most recreational uses.

Capability subclass: IIw.

55A—Toms silt loam, 0 to 2 percent slopes. This soil is very deep, nearly level, and somewhat poorly drained. It is on stream terraces and in slack-water areas along streams and intermittent drainageways. Areas of this soil commonly are long and winding. They range from about 3 to 100 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 10 inches, dark grayish brown, mottled silt loam

Subsoil:
10 to 21 inches, pale brown, mottled silt loam
21 to 26 inches, yellowish brown, mottled clay
26 to 32 inches, strong brown, mottled very cobbly clay
32 to 44 inches, gray, mottled silty clay

Substratum:
44 to 62 inches, yellowish brown and gray very channery silty clay loam
62 inches, hard shale bedrock

Included with this soil in mapping are the moderately well drained Coursey and poorly drained Maurertown soils. The Coursey soils are in the higher positions on the landscape. The Maurertown soils are in landscape positions similar to those of the Toms soil. They have grayer colors in the upper part of the subsoil than the Toms soil. Included soils make up about 25 percent of this unit.

Important soil properties—

Permeability: Slow
Available water capacity: High
Surface runoff: Slow
Erosion potential: Low
Organic matter content: Moderate
Natural fertility: High
Soil reaction: Moderately acid to neutral
Depth to bedrock: More than 60 inches
Shrink-swell potential: Moderate
Depth to a seasonal high water table: 6 to 18 inches
Flooding: None

Most areas of this soil are used for pasture. Some small areas are used for hay.

Because of the seasonal high water table, the undrained areas of this soil are poorly suited to cultivated crops. The seasonal wetness interferes with planting and harvesting. Conservation tillage, cover crops, a cropping system that includes grasses and legumes, and the incorporation of crop residue into the soil help to maintain organic matter content, maintain tilth, and minimize crusting. Crops respond well to applications of fertilizer.

This soil is moderately well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotating grazing among pastures, deferring grazing, and applying fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on this soil is high. The estimated production for yellow poplar is 550 board feet per acre.

The seasonal high water table and the high content of clay in the subsoil are limitations affecting sanitary facilities, building site development, and most recreational uses.

Capability subclass: IVw.

56B—Trappist silt loam, 2 to 7 percent slopes. This soil is moderately deep, gently sloping, and well drained. It is on the summits and shoulders of hills and ridges in the Shenandoah Valley. Slopes are smooth and commonly are complex. Areas are irregularly shaped or long and winding. They range from about 5 to 50 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 8 inches, yellowish brown silt loam

Subsoil:
8 to 15 inches, strong brown silty clay loam
15 to 37 inches, strong brown clay

Substratum:
37 to 40 inches, weathered shale
40 inches, shale bedrock

Included with this soil in mapping are Berks soils. These soils have more rock fragments throughout the solum than the Trappist soil. Also included are soils that are less than 20 inches deep over bedrock and moderately well drained soils. Included soils make up about 15 percent of this unit.

Important soil properties—

Permeability: Moderately slow or moderate
Available water capacity: Low
Surface runoff: Medium
Erosion potential: Medium
Organic matter content: Low to moderate
Natural fertility: Low
Soil reaction: Extremely acid to strongly acid
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Moderate
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are farmed. A few areas are wooded.

This soil is well suited to cultivated crops. The potential for erosion is a major management concern. Other management concerns are the need to increase the organic matter content of the surface layer and the need for applications of lime and fertilizer to offset the acidity and the low natural fertility of the soil. Conservation tillage, cover crops, and a cropping system that includes grasses and legumes can help to control runoff and erosion. Crop residue should be kept on the surface or incorporated into the plow layer.

This soil is well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are the major concerns in managing pasture. Proper stocking rates, rotation of grazing among pastures, timely deferment of grazing, and applications of lime and fertilizer, which offset the acidity and the low natural fertility of the soil, help to maintain the productivity and carrying capacity of the pastures. If the pasture is overgrazed, the runoff rate increases and erosion is excessive.

The potential productivity for trees on this soil is high. The wooded areas are managed for both pine and hardwoods. The estimated production for Virginia pine is 95 cubic feet, or 525 board feet, per acre. The estimated production for northern red oak is 280 board feet per acre. Using heavy logging equipment when the soil is too wet can cause ruts in the surface layer.

The restricted permeability, the moderate shrink-swell potential, the depth to bedrock, and the clayey subsoil are the major limitations affecting community development, especially sanitary facilities and building sites. Low strength is a limitation on sites for local roads and streets. The restricted permeability, the depth to bedrock, and the slope limit most recreational uses.

Capability subclass: IIe.

56C—Trappist silt loam, 7 to 15 percent slopes. This soil is moderately deep, strongly sloping, and well drained. It is on the slightly convex side slopes of knolls, hills, and ridges in the Shenandoah Valley. Slopes are smooth and commonly are complex. Areas are irregularly shaped or long and winding. They range from about 5 to 50 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 8 inches, yellowish brown silt loam

Subsoil:
8 to 15 inches, strong brown silty clay loam
15 to 37 inches, strong brown clay

Substratum:
37 to 40 inches, weathered shale
40 inches, shale bedrock

Included with this soil in mapping are Berks soils. These soils have more rock fragments throughout the solum than the Trappist soil. Also included are soils that are less than 20 inches deep over bedrock. Included soils make up about 15 percent of this unit.

Important soil properties—

Permeability: Moderately slow or moderate
Available water capacity: Low
Surface runoff: Rapid
Erosion potential: High
Organic matter content: Low to moderate
Natural fertility: Low
Soil reaction: Extremely acid to strongly acid
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Moderate
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are farmed. A few areas are wooded.

This soil is moderately well suited to cultivated crops. The potential for erosion is a major management concern. Other management concerns are the need to increase the organic matter content of the surface layer and the need for applications of lime and fertilizer to

offset the acidity and the low natural fertility of the soil. Conservation tillage, cover crops, and a cropping system that includes grasses and legumes can help to control runoff and erosion. Crop residue should be kept on the surface or incorporated into the plow layer.

This soil is well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are the major concerns in managing pasture. Proper stocking rates, rotation of grazing among pastures, timely deferment of grazing, and applications of lime and fertilizer, which offset the acidity and the low natural fertility of the soil, help to maintain the productivity and carrying capacity of the pastures. If the pasture is overgrazed, the runoff rate increases and erosion is excessive.

The potential productivity for trees on this soil is high. The wooded areas are managed for pine and hardwoods. The estimated production for Virginia pine is 95 cubic feet, or 525 board feet, per acre. The estimated production for northern red oak is 280 board feet per acre. Using heavy logging equipment when the soil is too wet can cause ruts in the surface layer.

The restricted permeability, the slope, the moderate shrink-swell potential, the depth to bedrock, and the clayey subsoil are the major limitations affecting community development, especially sanitary facilities and building sites. Low strength and the slope are limitations on sites for local roads and streets. The restricted permeability, the depth to bedrock, and the slope limit most recreational uses.

Capability subclass: IIIe.

57—Udorthents, loamy. These moderately deep and deep, well drained or moderately well drained soils have been disturbed by excavation. They consist of fill materials for building sites, recreational facilities, and other uses. The areas of the unit range from about 3 to 50 acres. Slopes commonly are 0 to 10 percent but range to as much as 25 percent.

Included with this unit in mapping are small areas of urban land; the well drained Alonzville, Caverns, and Gladehill soils; and the moderately well drained Coursey and Moomaw soils. Included areas make up about 20 percent of the unit.

The properties and characteristics of the soils in this map unit are so variable that onsite investigation generally is needed to determine the suitability and potential of the unit for most uses.

Capability subclass: not assigned.

58—Udorthents-Urban land complex. This map unit consists of areas of Urban land and shallow to very deep soils that have been disturbed by excavation. The components occur as areas so intermingled that it was not practical to map them separately. Most areas are generally along the major highways. This map unit is about 55 percent Udorthents, 30 percent Urban land, and 15 percent other soils. Areas are long and narrow or are slightly rectangular. They range from about 5 to more than 250 acres. Slopes are mostly 0 to 30 percent but range to as much as 80 percent.

The Udorthents consist of material that has been graded, cut, filled, or otherwise disturbed during urban development and highway construction. The exposed cuts consist of loamy or clayey soil material over limestone or shale bedrock. The exposed material varies. The loamy or clayey material has the characteristics of the soils in the adjacent areas.

The Urban land consists of asphalt, concrete, or other impervious surfaces. Examples are highways, shopping centers, and industrial parks.

Included with this unit in mapping are Berks, Carbo, Chilhowie, Endcav, Frederick, Poplimento, Opequon, Unison, and Weikert soils in undisturbed areas between the highways and buildings.

The properties and characteristics of the Udorthents are so variable that onsite investigation generally is needed to determine the suitability of the unit for most uses.

Capability subclass: not assigned.

59B—Unison loam, 2 to 7 percent slopes. This soil is very deep, gently sloping, and well drained. It is on broad terraces along streams in the Shenandoah Valley. Slopes are smooth and commonly are complex. Areas commonly are elongated or irregular in shape. They range from about 5 to 50 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 8 inches, brown loam

Subsoil:
8 to 19 inches, yellowish brown clay loam
19 to 34 inches, yellowish brown, mottled clay
34 to 52 inches, strong brown, mottled cobbly clay loam
52 to 62 inches, red clay loam

Included with this soil in mapping are the well drained Braddock and moderately well drained Moomaw soils. These soils are in landscape positions similar to those of the Unison soil. The Moomaw soils have a fragipan. The Braddock soils have a redder subsoil than that of the Unison soil. Included soils make up about 10 percent of this unit.

Important soil properties—

Permeability: Moderate

Available water capacity: Moderate
Surface runoff: Medium
Erosion potential: Medium
Organic matter content: Low to moderate
Natural fertility: Low
Soil reaction: Very strongly acid to moderately acid
Depth to bedrock: More than 60 inches
Shrink-swell potential: Moderate
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are farmed. A few areas are wooded.

This soil is well suited to cultivated crops and hay. It can be easily tilled under optimum moisture conditions. The potential for erosion is a major management concern. Other management concerns are the need to increase the organic matter content of the surface layer and the need for lime and fertilizer to offset the soil acidity and low natural fertility of the soil. In cultivated areas conservation tillage, cover crops, and a cropping system that includes grasses and legumes can help to control runoff and erosion. Crop residue should be kept on the surface or incorporated into the plow layer.

This soil is well suited to pasture. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotating grazing among pastures, deferring grazing, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures. If the pasture is overgrazed, the runoff rate increases and erosion is excessive.

The potential productivity for trees on this soil is moderately high. The estimated production for northern red oak is 288 board feet per acre. Seeds and seedlings survive and grow well if competing vegetation is controlled.

Low strength, the moderate permeability, and the clayey subsoil are the main limitations affecting community development. The low strength limits the use of this soil for roadfill and for local roads and streets. The slope and the small stones are limitations affecting playgrounds. The soil is well suited to most other recreational uses.

Capability subclass: IIe.

59C—Unison loam, 7 to 15 percent slopes. This soil is very deep, strongly sloping, and well drained. It is on broad terraces along streams in the Shenandoah Valley. Slopes are smooth and commonly are complex. Areas commonly are elongated or irregular in shape. They range from about 5 to 50 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 8 inches, brown loam

Subsoil:
8 to 19 inches, yellowish brown clay loam
19 to 34 inches, yellowish brown, mottled clay
34 to 52 inches, strong brown, mottled cobbly clay loam
52 to 62 inches, red clay loam

Included with this soil in mapping are the well drained Braddock and moderately well drained Moomaw soils. These soils are in landscape positions similar to those of the Unison soil. The Braddock soils have a redder subsoil than that of the Unison soil. The Moomaw soils have a fragipan. Included soils make up about 10 percent of this unit.

Important soil properties—

Permeability: Moderate
Available water capacity: Moderate
Surface runoff: Rapid
Erosion potential: High
Organic matter content: Low to moderate
Natural fertility: Low
Soil reaction: Very strongly acid to moderately acid
Depth to bedrock: More than 60 inches
Shrink-swell potential: Moderate
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are farmed. A few areas are wooded.

This soil is moderately well suited to cultivated crops and hay. It can be easily tilled under optimum moisture conditions. The potential for erosion is a major management concern. Other management concerns are the need to increase the organic matter content of the surface layer and the need for applications of lime and fertilizer to offset the acidity and the low natural fertility of the soil. Conservation tillage, cover crops, and a cropping system that includes grasses and legumes can help to control runoff and erosion. Crop residue should be kept on the surface or incorporated into the plow layer.

This soil is well suited to pasture. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotating grazing among pastures, deferring grazing, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures. If the pasture is overgrazed, the runoff rate increases and erosion is excessive.

The potential productivity for trees on this soil is moderately high. The estimated production for northern

red oak is 288 board feet per acre. Seeds and seedlings survive and grow well if competing vegetation is controlled.

Low strength, the slope, the moderate permeability, and the clayey subsoil are the main limitations affecting community development. The low strength limits the use of this soil for roadfill and for local roads and streets. The slope is a limitation affecting most recreational uses.

Capability subclass: IIIe.

60B—Unison gravelly loam, 2 to 7 percent slopes. This soil is very deep, gently sloping, and well drained. It is on broad terraces along streams in the Shenandoah Valley. Slopes are smooth and commonly are complex. Areas commonly are elongated or irregular in shape. They range from about 5 to 80 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 8 inches, brown gravelly loam

Subsoil:
8 to 19 inches, yellowish brown clay loam
19 to 34 inches, yellowish brown, mottled clay
34 to 52 inches, strong brown, mottled cobbly clay loam
52 to 62 inches, red clay loam

Included with this soil in mapping are the well drained Braddock and moderately well drained Moomaw soils. These soils are in landscape positions similar to those of the Unison soil. The Moomaw soils have a fragipan. The Braddock soils have a redder subsoil than that of the Unison soil. Included soils make up about 10 percent of this unit.

Important soil properties—

Permeability: Moderate
Available water capacity: Moderate
Surface runoff: Medium
Erosion potential: Medium
Organic matter content: Low to moderate
Natural fertility: Low
Soil reaction: Very strongly acid to moderately acid
Depth to bedrock: More than 60 inches
Shrink-swell potential: Moderate
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are farmed. A few areas are wooded.

This soil is well suited to cultivated crops and hay. It can be easily tilled under optimum moisture conditions. The potential for erosion is a major management concern. Other management concerns are the need to increase the organic matter content of the surface layer and the need for applications of lime and fertilizer to offset the acidity and the low natural fertility of the soil. The gravel-sized rock fragments in the surface layer interfere with cultivation and tillage. In cultivated areas conservation tillage, cover crops, and a cropping system that includes grasses and legumes can help to control runoff and erosion. Crop residue should be kept on the surface or incorporated into the plow layer.

This soil is well suited to pasture. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotating grazing among pastures, deferring grazing, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures. If the pasture is overgrazed, the runoff rate increases and erosion is excessive.

The potential productivity for trees on this soil is moderately high. The estimated production for northern red oak is 288 board feet per acre. Seeds and seedlings survive and grow well if competing vegetation is controlled.

Low strength, the moderate permeability, and the clayey subsoil are the main limitations affecting community development. The low strength limits the use of this soil for roadfill and for local roads and streets. The gravel-sized rock fragments limit the use of this soil for lawns, camp and picnic areas, and playgrounds.

Capability subclass: IIe.

60C—Unison gravelly loam, 7 to 15 percent slopes. This soil is very deep, strongly sloping, and well drained. It is on broad terraces along streams in the Shenandoah Valley. Slopes are smooth and commonly are complex. Areas commonly are elongated or irregular in shape. They range from about 5 to 50 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 8 inches, brown gravelly loam

Subsoil:
8 to 19 inches, yellowish brown clay loam
19 to 34 inches, yellowish brown, mottled clay
34 to 52 inches, strong brown, mottled cobbly clay loam
52 to 62 inches, red clay loam

Included with this soil in mapping are the well drained Braddock and moderately well drained Moomaw soils. These soils are in landscape positions similar to those of the Unison soil. The Braddock soils have a redder subsoil than that of the Unison soil. The

Moomaw soils have a fragipan. Included soils make up about 10 percent of this unit.

Important soil properties—

Permeability: Moderate
Available water capacity: Moderate
Surface runoff: Rapid
Erosion potential: High
Organic matter content: Low to moderate
Natural fertility: Low
Soil reaction: Very strongly acid to moderately acid
Depth to bedrock: More than 60 inches
Shrink-swell potential: Moderate
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are farmed. A few areas are wooded.

This soil is moderately well suited to cultivated crops and hay. It can be easily tilled under optimum moisture conditions. The potential for erosion is a major management concern. Other management concerns are the need to increase the organic matter content of the surface layer and the need for applications of lime and fertilizer to offset the acidity and the low natural fertility of the soil. The gravel-sized rock fragments in the surface layer interfere with tillage. In cultivated areas conservation tillage, cover crops, and a cropping system that includes grasses and legumes can help to control runoff and erosion. Crop residue should be kept on the surface or incorporated into the plow layer.

This soil is well suited to pasture. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotating grazing among pastures, deferring grazing, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures. If the pasture is overgrazed, the runoff rate increases and erosion is excessive.

The potential productivity for trees on this soil is moderately high. The estimated production for northern red oak is 288 board feet per acre. Seeds and seedlings survive and grow well if competing vegetation is controlled.

Low strength, the slope, the moderate permeability, and the clayey subsoil are the main limitations affecting community development. The low strength limits the use of this soil for roadfill and for local roads and streets. The slope and the gravel-sized rock fragments are limitations affecting lawns, camp and picnic areas, and playgrounds.

Capability subclass: IIIe.

61B—Unison cobbly loam, 2 to 7 percent slopes. This soil is very deep, gently sloping, and well drained. It is on broad terraces along streams in the Shenandoah Valley. Slopes are smooth and commonly are complex. Areas commonly are elongated or irregular in shape. They range from about 5 to 55 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 8 inches, brown cobbly loam

Subsoil:
8 to 19 inches, yellowish brown clay loam
19 to 34 inches, yellowish brown, mottled clay
34 to 52 inches, strong brown, mottled cobbly clay loam
52 to 62 inches, red clay loam

Included with this soil in mapping are the well drained Braddock and moderately well drained Moomaw soils. These soils are in landscape positions similar to those of the Unison soil. The Moomaw soils have a fragipan. The Braddock soils have a redder subsoil than that of the Unison soil. Included soils make up about 10 percent of this unit.

Important soil properties—

Permeability: Moderate
Available water capacity: Moderate
Surface runoff: Medium
Erosion potential: Medium
Organic matter content: Low to moderate
Natural fertility: Low
Soil reaction: Very strongly acid to moderately acid
Depth to bedrock: More than 60 inches
Shrink-swell potential: Moderate
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are farmed. A few areas are used as woodland.

This soil is moderately well suited to cultivated crops and hay. It can be tilled under optimum moisture conditions. The cobblestones in the surface layer, however, damage tillage equipment and interfere with planting and cultivating. The potential for erosion is a major management concern. Other management concerns are the need to increase the organic matter content of the surface layer and the need for applications of lime and fertilizer to offset the acidity and the low natural fertility of the soil. In cultivated areas conservation tillage, cover crops, and a cropping system that includes grasses and legumes can help to control runoff and erosion. Crop residue should be kept on the surface or incorporated into the plow layer.

This soil is well suited to pasture. Establishing and

maintaining a mixture of grasses and legumes, using proper stocking rates, rotating grazing among pastures, deferring grazing, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures. If the pasture is overgrazed, the runoff rate increases and erosion is excessive.

The potential productivity for trees on this soil is moderately high. The estimated production for northern red oak is 288 board feet per acre. Seeds and seedlings survive and grow well if competing vegetation is controlled.

Low strength, the moderate permeability, the cobblestones, and the clayey subsoil are the main limitations affecting community development. The low strength limits the use of this soil for roadfill and for local roads and streets. The cobblestones limit the use of this soil for lawns, picnic and camp areas, and playgrounds.

Capability subclass: IIIs.

61C—Unison cobbly loam, 7 to 15 percent slopes. This soil is very deep, strongly sloping, and well drained. It is on broad terraces along streams in the Shenandoah Valley. Slopes are smooth and commonly are complex. Areas commonly are elongated or irregular in shape. They range from about 5 to 50 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 8 inches, brown cobbly loam

Subsoil:
8 to 19 inches, yellowish brown clay loam
19 to 34 inches, yellowish brown, mottled clay
34 to 52 inches, strong brown, mottled cobbly clay loam
52 to 62 inches, red clay loam

Included with this soil in mapping are the well drained Braddock and moderately well drained Moomaw soils. These soils are in landscape positions similar to those of the Unison soil. The Braddock soils have a redder subsoil than that of the Unison soil. The Moomaw soils have a fragipan. Included soils make up about 10 percent of this unit.

Important soil properties—

Permeability: Moderate
Available water capacity: Moderate
Surface runoff: Rapid
Erosion potential: High
Organic matter content: Low to moderate
Natural fertility: Low
Soil reaction: Very strongly acid to moderately acid
Depth to bedrock: More than 60 inches
Shrink-swell potential: Moderate
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are farmed. A few areas are wooded.

This soil is moderately well suited to cultivated crops and hay. It can be tilled under optimum moisture conditions. The cobblestones in the surface layer, however, damage tillage equipment and interfere with planting and cultivation. The potential for erosion is a major management concern. Other management concerns are the need to increase the organic matter content of the surface layer and the need for applications of lime and fertilizer to offset the acidity and the low natural fertility of the soil. In cultivated areas conservation tillage, cover crops, and a cropping system that includes grasses and legumes can help to control runoff and erosion. Crop residue should be kept on the surface or incorporated into the plow layer.

This soil is moderately well suited to pasture. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotating grazing among pastures, deferring grazing, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures. If the pasture is overgrazed, the runoff rate increases and erosion is excessive.

The potential productivity for trees on this soil is moderately high. The estimated production for northern red oak is 288 board feet per acre. Seeds and seedlings survive and grow well if competing vegetation is controlled.

Low strength, the slope, the moderate permeability, the cobblestones, and the clayey subsoil are the main limitations affecting community development. The low strength limits the use of this soil for roadfill and for local roads and streets. The slope and the cobblestones limit the use of the soil for lawns and landscaping and most recreational uses.

Capability subclass: IVs.

62C—Wallen channery sandy loam, 7 to 15 percent slopes. This soil is moderately deep, strongly sloping, and somewhat excessively drained. It is on the sides of ridges in the mountains. Areas are long and winding and range from about 15 to 100 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 2 inches, very dark gray channery sandy loam

Subsoil:
2 to 7 inches, dark yellowish brown channery sandy loam
7 to 12 inches, yellowish brown channery sandy loam
12 to 25 inches, yellowish brown very channery sandy loam

Substratum:
25 to 35 inches, yellowish brown extremely channery sandy loam
35 inches, fractured sandstone bedrock

Included with this soil in mapping are the well drained Berks, Gainesboro, and Lehew soils. The Berks soils are in landscape positions similar to those of the Wallen soil. They have less sand in the solum than the Wallen soil. The Gainesboro and Lehew soils have a redder hue throughout than the Wallen soil. Also included are rock outcrop and stony soils. Included areas make up about 25 percent of this unit.

Important soil properties—

Permeability: Moderately rapid
Available water capacity: Very low
Surface runoff: Rapid
Erosion potential: High
Organic matter content: Low
Natural fertility: Low or medium
Soil reaction: Very strongly acid or strongly acid
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are used as woodland. A few small areas are used for cultivated crops or pasture.

This soil is moderately well suited to cultivated crops and hay. The potential for erosion is a major management concern. The slope and the high content of rock fragments in the surface layer restrict the use of machinery and tillage equipment. Crops respond well to applications of lime and fertilizer, but growth and yields are often limited by the very low available water capacity. In cultivated areas conservation tillage, cover crops, and a cropping system that includes grasses and legumes can help to control runoff and erosion and conserve moisture. Crop residue should be kept on the surface or incorporated into the plow layer.

This soil is moderately well suited to pasture. Grasses and legumes respond well to applications of lime and fertilizer, but the very low available water capacity often limits yields and makes maintenance difficult. Applying lime and fertilizer, rotating grazing among pastures, and deferring grazing increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on this soil is moderate. The estimated production for northern red oak is 240 board feet per acre. Seedling survival and growth are often limited by the very low available water capacity and the low or medium natural fertility of the soil. Establishing skid trails on the contour helps to control erosion.

The shallow depth to bedrock and the high content of rock fragments are the main limitations affecting community development. The shallow depth to bedrock especially limits the use of this soil as a site for sanitary facilities and for buildings. The rock fragments limit the use of this soil for lawns, camp and picnic areas, and playgrounds.

Capability subclass: IIIe.

62D—Wallen channery sandy loam, 15 to 35 percent slopes. This soil is moderately deep, moderately steep or steep, and somewhat excessively drained. It is on the sides of ridges in the mountains. Areas are long and winding and range from about 15 to 100 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 2 inches, very dark gray channery sandy loam

Subsoil:
2 to 7 inches, dark yellowish brown channery sandy loam
7 to 12 inches, yellowish brown channery sandy loam
12 to 25 inches, yellowish brown very channery sandy loam

Substratum:
25 to 35 inches, yellowish brown extremely channery sandy loam
35 inches, fractured sandstone bedrock

Included with this soil in mapping are the well drained Berks, Gainesboro, and Lehew soils. The Berks soils are in landscape positions similar to those of the Wallen soil. They have less sand in the solum than the Wallen soil. The Gainesboro and Lehew soils have a redder hue throughout than the Wallen soil. Also included are rock outcrop and stony soils. Included areas make up about 25 percent of this unit.

Important soil properties—

Permeability: Moderately rapid
Available water capacity: Very low
Surface runoff: Very rapid

Erosion potential: High
Organic matter content: Low
Natural fertility: Low or medium
Soil reaction: Very strongly acid or strongly acid
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are used as woodland. A few small areas are used for pasture.

This soil is poorly suited to cultivated crops and hay. The potential for erosion is a major management concern. The slope and the high content of rock fragments in the surface layer severely restrict the use of machinery and tillage equipment.

This soil is poorly suited to pasture. Grasses and legumes respond well to applications of lime and fertilizer, but the very low available water capacity often limits yields and makes maintenance difficult. Applying lime and fertilizer, rotating grazing among pastures, and deferring grazing increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on this soil is moderate. The estimated production for northern red oak is 240 board feet per acre on north aspects and 190 board feet per acre on south aspects. Seedling survival and growth are often limited by the very low available water capacity, the acidity, and the low or medium natural fertility of the soil. The slope limits the safe operation of most woodland equipment. Establishing skid trails on the contour helps to control erosion.

The shallow depth to bedrock and the slope are the main limitations affecting community development, especially sanitary facilities and building sites. The slope is a major limitation affecting most recreational uses.

Capability subclass: VIe.

63C—Wallen channery sandy loam, 2 to 15 percent slopes, very stony. This soil is moderately deep, gently sloping to strongly sloping, and somewhat excessively drained. It is on the sides of ridges in the mountains. Areas are long and winding and range from about 10 to 50 acres. Stones about 10 to 24 inches in diameter and about 3 to 24 feet apart cover up to 3 percent of the surface.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 2 inches, very dark gray channery sandy loam

Subsoil:
2 to 7 inches, dark yellowish brown channery sandy loam
7 to 12 inches, yellowish brown channery sandy loam
12 to 25 inches, yellowish brown very channery sandy loam

Substratum:
25 to 35 inches, yellowish brown extremely channery sandy loam
35 inches, fractured sandstone bedrock

Included with this soil in mapping are Drall and Lehew soils. The Drall soils are mostly near the boundary of the mapped areas. The Lehew soils are in landscape positions similar to those of the Wallen soil. They have a redder subsoil than the Wallen soil. Also included are rock outcrop, which is generally on ridgetops, and extremely stony soils at the head of drainageways. Included areas make up about 20 percent of this unit.

Important soil properties—

Permeability: Moderately rapid
Available water capacity: Very low
Surface runoff: Medium or rapid
Erosion potential: Medium
Organic matter content: Low
Natural fertility: Low or medium
Soil reaction: Very strongly acid or strongly acid
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

All areas of this soil are used for woodland. Because of the slope and the large stones on the surface, the soil is unsuitable for farming.

This soil is poorly suited to pasture. The large stones on the surface limit the use of machinery for managing and improving pasture. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotating grazing among pastures, deferring grazing, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on this soil is moderate. The estimated production for northern red oak is 240 board feet per acre. Seedling survival and growth are limited by the very low available water capacity, the acidity, and the low or medium natural fertility of the soil. The slope and the large stones on the surface restrict the use of woodland equipment.

Establishing skid trails on the contour helps to control erosion.

The depth to bedrock, the slope, and the large stones on the surface limit the use of this soil for sanitary facilities, building site development, and local roads and streets. The slope and the large stones on the surface are limitations affecting camp and picnic areas and playgrounds.

Capability subclass: VIIs.

63D—Wallen channery sandy loam, 15 to 35 percent slopes, very stony. This soil is moderately deep, moderately steep or steep, and somewhat excessively drained. It is on the sides of ridges in the mountains. Areas are long and winding and range from about 20 to 300 acres. Stones about 10 to 24 inches in diameter and about 3 to 24 feet apart cover up to 3 percent of the surface.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 2 inches, very dark gray channery sandy loam

Subsoil:
2 to 7 inches, dark yellowish brown channery sandy loam
7 to 12 inches, yellowish brown channery sandy loam
12 to 25 inches, yellowish brown very channery sandy loam

Substratum:
25 to 35 inches, yellowish brown extremely channery sandy loam
35 inches, fractured sandstone bedrock

Included with this soil in mapping are Drall and Lehew soils. The Drall soils are mostly near the boundary of the mapped areas. The Lehew soils are in landscape positions similar to those of the Wallen soil. They have a redder subsoil than the Wallen soil. Also included are rock outcrop, which is generally on ridgetops, and extremely stony soils at the head of drainageways. Included areas make up about 20 percent of this unit.

Important soil properties—

Permeability: Moderately rapid
Available water capacity: Very low
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low
Natural fertility: Low or medium
Soil reaction: Very strongly acid or strongly acid
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

All areas of this soil are used as woodland. Because of the slope and the large stones on the surface, the soil is unsuitable for farming.

This soil is poorly suited to pasture. The large stones on the surface and the slope limit the use of machinery for managing and improving pasture. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotating grazing among pastures, deferring grazing, and applying lime and fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on this soil is moderate. The estimated production for northern red oak is 240 board feet per acre on north aspects and 190 board feet per acre on south aspects. Seedling survival and growth are limited by the very low available water capacity, the acidity, and the low or medium natural fertility of the soil. The slope and the large stones on the surface restrict the use of woodland equipment. Establishing skid trails on the contour helps to control erosion.

The depth to bedrock, the large stones on the surface, and the slope are limitations affecting sanitary facilities and building site development. The slope is a limitation affecting local roads and streets. The slope and the large stones on the surface are limitations affecting camp and picnic areas and playgrounds.

Capability subclass: VIIs.

63E—Wallen channery sandy loam, 35 to 55 percent slopes, very stony. This soil is moderately deep, very steep, and somewhat excessively drained. It is on the sides of ridges in the mountains. Areas are long and winding and range from about 5 to 100 acres. Stones about 10 to 24 inches in diameter and about 3 to 24 feet apart cover 3 to 15 percent of the surface.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 2 inches, very dark gray channery sandy loam

Subsoil:
2 to 7 inches, dark yellowish brown channery sandy loam
7 to 12 inches, yellowish brown channery sandy loam
12 to 25 inches, yellowish brown very channery sandy loam

Substratum:
25 to 35 inches, yellowish brown extremely channery sandy loam
35 inches, fractured sandstone bedrock

Included with this soil in mapping are Drall and Lehew soils. The Drall soils are mostly near the boundary of the mapped areas. The Lehew soils are in landscape positions similar to those of the Wallen soil. They have a redder subsoil than the Wallen soil. Also included are rock outcrop, which is generally on ridgetops, and extremely stony soils at the head of drainageways. Included areas make up about 20 percent of this unit.

Important soil properties—

Permeability: Moderately rapid
Available water capacity: Very low
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low
Natural fertility: Low or medium
Soil reaction: Very strongly acid or strongly acid
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil in the George Washington National Forest are used as woodland. A few small areas are on private land. Because of the slope and the large stones on the surface, the soil is unsuitable for farming.

The potential productivity for trees on this soil is moderate. The estimated production for northern red oak is 240 board feet per acre on north aspects and 190 board feet per acre on south aspects. Seedling survival and growth are limited by the very low available water capacity, the acidity, and the low or medium natural fertility. The slope and the large stones on the surface severely restrict the use of woodland equipment.

The depth to bedrock, the slope, and the large stones on the surface are limitations affecting sanitary facilities and building site development. The depth to bedrock and the slope are limitations affecting local roads and streets. The slope and the large stones on the surface limit the development of most recreational uses.

Capability subclass: VIIs.

64D—Wallen channery sandy loam, 15 to 35 percent slopes, extremely stony. This soil is moderately deep, moderately steep or steep, and somewhat excessively drained. It is on the sides of ridges in the mountains. Areas are long and winding and range from about 10 to 100 acres. Stones about 10 to 24 inches in diameter and about 1.5 to 3.0 feet apart cover about 3 to 15 percent of the surface.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 2 inches, very dark gray channery sandy loam

Subsoil:
2 to 7 inches, dark yellowish brown channery sandy loam
7 to 12 inches, yellowish brown channery sandy loam
12 to 25 inches, yellowish brown very channery sandy loam

Substratum:
25 to 35 inches, yellowish brown extremely channery sandy loam
35 inches, fractured sandstone bedrock

Included with this soil in mapping are Drall and Lehew soils. The Drall soils are mostly near the boundary of the mapped areas. The Lehew soils are in landscape positions similar to those of the Wallen soil. They are redder in color than the Wallen soil. Also included are rock outcrop, which is generally on ridgetops, and rubbly soils at the head of drainageways. Included areas make up about 20 percent of this unit.

Important soil properties—

Permeability: Moderately rapid
Available water capacity: Very low
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low
Natural fertility: Low or medium
Soil reaction: Very strongly acid or strongly acid
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

All areas of this soil are in the George Washington National Forest and are used as woodland. Because of the slope and the large stones on the surface, the soil is unsuitable for farming.

The potential productivity for trees on this soil is moderate. The estimated production for northern red oak is 240 board feet per acre on north aspects and 190 board feet per acre on south aspects. Seedling survival and growth are limited by the very low available

water capacity, the acidity, and the low or medium natural fertility. The slope and the large stones on the surface severely restrict the use of woodland equipment.

The depth to bedrock, the slope, and the large stones on the surface limit the use of this soil for sanitary facilities and building site development. The depth to bedrock and the slope are limitations affecting local roads and streets. The slope and the large stones on the surface limit the development of most recreational uses.

Capability subclass: VIIs.

64E—Wallen channery sandy loam, 35 to 55 percent slopes, extremely stony. This soil is moderately deep, very steep, and somewhat excessively drained. It is on the sides of ridges in the mountains. Areas are long and winding and range from about 10 to 100 acres. Stones about 10 to 24 inches in diameter and about 1.5 to 3.0 feet apart cover 3 to 15 percent of the surface.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 2 inches, very dark gray channery sandy loam

Subsoil:
2 to 7 inches, dark yellowish brown channery sandy loam
7 to 12 inches, yellowish brown channery sandy loam
12 to 25 inches, yellowish brown very channery sandy loam

Substratum:
25 to 35 inches, yellowish brown extremely channery sandy loam
35 inches, fractured sandstone bedrock

Included with this soil in mapping are Drall and Lehew soils. The Drall soils are mostly near the boundary of the mapped areas. The Lehew soils are in landscape positions similar to those of the Wallen soil. They are redder in color than the Wallen soil. Also included are rock outcrop, which is generally on ridgetops, and rubbly soils at the head of drainageways. Included areas make up about 20 percent of this unit.

Important soil properties—

Permeability: Moderately rapid
Available water capacity: Very low
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low
Natural fertility: Low or medium
Soil reaction: Very strongly acid or strongly acid
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are used as woodland. Because of the slope and the large stones on the surface, the soil is unsuitable for farming.

The potential productivity for trees on this soil is moderate. The estimated production for northern red oak is 240 board feet per acre on north aspects and 190 board feet per acre on south aspects. Seedling survival and growth are limited by the very low available water capacity, the acidity, and the low or medium natural fertility. The slope and the large stones on the surface severely restrict the use of woodland equipment.

The slope, the depth to bedrock, and the large stones on the surface are limitations affecting sanitary facilities, building site development, and recreational development.

Capability subclass: VIIs.

64F—Wallen channery sandy loam, 55 to 70 percent slopes, extremely stony. This soil is moderately deep, very steep, and somewhat excessively drained. It is on the sides of ridges in the mountains. Areas are long and winding and range from about 10 to 100 acres. Stones about 10 to 24 inches in diameter and about 1.5 to 3.0 feet apart cover 3 to 15 percent of the surface.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 2 inches, very dark gray channery sandy loam

Subsoil:
2 to 7 inches, dark yellowish brown channery sandy loam
7 to 12 inches, yellowish brown channery sandy loam
12 to 25 inches, yellowish brown very channery sandy loam

Substratum:
25 to 35 inches, yellowish brown extremely channery sandy loam
35 inches, fractured sandstone bedrock

Included with this soil in mapping are Drall and Lehew soils. The Drall soils are mostly near the boundary of the mapped areas. The Lehew soils are in landscape positions similar to those of the Wallen soil.

They are redder in color than the Wallen soil. Also included are rock outcrop, which is generally on ridgetops, and rubbly soils at the head of drainageways. Included areas make up about 20 percent of this unit.

Important soil properties—

Permeability: Moderately rapid
Available water capacity: Very low
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low
Natural fertility: Low or medium
Soil reaction: Very strongly acid or strongly acid
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are used as woodland. Because of the slope and the large stones on the surface, the soil is unsuitable for farming, community development, or recreational uses.

The potential productivity for trees on this soil is moderate. The estimated production for northern red oak is 240 board feet per acre on north aspects and 190 board feet per acre on south aspects. Seedling survival and growth are limited by the very low available water capacity, the acidity, and the low or medium natural fertility. The slope and the large stones on the surface severely restrict the use of woodland equipment.

Capability subclass: VIIs.

65C—Wallen-Lehew complex, 2 to 15 percent slopes, very stony. These are moderately deep, gently sloping to strongly sloping, excessively drained soils on the summits and side slopes of ridges in the mountains. They occur as areas so closely intermingled that it was not practical to map them separately. This map unit is about 40 percent Wallen soil, 40 percent Lehew soil, and 20 percent other soils and rock outcrop. Areas are long and winding and range from about 10 to 150 acres. Stones about 10 to 24 inches in diameter and about 3 to 24 feet apart cover up to 3 percent of the surface.

A typical profile of the Wallen soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 2 inches, very dark gray channery sandy loam

Subsoil:
2 to 7 inches, dark yellowish brown channery sandy loam
7 to 12 inches, yellowish brown channery sandy loam
12 to 25 inches, yellowish brown very channery sandy loam

Substratum:
25 to 35 inches, yellowish brown extremely channery sandy loam
35 inches, fractured sandstone bedrock

A typical profile of the Lehew soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 2 inches, dark gray channery loam
2 to 4 inches, dark brown channery loam

Subsoil:
4 to 12 inches, reddish brown channery fine sandy loam
12 to 20 inches, reddish brown very channery fine sandy loam

Substratum:
20 to 24 inches, reddish brown very channery fine sandy loam
24 inches, sandstone bedrock

Included with these soils in mapping are Drall soils and sandstone rock outcrop. The Drall soils are along drainageways, and the rock outcrop occurs mostly near the ridgetops. Also included are extremely stony soils along steep drainageways.

Important properties of the Wallen soil—

Permeability: Moderately rapid
Available water capacity: Very low
Surface runoff: Medium or rapid
Erosion potential: Medium
Organic matter content: Low
Natural fertility: Low or medium
Soil reaction: Very strongly acid or strongly acid
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Important properties of the Lehew soil—

Permeability: Moderately rapid or rapid
Available water capacity: Very low
Surface runoff: Medium or rapid
Erosion potential: Medium
Organic matter content: Low to moderate
Natural fertility: Low or medium
Soil reaction: Very strongly acid or strongly acid
Depth to bedrock: 20 to 40 inches

Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

All areas of these soils are forested. Because of the large stones on the surface, the soils are unsuitable for cultivated crops.

This map unit is poorly suited to pasture. The large stones on the surface limit the use of machinery for managing and improving pasture.

The potential productivity for trees on these soils is moderate. The estimated production for northern red oak is 240 board feet per acre on the Wallen soil and 250 board feet per acre on the Lehew soil. The survival of seeds and seedlings is limited by the very low available water capacity. Logging roads should be constructed on the contour to minimize the hazard of erosion.

The large stones, the rock outcrop, and the depth to bedrock are limitations affecting sanitary facilities, building site development, and most recreational uses.

Capability subclass: VIIs.

65D—Wallen-Lehew complex, 15 to 35 percent slopes, very stony. These are moderately deep, moderately steep or steep, excessively drained soils on the sides of ridges in the mountains. They occur as areas so closely intermingled that it was not practical to map them separately. This map unit is about 40 percent Wallen soil, 40 percent Lehew soil, and 20 percent other soils and rock outcrop. Areas are long and winding and range from about 10 to 150 acres. Stones about 10 to 24 inches in diameter and about 3 to 24 feet apart cover up to 3 percent of the surface.

A typical profile of the Wallen soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 2 inches, very dark gray channery sandy loam

Subsoil:
2 to 7 inches, dark yellowish brown channery sandy loam
7 to 12 inches, yellowish brown channery sandy loam
12 to 25 inches, yellowish brown very channery sandy loam

Substratum:
25 to 35 inches, yellowish brown extremely channery sandy loam
35 inches, fractured sandstone bedrock

A typical profile of the Lehew soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 2 inches, dark gray channery loam
2 to 4 inches, dark brown channery loam

Subsoil:
4 to 12 inches, reddish brown channery fine sandy loam
12 to 20 inches, reddish brown very channery fine sandy loam

Substratum:
20 to 24 inches, reddish brown very channery fine sandy loam
24 inches, sandstone bedrock

Included with these soils in mapping are Drall soils and sandstone rock outcrop. The Drall soils are along drainageways, and the rock outcrop occurs mostly near the ridgetops. Also included are extremely stony soils along steep drainageways.

Important properties of the Wallen soil—

Permeability: Moderately rapid
Available water capacity: Very low
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low
Natural fertility: Low or medium
Soil reaction: Very strongly acid or strongly acid
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Important properties of the Lehew soil—

Permeability: Moderately rapid or rapid
Available water capacity: Very low
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low to moderate
Natural fertility: Low or medium
Soil reaction: Very strongly acid or strongly acid
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

All areas of these soils are forested. Because of the large stones on the surface and the slope, the soils are unsuitable for cultivated crops.

This map unit is poorly suited to pasture. The large stones and the slope limit the use of machinery for managing and improving pasture.

The potential productivity for trees on these soils is

moderate on north and south aspects. On north aspects the estimated production for northern red oak is 240 board feet per acre on the Wallen soil and 250 board feet per acre on the Lehew soil. On south aspects it is 190 board feet per acre on the Wallen soil and 204 board feet per acre on the Lehew soil. The slope and the large stones on the surface limit these soils for most forest management practices and limit the use of conventional logging equipment. The survival of seeds and seedlings is limited by the very low available water capacity and the high content of rock fragments. Logging roads should be constructed on the contour to minimize the hazard of erosion.

The large stones, the rock outcrop, the depth to bedrock, and the slope are limitations affecting building site development, sanitary facilities, and most recreational uses.

Capability subclass: VIIe.

65E—Wallen-Lehew complex, 35 to 55 percent slopes, very stony. These are moderately deep, very steep, excessively drained soils on the sides of ridges in the mountains. They occur as areas so closely intermingled that it was not practical to map them separately. This map unit is about 40 percent Wallen soil, 40 percent Lehew soil, and 20 percent other soils and rock outcrop. Areas are long and winding and range from about 10 to 150 acres. Stones about 10 to 24 inches in diameter and about 3 to 24 feet apart cover up to 3 percent of the surface.

A typical profile of the Wallen soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 2 inches, very dark gray channery sandy loam

Subsoil:
2 to 7 inches, dark yellowish brown channery sandy loam
7 to 12 inches, yellowish brown channery sandy loam
12 to 25 inches, yellowish brown very channery sandy loam

Substratum:
25 to 35 inches, yellowish brown extremely channery sandy loam
35 inches, fractured sandstone bedrock

A typical profile of the Lehew soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 2 inches, dark gray channery loam
2 to 4 inches, dark brown channery loam

Subsoil:
4 to 12 inches, reddish brown channery fine sandy loam
12 to 20 inches, reddish brown very channery fine sandy loam

Substratum:
20 to 24 inches, reddish brown very channery fine sandy loam
24 inches, sandstone bedrock

Included with these soils in mapping are Drall soils and sandstone rock outcrop. The Drall soils are along drainageways, and the rock outcrop occurs mostly near the ridgetops. Also included are extremely stony soils along drainageways.

Important properties of the Wallen soil—

Permeability: Moderately rapid
Available water capacity: Very low
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low
Natural fertility: Low or medium
Soil reaction: Very strongly acid or strongly acid
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Important properties of the Lehew soil—

Permeability: Moderately rapid or rapid
Available water capacity: Very low
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low to moderate
Natural fertility: Low or medium
Soil reaction: Very strongly acid or strongly acid
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

All areas of this map unit are forested. Most of the acreage is in the George Washington National Forest. Because of the large stones on the surface and the slope, the soils are unsuitable for cultivated crops and pasture.

The potential productivity for trees on these soils is moderate on north and south aspects. On north aspects the estimated production for northern red oak is 240 board feet per acre on the Wallen soil and 250 board

feet per acre on the Lehew soil. On south aspects it is 190 board feet per acre on the Wallen soil and 204 board feet per acre on the Lehew soil. The slope and the large stones on the surface limit these soils for most forest management practices and limit the use of conventional logging equipment. Seedling mortality and the equipment limitation are factors that affect forestry management. Logging roads should be constructed on the contour to minimize the hazard of erosion.

The large stones, the rock outcrop, the depth to bedrock, and the slope are limitations affecting building site development, sanitary facilities, and most recreational uses.

Capability subclass: VIIe.

66E—Wallen-Lehew complex, 35 to 55 percent slopes, extremely stony. These are moderately deep, very steep, excessively drained soils on the sides of ridges in the mountains. They occur as areas so closely intermingled that it was not practical to map them separately. This complex is about 40 percent Wallen soil, 40 percent Lehew soil, and 20 percent other soils and rock outcrop. Areas are long and winding and range from 10 to 100 acres. Stones about 10 to 24 inches in diameter and about 1.5 to 3.0 feet apart cover 3 to 15 percent of the surface.

A typical profile of the Wallen soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 2 inches, very dark gray channery sandy loam

Subsoil:
2 to 7 inches, dark yellowish brown channery sandy loam
7 to 12 inches, yellowish brown channery sandy loam
12 to 25 inches, yellowish brown very channery sandy loam

Substratum:
25 to 35 inches, yellowish brown extremely channery sandy loam
35 inches, fractured sandstone bedrock

A typical profile of the Lehew soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 2 inches, dark gray channery loam
2 to 4 inches, dark brown channery loam

Subsoil:
4 to 12 inches, reddish brown channery fine sandy loam
12 to 20 inches, reddish brown very channery fine sandy loam

Substratum:
20 to 24 inches, reddish brown very channery fine sandy loam
24 inches, sandstone bedrock

Included with these soils in mapping are Drall soils and sandstone rock outcrop. The Drall soils are along drainageways, and the rock outcrop occurs mostly near the ridgetops. Also included are rubbly soils on toe slopes and along drainageways.

Important properties of the Wallen soil—

Permeability: Moderately rapid
Available water capacity: Very low
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low
Natural fertility: Low or medium
Soil reaction: Very strongly acid or strongly acid
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Important properties of the Lehew soil—

Permeability: Moderately rapid or rapid
Available water capacity: Very low
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low to moderate
Natural fertility: Low or medium
Soil reaction: Very strongly acid or strongly acid
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

All areas of this map unit are forested. Most of the acreage is in the George Washington National Forest. Because of the large stones on the surface and the slope, the soils are unsuitable for farming.

The potential productivity for trees on these soils is moderate on north and south aspects. On north aspects the estimated production for northern red oak is 240 board feet per acre on the Wallen soil and 250 board feet per acre on the Lehew soil. On south aspects it is 190 board feet per acre on the Wallen soil and 204 board feet per acre on the Lehew soil. The slope and the stones on the surface limit these soils for most forest management practices and limit the use of conventional logging equipment. The survival of seeds and seedlings is limited by the very low available water capacity. Logging roads should be constructed on the

contour to minimize the hazard of erosion.

The large stones, the rock outcrop, and the slope are limitations affecting building site development, sanitary facilities, and recreational uses.

Capability subclass: VIIe.

66F—Wallen-Lehew complex, 55 to 70 percent slopes, extremely stony. These are moderately deep, very steep, excessively drained soils on the sides of ridges in the mountains. They occur as areas so closely intermingled that it was not practical to map them separately. This map unit is about 40 percent Wallen soil, 40 percent Lehew soil, and 20 percent other soils and rock outcrop. Areas are long and winding and range from about 10 to 150 acres. Stones up to 2 feet in diameter cover 15 to 50 percent of the surface.

A typical profile of the Wallen soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 2 inches, very dark gray channery sandy loam

Subsoil:
2 to 7 inches, dark yellowish brown channery sandy loam
7 to 12 inches, yellowish brown channery sandy loam
12 to 25 inches, yellowish brown very channery sandy loam

Substratum:
25 to 35 inches, yellowish brown extremely channery sandy loam
35 inches, fractured sandstone bedrock

A typical profile of the Lehew soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 2 inches, very dark gray channery sandy loam
2 to 4 inches, dark brown channery loam

Subsoil:
4 to 12 inches, reddish brown channery fine sandy loam
12 to 20 inches, reddish brown very channery fine sandy loam

Substratum:
20 to 24 inches, reddish brown very channery fine sandy loam
24 inches, sandstone bedrock

Included with these soils in mapping are Drall soils and sandstone rock outcrop. The Drall soils are mostly in drainageways. Also included are rubbly soils on toe slopes and along drainageways.

Important properties of the Wallen soil—

Permeability: Moderately rapid
Available water capacity: Very low
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low
Natural fertility: Low or medium
Soil reaction: Very strongly acid or strongly acid
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Important properties of the Lehew soil—

Permeability: Moderately rapid or rapid
Available water capacity: Very low
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low to moderate
Natural fertility: Low or medium
Soil reaction: Very strongly acid or strongly acid
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

All areas of this map unit are in the George Washington National Forest and are used as woodland.

The potential productivity for trees on these soils is moderate on north and south aspects. On north aspects the estimated production for northern red oak is 240 board feet per acre on the Wallen soil and 250 board feet per acre on the Lehew soil. On south aspects it is 190 board feet per acre on the Wallen soil and 204 board feet per acre on the Lehew soil. The slope and the large stones on the surface limit these soils for most forest management practices and limit the use of conventional logging equipment. The survival of seeds and seedlings is limited by the very low available water capacity. Logging roads are difficult to construct because of the slope.

The large stones, the rock outcrop, and the slope are limitations affecting building site development, sanitary facilities, and most recreational uses.

Capability subclass: VIIe.

67F—Weikert channery silt loam, 55 to 70 percent slopes. This soil is shallow, very steep, and well drained. It is on the sides of ridges in the mountains. Areas commonly are long and winding and range from about 5 to 35 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 3 inches, yellowish brown channery silt loam

Subsoil:
3 to 16 inches, yellowish brown very channery silt loam

Substratum:
16 inches, acid shale bedrock

Included with this soil in mapping are small intermingled areas of Berks soils. These soils are in landscape positions similar to those of the Weikert soil. They are deeper over bedrock than the Weikert soil. Also included are soils that are wetter than the Weikert soil, extremely stony areas along drainageways, and small areas of rock outcrop throughout the unit. Included areas make up about 20 percent of this unit.

Important soil properties—

Permeability: Moderately rapid
Available water capacity: Very low
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low to moderate
Natural fertility: Low or medium
Soil reaction: Very strongly acid or strongly acid
Depth to bedrock: 10 to 20 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

All areas of this soil are wooded. Because of the slope, the soil is unsuitable for cultivated crops and pasture.

The potential productivity for trees on this soil is moderate. The estimated production for northern red oak is 250 board feet per acre on north aspects and 210 board feet per acre on south aspects. The survival of seeds and seedlings is affected by the very low available water capacity. The slope limits the safe operation of most conventional logging equipment.

The slope and the depth to bedrock are limitations affecting building site development, sanitary facilities, and most recreational uses.

Capability subclass: VIIe.

68D—Weikert-Berks complex, 15 to 35 percent slopes. These are moderately steep or steep, well drained soils on the sides of ridges in the mountains. They occur as areas so intermingled that it was not practical to map them separately. This map unit is about 50 percent shallow Weikert soil, 40 percent moderately deep Berks soil, and 10 percent other soils and rock outcrop. Areas commonly are long and winding and range from about 5 to 200 acres.

A typical profile of the Weikert soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 3 inches, yellowish brown channery silt loam

Subsoil:
3 to 16 inches, yellowish brown very channery silt loam

Substratum:
16 inches, acid shale bedrock

A typical profile of the Berks soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 7 inches, yellowish brown channery silt loam

Subsoil:
7 to 16 inches, yellowish brown very channery silt loam
16 to 33 inches, yellowish brown extremely channery silt loam

Substratum:
33 to 37 inches, yellowish brown extremely channery silt loam
37 inches, hard, acid shale bedrock

Included with these soils in mapping are Gilpin soils. These included soils are on narrow ridgetops. Also included are wetter soils and extremely stony soils along drainageways, rock outcrop throughout the unit, and soils that are more than 40 inches deep over bedrock and that occur at the toe of steep shale slopes.

Important properties of the Weikert soil—

Permeability: Moderately rapid
Available water capacity: Very low
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low to moderate
Natural fertility: Low or medium
Soil reaction: Very strongly acid or strongly acid
Depth to bedrock: 10 to 20 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Important properties of the Berks soil—

Permeability: Moderate
Available water capacity: Very low

Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low
Natural fertility: Low or medium
Soil reaction: Very strongly acid or strongly acid
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of these soils are wooded. A few areas are used for pasture.

These soils are not suited to cultivated crops. They are droughty during the growing season, and the potential for erosion is a major management concern. The slope limits the safe operation of most farm equipment.

These soils are poorly suited to pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are the major concerns in managing pasture. Proper stocking rates, rotation of grazing among pastures, timely deferment of grazing, and applications of lime and fertilizer help to maintain the productivity and carrying capacity of the pastures. If the pasture is overgrazed, the runoff rate increases and erosion is excessive.

The potential productivity for trees is moderate on south aspects of the Weikert and Berks soils. On north aspects it is moderate on the Weikert soil and moderately high on the Berks soil. On north aspects the estimated production for northern red oak is 250 board feet per acre on the Weikert soil and 240 board feet per acre on the Berks soil. On south aspects it is 210 board feet per acre on the Weikert soil and 275 board feet per acre on the Berks soil. The survival of seeds and seedlings is affected by the very low available water capacity. Logging roads and skid trails should be laid out on the contour to reduce the concentration of runoff and thereby control erosion.

The slope and the depth to bedrock are limitations affecting community development. They especially limit the use of these soils for sanitary facilities, building site development, camp areas, picnic areas, and playgrounds.

Capability subclass: VIe.

68E—Weikert-Berks complex, 35 to 55 percent slopes. These are very steep, well drained soils on the side slopes of foothills and ridges in the mountains. They occur as areas so intermingled that it was not practical to map them separately. This map unit is about 50 percent shallow Weikert soil, 40 percent moderately deep Berks soil, and 10 percent other soils and rock outcrop. Areas commonly are long and winding and range from about 5 to 125 acres.

A typical profile of the Weikert soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 3 inches, yellowish brown channery silt loam

Subsoil:
3 to 16 inches, yellowish brown very channery silt loam

Substratum:
16 inches, acid shale bedrock

A typical profile of the Berks soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 7 inches, yellowish brown channery silt loam

Subsoil:
7 to 16 inches, yellowish brown very channery silt loam
16 to 33 inches, yellowish brown extremely channery silt loam

Substratum:
33 to 37 inches, yellowish brown extremely channery silt loam
37 inches, hard, acid shale bedrock

Included with these soils in mapping are Gilpin soils. These included soils are on narrow ridgetops. Also included are wetter soils and extremely stony soils along drainageways and areas of rock outcrop throughout the unit.

Important properties of the Weikert soil—

Permeability: Moderately rapid
Available water capacity: Very low
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low to moderate
Natural fertility: Low or medium
Soil reaction: Very strongly acid or strongly acid
Depth to bedrock: 10 to 20 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Important properties of the Berks soil—

Permeability: Moderate
Available water capacity: Very low
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low

Natural fertility: Low or medium
Soil reaction: Very strongly acid or strongly acid
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of these soils are wooded and are in the George Washington National Forest. Because of the slope, the soils are unsuitable for farming.

These soils are poorly suited to pasture. The slope limits the use of machinery for managing and improving pasture. If the soils are used for pasture, establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are the major management concerns. Proper stocking rates, rotation of grazing among pastures, timely deferment of grazing, and applications of lime and fertilizer help to maintain the productivity and carrying capacity of the pastures. If the pasture is overgrazed, the runoff rate increases and erosion is excessive.

The potential productivity for trees is moderate on south aspects of the Weikert and Berks soils. On north aspects it is moderate on the Weikert soil and moderately high on the Berks soil. On north aspects the estimated production for northern red oak is 250 board feet per acre on the Weikert soil and 240 board feet per acre on the Berks soil. On south aspects it is 210 board feet per acre on the Weikert soil and 275 board feet per acre on the Berks soil. The survival of seeds and seedlings is affected by the very low available water capacity. The slope limits the use of conventional logging equipment. Logging roads and skid trails should be laid out on the contour to reduce the concentration of runoff and thereby control erosion.

The slope and the depth to bedrock are the major limitations affecting community development. They especially limit the use of these soils for sanitary facilities, building site development, camp areas, picnic areas, and playgrounds.

Capability subclass: VIIe.

69D—Weikert-Berks complex, 15 to 35 percent slopes, very stony. These are moderately steep or steep, well drained soils on the side slopes of foothills and ridges in the mountains. They occur as areas so intermingled that it was not practical to map them separately. This map unit is about 40 percent shallow Weikert soil, 40 percent moderately deep Berks soil, and 20 percent other soils and rock outcrop. Areas commonly are long and winding and range from about 5 to 150 acres. Stones about 10 to 24 inches in diameter and about 3 to 24 feet apart cover up to 3 percent of the surface.

A typical profile of the Weikert soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 3 inches, yellowish brown channery silt loam

Subsoil:
3 to 16 inches, yellowish brown very channery silt loam

Substratum:
16 inches, acid shale bedrock

A typical profile of the Berks soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 7 inches, yellowish brown channery silt loam

Subsoil:
7 to 16 inches, yellowish brown very channery silt loam
16 to 33 inches, yellowish brown extremely channery silt loam

Substratum:
33 to 37 inches, yellowish brown extremely channery silt loam
37 inches, hard, acid shale bedrock

Included with these soils in mapping are Gilpin soils. These included soils are on narrow ridgetops. Also included are stony and nonstony soils, extremely stony soils along drainageways, rock outcrop, and soils that have slopes of less than 15 percent.

Important properties of the Weikert soil—

Permeability: Moderately rapid
Available water capacity: Very low
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low to moderate
Natural fertility: Low or medium
Soil reaction: Very strongly acid or strongly acid
Depth to bedrock: 10 to 20 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Important properties of the Berks soil—

Permeability: Moderate
Available water capacity: Very low
Surface runoff: Very rapid
Erosion potential: High

Organic matter content: Low
Natural fertility: Low or medium
Soil reaction: Very strongly acid or strongly acid
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of these soils are wooded. Because of the slope and the large stones on the surface, the soils are unsuitable for cultivated crops.

These soils are poorly suited to pasture. The slope and the large stones on the surface limit the use of machinery for managing and improving pasture. If the soil is used for pasture, establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are the major management concerns. Proper stocking rates, rotation of grazing among pastures, timely deferment of grazing, and applications of lime and fertilizer help to maintain the productivity and carrying capacity of the pastures. If the pasture is overgrazed, the runoff rate increases and erosion is excessive.

The potential productivity for trees is moderate on south aspects of the Weikert and Berks soils. On north aspects it is moderate on the Weikert soil and moderately high on the Berks soil. On north aspects the estimated production for northern red oak is 250 board feet per acre on the Weikert soil and 240 board feet per acre on the Berks soil. On south aspects it is 210 board feet per acre on the Weikert soil and 275 board feet per acre on the Berks soil. The survival of seeds and seedlings is affected by the very low available water capacity of both soils, the restricted rooting depth of the Weikert soil, and the large amount of rock fragments in the Berks soil. Logging roads and skid trails should be laid out on the contour to reduce the concentration of runoff and thereby control erosion.

The slope and the depth to bedrock are limitations affecting community development. They especially limit the use of these soils for sanitary facilities, building site development, camp areas, picnic areas, and playgrounds.

Capability subclass: VIIe.

69F—Weikert-Berks complex, 35 to 70 percent slopes, very stony. These are very steep, well drained soils on the side slopes of foothills and ridges in the mountains. They occur as areas so intermingled that it was not practical to map them separately. This map unit is about 50 percent shallow Weikert soil, 40 percent moderately deep Berks soil, and 10 percent other soils and rock outcrop. Areas commonly are long and winding and range from about 5 to 250 acres. Stones about 10 to 24 inches in diameter and about 3 to 24 feet apart cover up to 3 percent of the surface.

A typical profile of the Weikert soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 3 inches, yellowish brown channery silt loam

Subsoil:
3 to 16 inches, yellowish brown very channery silt loam

Substratum:
16 inches, acid shale bedrock

A typical profile of the Berks soil has the following sequence of layers, textures, and colors—

Surface layer:
0 to 7 inches, yellowish brown channery silt loam

Subsoil:
7 to 16 inches, yellowish brown very channery silt loam
16 to 33 inches, yellowish brown extremely channery silt loam

Substratum:
33 to 37 inches, yellowish brown extremely channery silt loam
37 inches, hard, acid shale bedrock

Included with these soils in mapping are Gilpin soils. These included soils are on narrow ridgetops. Also included are wetter soils and extremely stony soils along drainageways and areas of rock outcrop throughout the unit.

Important properties of the Weikert soil—

Permeability: Moderately rapid
Available water capacity: Very low
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low to moderate
Natural fertility: Low or medium
Soil reaction: Very strongly acid or strongly acid
Depth to bedrock: 10 to 20 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Important properties of the Berks soil—

Permeability: Moderate
Available water capacity: Very low
Surface runoff: Very rapid
Erosion potential: High

Organic matter content: Low
Natural fertility: Low or medium
Soil reaction: Very strongly acid or strongly acid
Depth to bedrock: 20 to 40 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of these soils are wooded. Because of the slope and the large stones on the surface, the soils are unsuitable for cultivated crops and pasture.

The potential productivity for trees is moderate on south aspects of the Weikert and Berks soils. On north aspects it is moderate on the Weikert soil and moderately high on the Berks soil. On north aspects the estimated production for northern red oak is 250 board feet per acre on the Weikert soil and 240 board feet per acre on the Berks soil. On south aspects it is 210 board feet per acre on the Weikert soil and 275 board feet per acre on the Berks soil. The survival of seeds and seedlings is affected by the very low available water capacity. The slope limits forest management practices and limits the use of conventional woodland equipment for logging activities. Logging roads and skid trails should be laid out on the contour to reduce the concentration of runoff and thereby control erosion.

The slope and the depth to bedrock are limitations affecting community development. They especially limit the use of these soils for sanitary facilities, building site development, camp areas, picnic areas, and playgrounds.

Capability subclass: VIIe.

70B—Wolfgap loam, 1 to 5 percent slopes, rarely flooded. This soil is deep, gently sloping, and well drained. It is on stream terraces in the Shenandoah Valley. Areas commonly are elongated and are parallel to the adjacent streams. They range from about 10 to 100 acres.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 11 inches, dark yellowish brown loam

Subsoil:
11 to 24 inches, dark yellowish brown loam
24 to 35 inches, dark brown loam
35 to 57 inches, brown clay loam
57 to 65 inches, dark brown loam

Included with this soil in mapping are the well drained Alonzville and Caverns soils. The Alonzville soils are in slightly higher terrace positions than the Wolfgap soil. The Caverns soils are in landscape positions similar to those of the Wolfgap soil. They have more sand in the solum than the Wolfgap soil. Also included are very gravelly soils in small channels throughout the unit. Included soils make up about 25 percent of the unit.

Important soil properties—

Permeability: Moderate
Available water capacity: Moderate
Surface runoff: Medium
Erosion potential: Medium
Organic matter content: Low to moderate
Natural fertility: Medium
Soil reaction: Strongly acid or moderately acid
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: Rare

Most areas of this soil are used for cultivated crops or for pasture. The remaining small areas are wooded.

This soil is well suited to cultivated crops. The flooding may delay tillage and limit crop growth and yields in some years. Conservation tillage and crop rotations that include grasses and legumes help to control runoff and erosion and conserve moisture.

This soil is well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, using proper stocking rates, rotating grazing among pastures, deferring grazing, and applying fertilizer increase the productivity and carrying capacity of the pastures.

The potential productivity for trees on this soil is moderately high. The estimated production for northern red oak is 288 board feet per acre.

The flooding and the restricted permeability limit the use of this soil for community development, especially for sanitary facilities and building sites.

Capability subclass: IIe.

71D—Zepp very channery loam, 15 to 35 percent slopes, very stony. This soil is very deep, moderately steep or steep, and well drained. It is on the benches and side slopes of ridges in the Massanutten and Shenandoah Mountains. Areas commonly are long and narrow. They range from about 10 to 200 acres. Stones about 10 to 24 inches in diameter and about 3 to 24 feet apart cover up to 3 percent of the surface.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 4 inches, brown very channery loam

Subsoil:
4 to 10 inches, yellowish brown channery loam
10 to 23 inches, brown channery loam
23 to 48 inches, reddish brown very channery sandy loam
48 to 57 inches, yellowish red channery clay loam

Substratum:
57 to 65 inches, yellowish red extremely channery clay loam

Included with this soil in mapping are the well drained Gilpin, Lehew, and Wallen soils. The Gilpin and Wallen soils are in landscape positions similar to those of the Zepp soil. They are shallower over bedrock than the Zepp soil. The Lehew soils are in the higher positions on the landscape. Included soils make up about 25 percent of this unit.

Important soil properties—

Permeability: Moderately rapid
Available water capacity: Moderate
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low
Natural fertility: Low
Soil reaction: Extremely acid to strongly acid
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are used as woodland. Because of the slope and the large stones on the surface, the soil is unsuitable for farming.

The potential productivity for trees on this soil is moderately high on north aspects and moderate on south aspects. The estimated production for northern red oak is 277 board feet per acre on north aspects and 210 board feet per acre on south aspects. The large stones on the surface and the slope limit the use of conventional logging equipment and limit some woodland management practices. Logging roads should be laid out on the contour to minimize the hazard of erosion. Thinning tree stands, clearcutting, and removing insect- and disease-infested trees increase timber production.

The slope limits the use of this soil for camp areas, playgrounds, and picnic areas. It also is a limitation on sites for sanitary facilities and building site development.

This soil is only fairly suited to openland wildlife habitat because of the large stones and the slope. The suitability for woodland wildlife habitat is good.

Capability subclass: VIIs.

71E—Zepp very channery loam, 35 to 55 percent slopes, very stony. This soil is deep, very steep, and well drained. It is on the benches and side slopes of ridges in the Massanutten and Shenandoah Mountains. Areas commonly are long and narrow. They range from about 10 to 200 acres. Stones about 10 to 24 inches in diameter and about 3 to 24 feet apart cover up to 3 percent of the surface.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 4 inches, brown very channery loam

Subsoil:
4 to 10 inches, yellowish brown channery loam
10 to 23 inches, brown channery loam
23 to 48 inches, reddish brown very channery sandy loam
48 to 57 inches, yellowish red channery clay loam

Substratum:
57 to 65 inches, yellowish red extremely channery clay loam

Included with this soil in mapping are small intermingled areas of the well drained Gilpin, Lehew, and Wallen soils. The Gilpin and Wallen soils are in landscape positions similar to those of the Zepp soil. They are shallower over bedrock than the Zepp soil. The Lehew soils are in the higher positions on the landscape. Included soils make up about 25 percent of this unit.

Important soil properties—

Permeability: Moderately rapid
Available water capacity: Moderate
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low
Natural fertility: Low
Soil reaction: Extremely acid to strongly acid
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are in the George Washington National Forest and are used as woodland. Some small wooded areas are on private land. Because of the slope, the soil is unsuitable for cultivated crops, pasture, and hay.

The potential productivity for trees on this soil is moderately high on north aspects and moderate on south aspects. The estimated production for northern red oak is 277 board feet per acre on north aspects and 210 board feet per acre on south aspects. The large stones on the surface and the slope limit the use of conventional logging equipment and limit some woodland management practices. Logging roads should be laid out on the contour to minimize the hazard of erosion. Oaks, yellow poplar, and Virginia pine are commonly grown species. Thinning tree stands, clearcutting, and removing insect- or disease-infested trees increase timber production.

The slope and the large stones are limitations affecting sanitary facilities, building site development, and most recreational uses.

Capability subclass: VIIe.

72E—Zepp very channery loam, 35 to 55 percent slopes, extremely stony. This soil is deep, very steep, and well drained. It is on the benches and side slopes of ridges in the Massanutten and Shenandoah Mountains. Areas commonly are long and narrow. They range from about 10 to 200 acres. Stones about 10 to 24 inches in diameter and about 1.5 to 3.0 feet apart cover 3 to 15 percent of the surface.

A typical profile has the following sequence of layers, textures, and colors—

Surface layer:
0 to 4 inches, brown very channery loam

Subsoil:
4 to 10 inches, yellowish brown channery loam
10 to 23 inches, brown channery loam
23 to 48 inches, reddish brown very channery sandy loam
48 to 57 inches, yellowish red channery clay loam

Substratum:
57 to 65 inches, yellowish red extremely channery clay loam

Included with this soil in mapping are the well drained Lehew and Wallen soils. The Wallen soils are in landscape positions similar to those of the Zepp soil. They are shallower over bedrock than the Zepp soil. The Lehew soils are in the higher positions on the landscape. Included soils make up about 20 percent of this unit.

Important soil properties—

Permeability: Moderately rapid
Available water capacity: Moderate
Surface runoff: Very rapid
Erosion potential: High
Organic matter content: Low
Natural fertility: Low
Soil reaction: Extremely acid to strongly acid
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Depth to a seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are wooded and are in the George Washington National Forest. Because of the slope and the large stones on the surface, the soil is unsuitable for cultivated crops, pasture, and hay.

The potential productivity for trees on this soil is moderately high on north aspects and moderate on south aspects. The estimated production for northern red oak is 277 board feet per acre on north aspects and 210 board feet per acre on south aspects. The large stones on the surface and the slope limit the use of conventional logging equipment and limit some woodland management practices. Logging roads should be laid out on the contour to minimize the hazard of erosion. Thinning tree stands, clearcutting, and removing insect- or disease-infested trees increase timber production.

The large stones on the surface and the slope are limitations affecting sanitary facilities, building site development, and most recreational uses.

Capability subclass: VIIe.

Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is the land that is best suited to food, feed, forage, fiber, and oilseed crops. It may be cultivated land, pasture, woodland, or other land, but it is not urban or built-up land or water areas. It either is used for food or fiber crops or is available for those crops. The soil qualities, growing season, and moisture supply are those needed for a well managed soil to produce a sustained high yield of crops in an economic manner. Prime farmland produces the highest yields with minimal expenditure of energy and economic resources, and farming it results in the least damage to the environment.

Prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation. The temperature and growing season are favorable. The level of acidity or alkalinity is acceptable. Prime farmland has few or no rocks and is permeable to water and air. It is not excessively erodible or saturated with water for long periods and is not frequently flooded during the growing season. The slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Soil Conservation Service.

About 44,855 acres in the survey area, or nearly 14 percent of the total acreage, meets the soil requirements for prime farmland. This acreage is mainly in the Limestone Valley.

The map units in the survey area that are considered prime farmland are listed in table 5. This list does not constitute a recommendation for a particular land use. The extent of each listed map unit is shown in table 4. The location is shown on the detailed soil maps at the back of this publication. The soil qualities that affect use and management are described under the heading "Detailed Soil Map Units."

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavior characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreation facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and Pasture

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under "Detailed Soil Map Units." Specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

Yields Per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 6. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification of each map unit also is shown in the table.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 6 are grown in

the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for woodland or for engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit. Only class and subclass are used in this survey.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have slight limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w, s,* or *c* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, woodland, wildlife habitat, or recreation.

The capability classification of each map unit is given in the section "Detailed Soil Map Units" and in the yields table.

Woodland Management and Productivity

Table 7 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed. The table gives the ordination symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for an indicator tree species. The number indicates the volume, in cubic meters per hectare per year, that the indicator species can produce. The larger the number, the greater the potential productivity. The number 1 indicates low productivity; 2 and 3, moderate; 4 and 5, moderately high; 6 to 8, high; 9 to 11, very high; and 12 or more, extremely high. The second part of the symbol, a letter, indicates the major kind of soil limitation for use and management. The letter *R* indicates steep slopes; *X*, stones or rocks on the surface; *W*, excess water in or on the soil; *T*, excessive alkalinity, acidity, sodium salts, or other toxic substances in the soil; *D*, restricted rooting depth caused by bedrock, a hardpan, or other restrictive layer; *C*, clay in the upper part of the soil; *S*, sandy texture; and *F*, high content of rock fragments in the soil profile. The letter *A* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: R, X, W, T, D, C, S, and F.

In table 7, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Erosion hazard is the probability that erosion will

occur as a result of site preparation and cutting operations and where the soil is exposed along roads, skid trails, fire lanes, and log-handling areas. Forests that have been burned or overgrazed are also subject to erosion. Ratings of the erosion hazard are based on the percent of the slope and on the erosion factor K shown in table 15. A rating of *slight* indicates that no particular prevention measures are needed under ordinary conditions. A rating of *moderate* indicates that erosion-control measures are needed in certain silvicultural activities. A rating of *severe* indicates that special precautions are needed to control erosion in most silvicultural activities.

The proper construction and maintenance of roads, trails, landings, and fire lanes will help to overcome the erosion hazard.

Equipment limitation reflects the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. The chief characteristics and conditions considered in the ratings are slope, stones on the surface, rock outcrops, soil wetness, and texture of the surface layer. A rating of *slight* indicates that equipment use normally is not restricted either in kind of equipment that can be used or time of year because of soil factors. If soil wetness is a factor, equipment use can be restricted for a period not to exceed 2 months. A rating of *moderate* indicates that equipment use is moderately restricted because of one or more soil factors. If soil wetness is a factor, equipment use is restricted for 2 to 6 months. A rating of *severe* indicates that equipment use is severely restricted either in kind of equipment or season of use. If soil wetness is a factor, equipment use is restricted for more than 6 months.

Choosing the most suitable equipment and timing harvesting and other management operations to avoid seasonal limitations help to overcome the equipment limitation.

Seedling mortality refers to the probability of death of naturally occurring or planted tree seedlings as influenced by kinds of soil or topographic conditions. The factors considered in rating the soils for seedling mortality are texture of the surface layer, depth and duration of the water table, rock fragments in the surface layer, rooting depth, and aspect of the slope. A rating of *slight* indicates that under normal conditions the expected mortality is less than 25 percent. A rating of *moderate* indicates that the expected mortality is 25 to 50 percent. Extra precautions are advisable. A rating of *severe* indicates that the expected mortality is more than 50 percent. Extra precautions are important. Replanting may be necessary.

The use of special planting stock and special site preparation, such as bedding, furrowing, or surface drainage, can help to reduce seedling mortality.

Windthrow hazard is the likelihood of trees being uprooted (tipped over) by the wind because the soil is not deep enough for adequate root anchorage. The main restrictions are a seasonal high water table and the depth to bedrock, a fragipan, or other limiting layers. A rating of *slight* indicates that under normal conditions no trees are blown down by the wind. Strong winds may break trees but do not uproot them. A rating of *moderate* indicates that moderate or strong winds occasionally blow down a few trees during periods of soil wetness. A rating of *severe* indicates that moderate or strong winds may blow down many trees during periods of soil wetness.

The use of specialized equipment that does not damage surficial root systems during partial cutting operations can help to reduce windthrow. Care in thinning or no thinning also can help to reduce windthrow.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index*. This index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

The *productivity class*, a number, represents an expected volume produced by the most important trees. This number, expressed as cubic meters per hectare per year, indicates the amount of fiber produced in a fully stocked, even-aged, unmanaged stand. A cubic meter per hectare equals 14.3 cubic feet per acre.

The first species listed under *common trees* for a soil is the indicator species for that soil. The indicator species is the species that is common in the area and is generally the most productive on the soil. The productivity class of the indicator species is the number used for the ordination symbol.

Trees to plant are those that are suited to the soil and are planted for commercial wood production.

Recreation

The soils of the survey area are rated in table 8 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic

quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreation use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 8, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 8 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 11 and interpretations for dwellings without basements and for local roads and streets in table 10.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 9, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops

are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, timothy, bromegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggartick, quackgrass, and ragweed.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are oak, birch, cherry, maple, apple, hawthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are gray dogwood, autumn olive, and crabapple.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, yew, cedar, and hemlock.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, arrowhead, burreed, pickerel weed, cordgrass, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, swamps, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. Wildlife attracted to these areas include bobwhite quail, meadow vole, meadowlark, field sparrow, cottontail, and red fox.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, and deer.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, frogs, and tree swallows.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are given in the following tables: Building site development, Sanitary facilities, Construction materials, and Water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations need to be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to

bedrock, hardness of bedrock within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to (1) evaluate the potential of areas for residential, commercial, industrial, and recreation uses; (2) make preliminary estimates of construction conditions; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; (5) plan detailed onsite investigations of soils and geology; (6) locate potential sources of gravel, sand, earthfill, and topsoil; (7) plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and (8) predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 10 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and the depth to the water table.

Dwellings and *small commercial buildings* are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrink-swell potential, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, slope, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 or 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material, a base of gravel, crushed rock, or stabilized soil material, and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost-action potential, and depth to a high water table affect the traffic-supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock or to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 11 shows the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations

are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 11 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 11 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage due to rapid permeability of the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground-water pollution. Ease of excavation and revegetation needs to be considered.

The ratings in table 11 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil

material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 12 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, a low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have a moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet, and the depth to the water table is less than 1 foot. These soils have layers of suitable material, but the material is less than 3 feet thick.

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In table 12, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less

than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 13 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas and for embankments, dikes, and levees. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and potential frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, or sulfur. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or to a cemented pan. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to control erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of soil blowing or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of soil blowing, low available water capacity, restricted rooting depth, toxic substances such as salts or sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classification, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

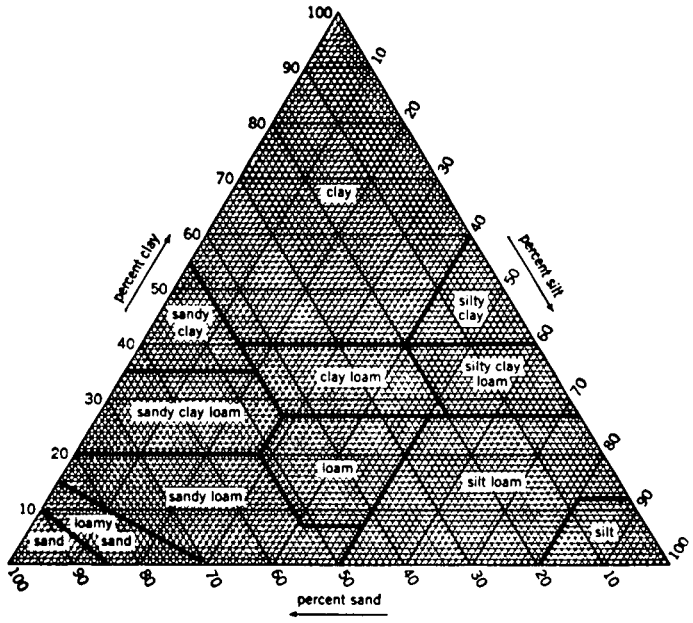

Figure 5.—Percentages of clay, silt, and sand in the basic USDA soil textural classes.

Engineering Index Properties

Table 14 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter (fig. 5). "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as about 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system *(2)* and the system adopted by the American Association of State Highway and Transportation Officials *(1)*.

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to

those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Rock fragments larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 15 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, and plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at ⅓ bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume

change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.05 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 15, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Tables 16 and 17 give estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the infiltration of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

Some soils in table 16 are assigned to two hydrologic soil groups. Dual grouping is used for one of two reasons. Some soils have a seasonal high water table but can be drained. In this instance the first letter applies to the drained condition of the soil and the second letter to the undrained condition. In some soils that are less than 20 inches deep to bedrock, the first letter applies to areas where the bedrock is cracked and pervious and the second letter to areas where the bedrock is impervious or where exposed bedrock makes up more than 25 percent of the surface of the soil.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding, the temporary covering of the soil surface by flowing water, is caused by overflowing streams, by runoff from adjacent slopes, or by inflow from high tides. Shallow water standing or flowing for short periods after rainfall or snowmelt is not considered flooding. Standing water in swamps and marshes or in a closed depression is considered ponding.

Table 16 gives the frequency and duration of flooding and the time of year when flooding is most likely to occur.

Frequency, duration, and probable period of occurrence are estimated. Frequency generally is

expressed as none, rare, occasional, or frequent. *None* means that flooding is not probable. *Rare* means that flooding is unlikely but possible under unusual weather conditions. (There is a near 0 to 5 percent chance of flooding in any year.) *Occasional* means that flooding occurs infrequently under normal weather conditions. (There is a 5 to 50 percent chance of flooding in any year.) *Frequent* means that flooding occurs often under normal weather conditions. (There is more than a 50 percent chance of flooding in any year.) Duration is expressed as *very brief* (less than 2 days), *brief* (2 to 7 days), *long* (7 days to 1 month), and *very long* (more than 1 month). The time of year that floods are most likely to occur is expressed in months.

The information on flooding is based on evidence in the soil profile, namely, thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and absence of distinctive horizons, which are characteristic of soils that are not subject to flooding.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 16 are the depth to the seasonal high water table; the kind of water table—that is, perched or apparent; and the months of the year that the water table commonly is highest. A water table that is seasonally high for less than 1 month is not indicated in table 16.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

The two numbers in the "High water table—Depth" column indicate the normal range in depth to a saturated zone. Depth is given to the nearest half foot. The first numeral in the range indicates the highest water level. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. "More than 6.0" indicates that the water table is below a depth of 6 feet or that it is within a depth of 6 feet for less than a month.

Depth to bedrock is given in table 17 if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is specified as either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Potential frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage mainly to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severe corrosion environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories *(4)*. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 18 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Eleven soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Ultisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Udult (*Ud*, meaning humid, plus *ult*, from Ultisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Hapludults (*Hapl*, meaning minimal horizonation, plus *udult*, the suborder of the Ultisols that has a udic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Hapludults.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, mixed, mesic Typic Hapludults.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. The soil is compared with similar soils and with nearby soils of other series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the *Soil Survey Manual (3)*. Many of the technical terms used in the descriptions are defined in *Soil Taxonomy (4)*. Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Alonzville Series

Soils of the Alonzville series are very deep and well drained. They formed in alluvium derived largely from acid sandstone, shale, and limestone. They are on

terraces and alluvial fans along the major streams and rivers in the Shenandoah Valley. Slope ranges from 2 to 15 percent.

Alonzville soils are associated with the Caverns and Wolfgap soils. Caverns and Wolfgap soils have a lower base saturation than the Alonzville soils. Also, Caverns soils have less clay in the subsoil.

Typical pedon of Alonzville loam, 2 to 7 percent slopes, rarely flooded, 2.3 miles south of Mt. Jackson, 500 feet southwest of the intersection of Virginia 11 and Virginia 730, and 300 feet west of Virginia 11:

Ap—0 to 9 inches; dark brown (10YR 4/3) loam; weak medium subangular blocky structure parting to weak fine granular; friable; common fine roots; few fine and medium discontinuous pores; neutral; abrupt smooth boundary.

Bt1—9 to 19 inches; yellowish brown (10YR 5/6) loam; moderate medium subangular blocky structure; friable; few fine roots; many fine and medium discontinuous pores; dark brown (10YR 4/3) coatings in worm channels; few faint clay films on faces of peds; neutral; clear smooth boundary.

Bt2—19 to 37 inches; strong brown (7.5YR 5/6) clay loam; moderate fine and medium angular and subangular blocky structure; firm, slightly sticky and slightly plastic; few very fine roots; few fine discontinuous pores; light yellowish brown (10YR 6/4) coatings in worm channels; many distinct yellow (10YR 7/6) clay films on faces of peds; many black manganese stains; strongly acid; clear wavy boundary.

Bt3—37 to 54 inches; strong brown (7.5YR 5/6) loam; few fine distinct brownish yellow (10YR 6/6) mottles; weak coarse prismatic structure parting to moderate medium angular and subangular blocky; firm, slightly sticky and nonplastic; many distinct light yellowish brown (10YR 6/4) clay films on faces of peds; many black manganese stains; strongly acid; clear wavy boundary.

C—54 to 65 inches; strong brown (7.5YR 5/6) sandy clay loam; common medium distinct light gray (10YR 7/2) and common fine distinct brownish yellow (10YR 6/8) mottles; massive; friable, slightly sticky and slightly plastic; few black manganese stains; strongly acid.

The thickness of the solum ranges from 30 to more than 60 inches. The depth to bedrock is more than 60 inches. Rock fragments of mostly rounded sandstone gravel and cobbles make up 0 to 15 percent of the surface layer and subsoil and 0 to 35 percent of the substratum. The soils range from extremely acid to strongly acid unless limed.

The A or Ap horizon has hue of 10YR, value of 3 or 4, and chroma of 2 to 4. It is fine sandy loam, loam, or silt loam.

The Bt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. It is loam, clay loam, sandy clay loam, or silty clay loam.

The C horizon has shades of brown, gray, yellow, or olive and generally is mottled. It is fine sandy loam, loam, or sandy clay loam in the fine-earth fraction.

Berks Series

Soils of the Berks series are moderately deep and well drained. They formed in material weathered from shale, siltstone, and fine-grained sandstone. They are on uplands in the Shenandoah Ridge and Valley area. Slope ranges from 2 to 70 percent.

Berks soils are associated with the Blairton, Braddock, Gainesboro, Gilpin, Sequoia, Trappist, Unison, and Weikert soils. Blairton soils have gray mottles in the subsoil. Braddock and Unison soils are deeper over bedrock than the Berks soils, and Weikert soils are shallower. Gainesboro soils are redder than the Berks soil, and Gilpin, Sequoia, Trappist, and Unison soils have fewer rock fragments.

Typical pedon of Berks channery silt loam, 2 to 7 percent slopes, 2 miles southwest of Carmel, 0.9 mile southwest of the intersection of Virginia 678 and Virginia 769, and 0.3 mile northwest of Virginia 678:

Oi—2 inches to 0; loose leaves and twigs and partially decomposed, black (10YR 2/1) organic material; many fine roots.

A—0 to 7 inches; yellowish brown (10YR 5/4) channery silt loam; weak fine granular structure; friable; many fine and medium and few coarse roots; few very fine discontinuous pores; about 20 percent shale channers; strongly acid; abrupt smooth boundary.

Bw—7 to 16 inches; yellowish brown (10YR 5/4) very channery silt loam; weak fine and medium subangular blocky structure; friable; many fine and common medium roots; few very fine discontinuous pores; about 55 percent shale channers; very strongly acid; clear wavy boundary.

BC—16 to 33 inches; yellowish brown (10YR 5/4) extremely channery silt loam; weak very fine subangular blocky structure; friable; common fine and few medium roots; about 65 percent shale channers; very strongly acid; clear wavy boundary.

C—33 to 37 inches; yellowish brown (10YR 5/4) extremely channery silt loam; massive (structure obscured by coarse fragments); few fine roots; about 75 percent shale channers; very strongly acid; clear wavy boundary.

R—37 inches; hard, acid shale bedrock.

The thickness of the solum ranges from 18 to 36 inches. The depth to bedrock ranges from 20 to 40 inches. Rock fragments of mostly channer-sized shale, fine-grained sandstone, or siltstone make up 10 to 50 percent of the A horizon, 25 to 65 percent of individual subhorizons of the B horizon, and 50 to 90 percent of the C horizon. The soils range from extremely acid to slightly acid unless limed.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 2 to 4. It is silt loam or loam in the fine-earth fraction.

The Bw and BC horizons have hue of 10YR, value of 4 or 5, and chroma of 4 to 8. They are silt loam or loam in the fine-earth fraction.

The C horizon has hue of 10YR, value of 4 to 6, and chroma of 2 to 6. It is mostly shale fragments with fine-earth coatings of silt loam or loam.

The Cr horizon, if it occurs, is rippable shale, siltstone, or fine-grained sandstone. The R horizon is hard, fractured shale, siltstone, or fine-grained sandstone with a few voids.

Blairton Series

Soils of the Blairton series are moderately deep and somewhat poorly drained. They formed in material weathered from gray, acid shale. They are on uplands in the Shenandoah Valley. Slope ranges from 2 to 15 percent.

Blairton soils are associated with the Berks, Braddock, Gainesboro, Gilpin, Sequoia, Trappist, Unison, and Weikert soils. The associated soils do not have gray mottles in the subsoil and are well drained.

Typical pedon of Blairton silt loam, 2 to 7 percent slopes, 1 mile east of the intersection of Virginia 654 and Virginia 11 and 150 feet north of Virginia 675:

Ap—0 to 9 inches; brown (10YR 4/3) silt loam; weak fine and medium granular structure; friable; many fine roots; many fine and common medium discontinuous pores; few worm channels; about 5 percent shale channers; neutral; abrupt smooth boundary.

Bt1—9 to 16 inches; yellowish brown (10YR 5/4) silty clay loam; many fine distinct pale brown (10YR 6/3) and few fine distinct yellowish red (5YR 5/6) mottles; moderate fine and medium subangular blocky structure; friable, slightly sticky and slightly plastic; common fine roots; common fine and few medium discontinuous pores; many distinct brown (10YR 5/3) and yellowish brown (10YR 5/4) clay films on faces of peds; about 5 percent shale channers; strongly acid; clear smooth boundary.

Bt2—16 to 31 inches; yellowish brown (10YR 5/6) silty clay loam; many fine and medium distinct gray (10YR 6/1) and common fine distinct pale brown (10YR 6/3) and yellowish red (5YR 5/6) mottles; moderate fine and medium angular blocky structure; friable, slightly sticky and slightly plastic; many fine and medium discontinuous pores; many distinct brown (10YR 5/3) clay films on faces of peds; about 10 percent shale channers; strongly acid; abrupt wavy boundary.

R—31 inches; acid shale bedrock.

The thickness of the solum and the depth to bedrock range from 20 to 40 inches. Rock fragments of mostly channer size make up 5 to 25 percent of the A horizon, 5 to 50 percent of the B horizon, and 30 to 70 percent of the C horizon. The soils are very strongly acid or strongly acid unless limed.

The A or Ap horizon has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 2 to 4. It is silt loam or loam in the fine-earth fraction.

The Bt horizon has hue of 7.5YR to 2.5Y, value of 5 or 6, and chroma of 2 to 6. It has mottles with chroma of 2 or less at a depth of 12 to 18 inches. This horizon is silt loam or silty clay loam in the fine-earth fraction.

The C horizon, if it occurs, has hue of 7.5YR to 2.5Y, value of 5 or 6, and chroma of 2 to 6. It is loam or silt loam in the fine-earth fraction.

Braddock Series

Soils of the Braddock series are very deep and well drained. They formed in alluvium derived mainly from a mixture of sandstone and crystalline rocks. They are mainly on stream terraces in the Shenandoah Valley. Slope ranges from 2 to 25 percent.

Braddock soils are associated with the Berks, Blairton, Gainesboro, Gilpin, Sequoia, Trappist, Unison, and Weikert soils. Berks, Blairton, Gainesboro, Gilpin, and Weikert soils have less clay in the subsoil than the Braddock soils. Sequoia and Trappist soils are shallow over bedrock. Unison soils have yellowish brown layers.

Typical pedon of Braddock loam, 2 to 7 percent slopes, 0.25 mile south of the intersection of U.S. 11 and Virginia 730, about 0.25 mile northwest of Cedar Grove Cemetery, 325 feet east of the North Fork of the Shenandoah River:

Ap—0 to 7 inches; dark brown (10YR 3/3) loam; weak fine granular structure; very friable; common medium roots; few fine discontinuous pores; about 3 percent sandstone gravel; strongly acid; abrupt smooth boundary.

BA—7 to 13 inches; strong brown (7.5YR 5/6) clay loam; few fine prominent red (2.5YR 4/8) mottles;

weak fine and medium angular blocky structure; friable, slightly sticky and slightly plastic; common fine and medium roots; many fine and medium discontinuous pores; few faint clay films on faces of peds; few worm channels filled with dark brown (10YR 3/3) loam; about 3 percent sandstone gravel; strongly acid; clear smooth boundary.

Bt1—13 to 28 inches; yellowish red (5YR 4/6) clay; moderate fine and medium angular blocky structure; friable, very sticky and very plastic; few fine roots; many prominent strong brown (7.5YR 5/8) clay films on faces of peds; about 5 percent sandstone gravel; very strongly acid; clear wavy boundary.

Bt2—28 to 37 inches; yellowish red (5YR 4/6) very gravelly clay loam; common fine prominent red (10R 4/8) mottles; moderate fine and medium angular blocky structure; friable, slightly sticky and slightly plastic; few fine roots; many distinct strong brown (7.5YR 5/8) clay films on faces of peds; about 40 percent sandstone gravel; very strongly acid; clear smooth boundary.

BC—37 to 51 inches; red (2.5YR 4/6) very cobbly clay loam; reddish brown (5YR 4/4), strong brown (7.5YR 5/6), and gray (10YR 6/1) streaks and mottles; weak fine and medium angular blocky structure; friable, sticky and plastic; few faint clay films on faces of peds; about 50 percent sandstone cobbles; extremely acid; clear smooth boundary.

C—51 to 65 inches; red (2.5YR 4/6) extremely cobbly sandy clay loam; reddish brown (5YR 4/4), strong brown (7.5YR 5/6), and reddish gray (10R 6/1) mottles; massive; about 60 percent sandstone cobbles and highly weathered sandstone fragments; extremely acid.

The thickness of the solum ranges from 40 to more than 60 inches. The depth to bedrock is more than 60 inches. Rock fragments of mostly gravel- and cobble-sized sandstone make up 2 to 20 percent of the A horizon, 5 to 50 percent of the B horizon, and 25 to more than 80 percent of the C horizon. The soils are extremely acid to strongly acid unless limed.

The A or Ap horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 3 to 6. It is loam or sandy loam in the fine-earth fraction. The E horizon, if it occurs, has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8. It is loam or sandy loam in the fine-earth fraction.

The BA horizon has hue of 2.5YR to 7.5YR, value of 4 or 5, and chroma of 4 to 8. It is clay loam or sandy clay loam in the fine-earth fraction.

The Bt horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 6 to 8. It is clay loam or clay in the fine-earth fraction.

The BC horizon has hue of 2.5YR, value of 4 or 5, and chroma of 6 to 8. In some pedons it is streaked or mottled in shades of red, yellow, or brown.

The C horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 6 to 8 and generally is mottled or variegated. It is loam to clay in the fine-earth fraction.

Broadway Series

Soils of the Broadway series are very deep and well drained. They formed in alluvium derived mainly from limestone, calcareous shale, and sandstone. They are on flood plains in the Shenandoah Valley. Slope is 0 to 2 percent.

Broadway soils are associated with the Derroc, Gladehill, Newmarc, and Nomberville soils. The associated soils do not have carbonates within 40 inches of the surface.

Typical pedon of Broadway silt loam, 0 to 2 percent slopes, occasionally flooded, 3 miles south of Mt. Jackson, 2,000 feet southeast of the intersection of Virginia 730 and U.S. 11, and 60 feet southwest of Smith Creek:

Ap—0 to 11 inches; dark brown (10YR 3/3) silt loam, dark yellowish brown (10YR 4/4) dry; weak fine granular structure; friable; common fine roots; few fine discontinuous pores; violent effervescence; moderately alkaline; gradual smooth boundary.

Bw1—11 to 28 inches; brown (10YR 4/3) silty clay loam; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; few fine roots; common fine discontinuous pores; few worm casts and channels; violent effervescence; moderately alkaline; gradual smooth boundary.

Bw2—28 to 46 inches; brown (10YR 4/3) silty clay loam; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; few fine roots; common fine discontinuous pores; few organic stains on faces of peds; violent effervescence; moderately alkaline; abrupt smooth boundary.

C—46 to 72 inches; grayish brown (10YR 5/2) loamy sand; many coarse distinct strong brown (7.5YR 5/6) and yellow (10YR 7/6) mottles; massive; friable; few fine roots; about 3 percent soft, white accumulations of calcium carbonate; violent effervescence; moderately alkaline.

The thickness of the solum ranges from 30 to 60 inches. The depth to bedrock is more than 60 inches. The content of secondary carbonate concretions ranges from 0 to 10 percent throughout the profile. It increases with increasing depth. Gravel- and cobble-sized rock fragments of mostly calcareous shale, shale, chert, and

sandstone make up 0 to 2 percent of the upper part of the soils and 0 to 15 percent of the lower part. The soils are mildly alkaline or moderately alkaline.

The A or Ap horizon has hue of 7.5YR or 10YR and value and chroma of 2 or 3. It is very fine sandy loam, silt loam, or loam.

The Bw horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 to 4. It is silt loam or silty clay loam.

The C horizon has hue of 10YR, value of 3 to 5, and chroma of 2 to 4. It is loamy sand, sandy loam, fine sandy loam, silt loam, loam, silty clay loam, or clay loam.

Carbo Series

Soils of the Carbo series are moderately deep and well drained. They formed in material weathered from limestone interbedded with shale. They are on uplands in the Shenandoah Valley. Slope ranges from 2 to 35 percent.

Carbo soils are associated with the Chilhowie, Edom, Endcav, Frederick, Massanetta, Opequon, Poplimento, and Timberville soils. Edom, Frederick, Massanetta, Opequon, Poplimento, and Timberville soils have less clay in the subsoil than the Carbo soils. Chilhowie soils have a solum that is thinner than that of the Carbo soils, and Endcav soils have a solum that is thicker.

Typical pedon of Carbo silty clay loam, 2 to 7 percent slopes, 1 mile southeast of the community of Hamburg and 600 feet south of the intersection of Virginia 614 and Virginia 708:

Ap—0 to 8 inches; yellowish brown (10YR 5/4) silty clay loam; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; common fine and very fine roots; common fine discontinuous pores; about 3 percent chert fragments; neutral; abrupt smooth boundary.

Bt1—8 to 18 inches; strong brown (7.5YR 5/6) clay; moderate fine subangular blocky structure; firm, sticky and plastic; common fine and very fine roots; few fine discontinuous pores; few faint strong brown (7.5YR 4/6) clay films on faces of peds; slightly acid; gradual wavy boundary.

Bt2—18 to 31 inches; yellowish brown (10YR 5/6) clay; few fine distinct strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; firm, sticky and very plastic; few very fine roots; few very fine discontinuous pores; common distinct strong brown (7.5YR 4/6) clay films on faces of peds; few pressure faces; about 2 percent chert fragments; neutral; clear wavy boundary.

Bt3—31 to 37 inches; yellowish brown (10YR 5/8) clay; common medium distinct strong brown (7.5YR 5/8) and light yellowish brown (2.5Y 6/4) mottles; strong coarse subangular blocky structure; firm, sticky and very plastic; few fine and very fine roots; common very fine discontinuous pores; common distinct strong brown (7.5YR 4/6) clay films on faces of peds; few pressure faces; about 10 percent manganese stains and concretions; neutral; abrupt wavy boundary.

R—37 inches; dark gray (N 4/0) limestone bedrock.

The thickness of the solum and the depth to bedrock range from 20 to 40 inches. Gravel- and channer-sized rock fragments of mostly limestone, shale, and quartz make up 0 to 5 percent of the A horizon and 0 to 15 percent of the B horizon. The content of iron and manganese concretions ranges from 0 to 10 percent throughout the solum. Some pedons have secondary carbonate concretions in the lower part of the Bt horizon and in the C horizon. The soils range from very strongly acid to neutral in the A horizon and from moderately acid to mildly alkaline in the Bt horizon.

The A or Ap horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6. It is silt loam or silty clay loam.

The Bt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 8. It has mottles in some pedons. It is clay.

Some pedons have a BC or C horizon. These horizons have hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 4 to 8. In some pedons they have high-chroma mottles. These horizons are clay or silty clay.

The R horizon is hard, dark gray limestone interbedded with shale and thin strata of clay.

Caverns Series

Soils of the Caverns series are very deep and well drained. They formed in alluvium derived largely from acid sandstone, shale, and limestone. They are on stream terraces in the Shenandoah Valley. Slope is 0 to 2 percent.

Caverns soils are associated with the Alonzville and Wolfgap soils. The associated soils have more clay in the subsoil than the Caverns soils.

Typical pedon of Caverns sandy loam, 0 to 2 percent slopes, rarely flooded, 1 mile east of Edinburg from the intersection of U.S. 11 and Virginia 675, about 2,000 feet north of Virginia 675, and 500 feet south of the North Fork of the Shenandoah River:

Ap1—0 to 4 inches; dark brown (7.5YR 4/4) sandy loam; weak fine granular structure; very friable; many fine and common medium roots; about 5

percent rounded sandstone gravel; neutral; clear smooth boundary.

Ap2—4 to 10 inches; dark brown (7.5YR 4/4) sandy loam; weak fine and medium subangular blocky structure; friable; common fine roots; common fine discontinuous pores; neutral; clear smooth boundary.

BA—10 to 18 inches; dark brown (7.5YR 4/4) fine sandy loam; moderate fine and medium subangular blocky structure; friable; few fine roots; many fine and medium discontinuous pores; neutral; clear smooth boundary.

Bt—18 to 39 inches; brown (7.5YR 5/4) fine sandy loam; weak coarse prismatic structure parting to moderate fine and medium subangular blocky; friable, slightly sticky and nonplastic; many fine and medium discontinuous pores; about 1 percent rounded sandstone gravel; few faint strong brown (7.5YR 4/6) clay films on faces of peds and in pores; dark reddish brown (5YR 3/4) organic coatings on faces of peds; moderately acid; abrupt smooth boundary.

C—39 to 72 inches; reddish brown (5YR 4/4) and dark brown (7.5YR 4/3) sandy loam; massive; friable; few fine discontinuous pores; moderately acid.

The thickness of the solum ranges from 30 to 50 inches. The depth to bedrock is more than 60 inches. Gravel-sized rock fragments make up 0 to 15 percent of the solum and 0 to 30 percent of the substratum. The soils range from very strongly acid to neutral in the A horizon and upper part of the B horizon and from very strongly acid to moderately acid in the lower part of the B horizon and in the C horizon.

The A or Ap horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 to 4. It is sandy loam or fine sandy loam.

The BA horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 3 or 4. It is sandy loam or fine sandy loam.

The Bt horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 3 to 6. It is fine sandy loam or loam.

The C horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 3 to 6. In some pedons it is mottled in shades of brown and gray. This horizon is fine sandy loam, loam, sandy loam, or loamy sand in the fine-earth fraction. It is commonly stratified.

Chilhowie Series

Soils of the Chilhowie series are moderately deep and well drained. They formed in material weathered from interbedded calcareous shale and limestone. They are on uplands in the Shenandoah Valley. Slope ranges from 2 to 55 percent.

Chilhowie soils are associated with the Carbo, Edom, Endcav, Frederick, Massanetta, Opequon, Poplimento, and Timberville soils. Carbo and Endcav soils have a solum that is thicker than that of the Chilhowie soils. Edom, Frederick, Massanetta, Opequon, Poplimento, and Timberville soils have less clay in the subsoil than the Chilhowie soils.

Typical pedon of Chilhowie silty clay loam, 2 to 7 percent slopes, 1 mile northeast of Maurertown, 1,800 feet southeast of the intersection of Virginia 650 and U.S. 11, and 300 feet southwest of Virginia 650:

Ap—0 to 6 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium granular structure; friable, slightly sticky and slightly plastic; common fine roots; common fine pores; neutral; abrupt smooth boundary.

Bt—6 to 18 inches; strong brown (7.5YR 5/6) clay; moderate fine subangular blocky structure; firm, sticky and plastic; few fine roots; many fine pores; few distinct dark brown (7.5YR 4/4) clay films on faces of peds; common fine manganese concretions; few worm casts and channels; few root channels filled with dark yellowish brown (10YR 4/4) silty clay loam; neutral; abrupt smooth boundary.

C—18 to 35 inches; strong brown (7.5YR 5/6) extremely channery clay; the fine-earth fraction is along calcareous shale interfaces; massive; firm, sticky and plastic; few very fine roots; about 65 percent grayish brown (2.5Y 5/2), strongly weathered, calcareous shale channers; neutral; clear smooth boundary.

R—35 inches; calcareous shale bedrock.

The thickness of the solum ranges from 10 to 25 inches. The depth to bedrock ranges from 20 to 40 inches. Rock fragments of mostly channer-sized, calcareous shale and limestone make up 0 to 15 percent of the solum and 25 to 80 percent of the substratum. The soils range from slightly acid to mildly alkaline in the A and B horizons and are neutral or mildly alkaline in the C horizon.

The A or Ap horizon has hue of 7.5YR or 10YR, value of 4, and chroma of 2 to 4. It is silty clay loam or silty clay.

The Bt horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 6. It is clay or silty clay.

The C horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 8. It is clay or silty clay in the fine-earth fraction.

Coursey Series

Soils of the Coursey series are very deep and moderately well drained. They formed in alluvium derived from acid sandstone, siltstone, and shale. They are on low stream terraces. Slope ranges from 2 to 15 percent.

Coursey soils are associated with the Jefferson, Laidig, Lehew, Massanutten, Moomaw, Wallen, and Zepp soils. Jefferson, Laidig, Lehew, Massanutten, Wallen, and Zepp soils have angular rock fragments characteristic of residuum or colluvium. Moomaw soils have a fragipan.

Typical pedon of Coursey loam, 2 to 7 percent slopes, 0.4 mile east of the intersection of Virginia 645 and Virginia 649 and 500 feet northwest of Virginia 649:

Ap—0 to 12 inches; dark brown (10YR 4/3) loam; moderate fine granular structure; friable; many fine and common medium roots; many fine and common medium discontinuous pores; about 2 percent gravel; neutral; clear smooth boundary.

BA—12 to 17 inches; yellowish brown (10YR 5/4) loam; weak medium subangular blocky structure parting to moderate fine granular; friable; many fine and few medium roots; many fine and medium discontinuous pores; about 2 percent gravel; neutral; abrupt broken boundary.

Bt1—17 to 28 inches; yellowish red (5YR 5/6) loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; many fine roots; many fine and common medium pores; many prominent yellowish brown (10YR 5/4) clay films on faces of peds; about 2 percent gravel; neutral; clear smooth boundary.

Bt2—28 to 34 inches; yellowish brown (10YR 5/4) clay loam; many fine faint brownish yellow (10YR 6/6) and grayish brown (10YR 5/2), many fine prominent red (2.5YR 4/8), and few fine faint dark yellowish brown (10YR 4/4) mottles; moderate medium subangular blocky structure; firm, sticky and slightly plastic; few fine discontinuous pores; many distinct yellowish brown (10YR 5/8) clay films on faces of peds; about 2 percent gravel; very strongly acid; clear smooth boundary.

Btg—34 to 58 inches; grayish brown (10YR 5/2) clay loam; many fine prominent red (2.5YR 4/6) and common medium faint dark gray (10YR 4/1) mottles; strong coarse prismatic structure parting to moderate strong subangular blocky; firm, sticky and plastic; few fine discontinuous pores; many distinct yellowish brown (10YR 5/4) clay films on faces of peds; about 2 percent gravel; strongly acid; clear smooth boundary.

C—58 to 63 inches; strong brown (7.5YR 5/8) sandy clay loam; common medium prominent yellowish red (7.5YR 6/8) and many medium prominent dark gray (N 4/0) mottles; massive; firm, slightly sticky and slightly plastic; about 2 percent gravel; extremely acid.

The thickness of the solum ranges from 30 to 60 inches. The depth to bedrock is more than 60 inches. Rock fragments of mostly gravel-sized sandstone and shale make up 2 to 35 percent of the solum and 2 to 50 percent of the C horizon. The soils range from extremely acid to strongly acid unless limed.

The A or Ap horizon has hue of 10YR, value of 4 to 6, and chroma of 2 to 4. It is loam or silt loam in the fine-earth fraction.

The BA horizon has hue of 5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 8. It is loam, clay loam, or sandy clay loam in the fine-earth fraction.

The Bt horizon has hue of 5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 8. In the lower part it is mottled in shades of gray, red, and brown. This horizon is loam, clay loam, or sandy clay loam in the fine-earth fraction.

The C horizon is neutral in hue; has hue of 7.5YR to 2.5Y, value of 4 to 8, and chroma of 1 to 8; or is mottled in these colors. It is loam, clay loam, or sandy clay loam in the fine-earth fraction.

Derroc Series

Soils of the Derroc series are very deep and well drained. They formed in alluvium derived from limestone, sandstone, quartzite, and shale. They are on flood plains. Slope is 0 to 2 percent.

Derroc soils are associated with the Broadway, Gladehill, Newmarc, and Nomberville soils. The associated soils have fewer rock fragments than the Derroc soils.

Typical pedon of Derroc cobbly sandy loam, 0 to 2 percent slopes, frequently flooded, 0.6 mile south of the intersection of Virginia 678 and Virginia 613 and 800 feet west of Passage Creek on the Shenandoah and Warren County line:

Oi—3 inches to 0; loose leaves and twigs and very dark grayish brown (10YR 3/2) organic material.

A—0 to 3 inches; dark brown (10YR 4/3) cobbly sandy loam; weak fine granular structure; friable; many fine and medium roots; few fine pores; about 20 percent sandstone gravel and cobbles; very strongly acid; abrupt smooth boundary.

Bw1—3 to 12 inches; yellowish brown (10YR 5/6) very cobbly sandy loam; weak fine subangular blocky structure; friable; many fine and medium roots; few

fine pores; about 35 percent sandstone gravel and cobbles; very strongly acid; clear wavy boundary.

Bw2—12 to 37 inches; yellowish brown (10YR 5/6) extremely cobbly sandy loam; weak fine and medium subangular blocky structure; very friable; few medium roots; few organic stains on faces of rock fragments; about 60 percent sandstone gravel and cobbles; very strongly acid; clear smooth boundary.

2C1—37 to 46 inches; yellowish brown (10YR 5/6) very cobbly loamy sand; single grain; loose; few fine roots; about 35 percent sandstone gravel and cobbles; very strongly acid; clear wavy boundary.

3C2—46 to 65 inches; yellowish brown (10YR 5/6) very cobbly sandy loam; common distinct light brownish gray (10YR 6/2) mottles; weak medium and coarse subangular blocky structure; friable; few fine roots; about 35 percent rounded sandstone fragments; very strongly acid.

The thickness of the solum ranges from 20 to 40 inches. The depth to bedrock is more than 60 inches. Rock fragments of mostly rounded gravel and cobbles make up 5 to 50 percent of the A horizon and 35 to 70 percent of the B and C horizons. The soils are very strongly acid or strongly acid unless limed.

The A horizon has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 2 to 4. It is sandy loam in the fine-earth fraction.

The B horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. It is sandy loam in the fine-earth fraction.

The C horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6. It is loamy sand or sandy loam in the fine-earth fraction. Some pedons have strata containing less than 15 percent gravel or cobbles.

Drall Series

Soils of the Drall series are deep and excessively drained. They formed in colluvium derived from sandstone, quartzite, and conglomerate. They are on uplands. Slope ranges from 15 to 70 percent.

Drall soils are associated with the Laidig, Lehew, and Wallen soils. The associated soils have more clay in the subsoil than the Drall soils.

Typical pedon of Drall very channery loamy sand, in an area of Rock outcrop-Drall-Wallen complex, 15 to 70 percent slopes; 100 feet east of Veach Gap Trail and 50 feet from the top of Massanutten Mountain:

Oi—4 inches to 0; loose leaves and twigs and black (10YR 2/1) organic material.

A—0 to 4 inches; grayish brown (10YR 5/2) very channery loamy sand; weak fine granular structure; very friable; few fine and many medium roots; about 40 percent sandstone channers; very strongly acid; clear smooth boundary.

Bw—4 to 22 inches; light yellowish brown (10YR 6/4) very channery loamy sand; weak medium subangular blocky structure; very friable; many medium, few fine, and few coarse roots; about 45 percent sandstone channers; strongly acid; clear wavy boundary.

C—22 to 42 inches; light yellowish brown (10YR 6/4) extremely channery loamy sand; weak medium granular structure; very friable; many medium, few fine, and few coarse roots; about 60 percent sandstone channers; very strongly acid; clear wavy boundary.

R—42 inches; hard quartzite rock.

The thickness of the solum ranges from 20 to 40 inches. The depth to bedrock ranges from 40 to 60 inches. Rock fragments of quartzite and sandstone channers make up 15 to 50 percent of the A horizon and 40 to 90 percent of individual subhorizons of the B and C horizons. The soils are very strongly acid or strongly acid.

The A horizon has hue of 10YR, value of 3 to 7, and chroma of 1 to 4. It is loamy sand in the fine-earth fraction.

The Bw horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8. It is loamy sand in the fine-earth fraction.

The C horizon has hue of 7.5YR to 2.5Y, value of 4 to 7, and chroma of 4 to 8. It is loamy sand in the fine-earth fraction.

Edom Series

Soils of the Edom series are deep and well drained. They formed in material weathered from calcareous shale or shaly limestone. They are on uplands in areas that have a distinct dendritic drainage system. Slope ranges from 2 to 15 percent.

Edom soils are associated with the Carbo, Chilhowie, Endcav, Frederick, Massanetta, Opequon, Poplimento, and Timberville soils. Carbo, Chilhowie, and Endcav soils have more clay in the subsoil than the Edom soils. Frederick, Poplimento, and Timberville soils have a lower base saturation than the Edom soils. Massanetta soils have gray mottles in the subsoil. Opequon soils have bedrock at a depth of 10 to 20 inches.

Typical pedon of Edom silty clay loam, 2 to 7 percent

slopes, 1 mile northeast of Maurertown, 2,300 feet southeast of the intersection of Virginia 650 and U.S. 11, and 350 feet southwest of Virginia 650:

Ap1—0 to 3 inches; dark brown (10YR 4/3) silty clay loam; moderate medium granular structure; friable; many fine and very fine roots; about 2 percent shale channers; slightly acid; clear smooth boundary.

Ap2—3 to 7 inches; dark brown (7.5YR 4/4) silty clay loam; common medium distinct yellowish red (5YR 5/6) mottles; moderate fine subangular blocky structure; friable, slightly sticky and slightly plastic; few very fine roots; common fine pores; common worm casts; about 2 percent shale channers; neutral; abrupt smooth boundary.

Bt1—7 to 18 inches; yellowish red (5YR 5/6) clay; strong fine subangular blocky structure; firm, sticky and plastic; few very fine roots; common very fine pores; few prominent brown (7.5YR 5/4) clay films on faces of peds; about 2 percent shale channers; strongly acid; clear wavy boundary.

Bt2—18 to 34 inches; yellowish red (5YR 5/6) clay; common coarse distinct light yellowish brown (10YR 6/4) and few fine distinct light brownish gray (10YR 6/2) mottles inherited from weathered shale fragments; weak fine subangular blocky structure; firm, sticky and plastic; few fine and common coarse roots; common very fine pores; common distinct clay films on faces of peds; about 3 percent manganese stains and concretions; about 5 percent strongly weathered shale channers; moderately acid; clear wavy boundary.

C—34 to 65 inches; yellowish red (5YR 4/6) very channery silty clay; many coarse distinct light brownish gray (10YR 6/2) mottles inherited from weathered shale; massive; firm, sticky and plastic; few very fine roots; few fine distinct clay films on shale fragments; about 10 percent manganese stains and concretions; about 50 percent strongly weathered yellow (10YR 7/6) shale channers; slightly acid.

The thickness of the solum ranges from 20 to 40 inches. The depth to bedrock ranges from 40 to more than 60 inches. Rock fragments of mostly channer-sized shale and limestone make up 2 to 20 percent of the solum and 20 to 65 percent of the C horizon. The soils range from strongly acid to mildly alkaline in the A horizon and upper part of the B horizon and from moderately acid to mildly alkaline in the lower part of the B horizon and in the C horizon.

The A or Ap horizon has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 2 to 4. It is silt loam or silty clay loam in the fine-earth fraction.

The Bt horizon has hue of 5YR to 10YR, value of 4 or 5, and chroma of 4 to 6. It is clay or silty clay in the fine-earth fraction.

The C horizon has hue of 5YR to 10YR, value of 4 or 5, and chroma of 4 to 8. It is silty clay or silty clay loam in the fine-earth fraction.

Endcav Series

Soils of the Endcav series are deep and well drained. They formed in material weathered from limestone and calcareous shale. They are on uplands in the Shenandoah Valley. Slope ranges from 2 to 35 percent.

Endcav soils are associated with the Carbo, Chilhowie, Edom, Frederick, Massanetta, Opequon, Poplimento, and Timberville soils. Carbo and Chilhowie soils have a solum that is thinner than that of the Endcav soils. Edom, Frederick, Massanetta, Opequon, Poplimento, and Timberville soils have less clay in the subsoil than the Endcav soils.

Typical pedon of Endcav silt loam, 2 to 7 percent slopes, 2 miles west of Mt. Jackson, 1 mile south of the intersection of Virginia 614 and Virginia 764, and ⅓ mile southwest of St. Mary's Church:

Ap—0 to 8 inches; dark brown (10YR 4/3) silt loam; weak medium subangular blocky structure parting to moderate fine granular; friable, nonsticky and nonplastic; common very fine roots; many fine and medium discontinuous pores; about 3 percent concretions; neutral; abrupt smooth boundary.

Bt1—8 to 16 inches; yellowish brown (10YR 5/6) silty clay; weak medium subangular blocky structure; friable, sticky and slightly plastic; common very fine roots; many fine and few medium discontinuous pores; about 15 percent manganese concretions; few faint clay films on faces of peds; neutral; clear smooth boundary.

Bt2—16 to 22 inches; strong brown (7.5YR 5/6) clay; moderate fine and medium subangular blocky structure; firm, sticky and plastic; few fine roots; few very fine discontinuous pores; common distinct clay films on faces of peds; about 2 percent manganese concretions; moderately acid; clear smooth boundary.

Bt3—22 to 33 inches; dark brown (7.5YR 4/4) clay; weak coarse subangular blocky structure parting to moderate medium subangular blocky; firm, sticky and plastic; few very fine roots; few very fine discontinuous pores; common distinct clay films on faces of peds; about 2 percent concretions; common pressure faces; about 15 percent medium distinct light gray (10YR 7/2), weathered limestone fragments; moderately acid; clear smooth boundary.

Bt4—33 to 52 inches; yellowish brown (10YR 5/6) clay; medium coarse subangular blocky structure; firm, very sticky and very plastic; few very fine roots; few very fine discontinuous pores; common distinct clay films on faces of peds; many black manganese stains; about 2 percent manganese concretions; common pressure faces; neutral; clear smooth boundary.

Bt5—52 to 58 inches; yellowish brown (10YR 5/6) clay; moderate medium subangular blocky structure; firm, sticky and plastic; few fine discontinuous pores; few distinct clay films on faces of peds; about 15 percent medium distinct white (N 8/0), weathered calcium carbonate concretions; common black manganese stains; neutral; clear smooth boundary.

R—58 inches; limestone bedrock.

The thickness of the solum and the depth to bedrock range from 40 to 60 inches. Gravel- and channer-sized rock fragments of chert and limestone make up 0 to 15 percent of the solum and 0 to 35 percent of the C horizon. Few or common black oxide concretions and stains are in the upper part of the Bt horizon. They increase in number with increasing depth. The soils range from strongly acid to neutral in the A horizon and upper part of the Bt horizon and from moderately acid to moderately alkaline in the lower part of the Bt horizon and in the C horizon.

The A or Ap horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 or 4. It is silt loam or silty clay loam.

The Bt horizon has hue of 5YR to 10YR, value of 4 or 5, and chroma of 4 to 8. Hue of 5YR is restricted to the lower part. This horizon is clay or silty clay.

The BC horizon, if it occurs, has hue of 5YR to 10YR, value of 4 or 5, and chroma of 4 to 8. It is clay or silty clay in the fine-earth fraction.

The C horizon, if it occurs, has hue of 5YR to 10YR, value of 4 or 5, and chroma of 4 to 8. It is silty clay or clay in the fine-earth fraction.

The R horizon is limestone bedrock.

Frederick Series

Soils of the Frederick series are very deep and well drained. They formed in residuum derived mainly from dolomitic limestone with thin, interbedded layers of sandstone and shale. They are on uplands in the Shenandoah Valley. Slope ranges from 2 to 35 percent.

Frederick soils are associated with the Carbo, Chilhowie, Edom, Endcav, Massanetta, Opequon, Poplimento, and Timberville soils. Carbo, Chilhowie, and Endcav soils have more clay in the subsoil than the Frederick soils. Edom, Massanetta, Opequon, and Poplimento soils have a higher base saturation than the Frederick soils. Timberville soils have a yellowish brown subsoil.

Typical pedon of Frederick silt loam, in an area of Frederick and Poplimento silt loams, 2 to 7 percent slopes; 1.0 mile north of Patmos Church and 0.2 mile northeast of the intersection of Virginia 676 and Virginia 763:

A—0 to 4 inches; dark brown (10YR 4/3) silt loam; weak fine granular structure; friable; many fine and medium roots; about 10 percent rounded sandstone gravel; moderately acid; abrupt wavy boundary.

E—4 to 7 inches; yellow (10YR 7/6) silt loam; weak fine subangular blocky structure; friable; many fine and medium roots; common fine and medium continuous pores; about 10 percent rounded sandstone gravel; strongly acid; clear wavy boundary.

BE—7 to 16 inches; yellowish red (5YR 5/6) silty clay loam; many medium distinct light yellowish brown (10YR 6/4) mottles (skeletons); moderate fine and medium subangular blocky structure; firm, slightly sticky and nonplastic; many fine and medium roots; common fine and medium continuous pores; few faint clay films on faces of peds; about 2 percent sandstone gravel; strongly acid; clear wavy boundary.

Bt1—16 to 36 inches; red (2.5YR 4/6) clay; few fine distinct light yellowish brown (10YR 6/4) mottles; moderate medium subangular blocky structure; firm, sticky and plastic; common fine and medium roots; common fine and medium continuous pores; common distinct clay films on faces of peds; moderately acid; clear smooth boundary.

Bt2—36 to 47 inches; yellowish red (5YR 4/6) clay; common fine distinct red (2.5YR 4/8) and many fine prominent very pale brown (10YR 7/4) mottles; moderate medium subangular blocky structure; firm, sticky and slightly plastic; common fine and medium roots; few fine and medium discontinuous pores; common distinct clay films on faces of peds; moderately acid; clear smooth boundary.

Bt3—47 to 65 inches; mottled yellowish brown (10YR 5/8), red (2.5YR 4/6), and light gray (10YR 7/2) clay; moderate fine and medium subangular blocky structure; firm, sticky and slightly plastic; few medium roots; few fine discontinuous pores; common distinct clay films on faces of peds; moderately acid.

The thickness of the solum is 60 inches or more. The depth to bedrock is more than 60 inches. Rock fragments of gravel-sized sandstone and chert make up

0 to 20 percent of the A and E horizons and 0 to 10 percent of the B and C horizons. The soils range from very strongly acid to moderately acid.

The A or Ap horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 2 to 8. It is silt loam, loam, or silty clay loam in the fine-earth fraction.

The E horizon has hue of 7.5YR or 10YR, value of 5 to 7, and chroma of 3 to 8. It is silt loam or loam in the fine-earth fraction.

The BE horizon has hue of 2.5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. It is silty clay loam or clay loam.

The Bt horizon has hue of 2.5YR or 5YR, value of 4 to 6, and chroma of 4 to 8. The lower part of the Bt horizon has mottles in shades of red, yellow, brown, and gray. This horizon is silty clay or clay.

The BC horizon, if it occurs, has hue of 2.5YR to 10YR, value of 3 to 6, and chroma of 3 to 8. It is silty clay or clay.

Gainesboro Series

Soils of the Gainesboro series are moderately deep and well drained. They formed in material weathered from red, acid shale and fine-grained sandstone. They are on uplands in the Shenandoah Valley. Slope ranges from 2 to 35 percent.

Gainesboro soils are associated with the Berks, Blairton, Braddock, Gilpin, Lehew, Sequoia, Trappist, Unison, and Weikert soils. Berks, Blairton, Gilpin, Unison, and Weikert soils have a yellowish brown and brown subsoil. Braddock soils are more than 60 inches deep over bedrock. Lehew soils have siliceous mineralogy. Sequoia and Trappist soils have a clayey subsoil.

Typical pedon of Gainesboro channery silt loam, in an area of Lehew and Gainesboro soils, 7 to 15 percent slopes; approximately 0.4 mile southwest of the intersection of Virginia 711 and Virginia 721 and 0.2 mile west of Virginia 721:

Ap—0 to 7 inches; dark reddish brown (5YR 3/3) channery silt loam; weak fine and medium granular structure; friable; many fine roots; few fine and medium discontinuous pores; about 20 percent shale and sandstone channers; moderately acid; abrupt smooth boundary.

Bt1—7 to 15 inches; reddish brown (2.5YR 4/4) channery silty clay loam; moderate fine and medium blocky structure; friable, slightly sticky and nonplastic; many fine roots; many fine and medium discontinuous pores; many distinct clay films on faces of peds; about 20 percent shale channers; very strongly acid; clear smooth boundary.

Bt2—15 to 24 inches; reddish brown (2.5YR 4/4) very channery silty clay loam; moderate fine and medium blocky structure; friable, slightly sticky and nonplastic; common fine roots; common fine and medium discontinuous pores; many distinct clay films on faces of peds; about 55 percent shale channers; very strongly acid; abrupt smooth boundary.

C—24 to 30 inches; reddish brown (2.5YR 4/4) extremely channery silty clay loam; massive; few fine roots; about 65 percent shale channers; very strongly acid; abrupt smooth boundary.

R—30 inches; hard, red shale and fine-grained sandstone bedrock.

The thickness of the solum and the depth to bedrock range from 20 to 40 inches. Rock fragments make up 15 to 60 percent of the solum and 50 to 90 percent of the substratum. Reaction ranges from very strongly acid to moderately acid.

The A or Ap horizon has hue of 5YR or 7.5YR, value of 2 to 5, and chroma of 2 to 4. It is loam or silt loam in the fine-earth fraction.

The Bt horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 3 or 4. It is silt loam, silty clay loam, or clay loam in the fine-earth fraction.

The C horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 3 or 4. It is silt loam, silty clay loam, or clay loam in the fine-earth fraction.

Gilpin Series

Soils of the Gilpin series are moderately deep and well drained. They formed in material weathered from shale, siltstone, and sandstone. They are on uplands in the mountains and valleys. Slope ranges from 2 to 55 percent.

Gilpin soils are associated with the Berks, Blairton, Braddock, Gainesboro, Sequoia, Trappist, Unison, and Weikert soils. Berks, Gainesboro, and Weikert soils have more rock fragments in the subsoil than the Gilpin soils. Blairton soils have gray mottles in the subsoil. Braddock and Unison soils are more than 60 inches deep over bedrock. Sequoia and Trappist soils have clay in the subsoil.

Typical pedon of Gilpin channery silt loam, 2 to 15 percent slopes, 100 feet northwest of the first wildlife clearing along Powells Fort Trail, north of Edinburg Gap, in the George Washington National Forest:

Oi—2 inches to 0; loose, undecomposed leaves and twigs and black (5YR 2/1), highly decomposed organic material.

A—0 to 3 inches; dark yellowish brown (10YR 4/4)

channery silt loam; weak fine granular structure; very friable; many fine roots; about 20 percent shale channers; strongly acid; abrupt smooth boundary.

Bt1—3 to 10 inches; strong brown (7.5YR 5/6) channery silt loam; moderate fine granular structure; friable; many fine and medium roots; few distinct clay films on faces of peds; about 20 percent shale channers; strongly acid; clear smooth boundary.

Bt2—10 to 19 inches; strong brown (7.5YR 5/6) channery silty clay loam; moderate fine subangular blocky structure; friable, slightly sticky and nonplastic; common fine to coarse roots; few distinct clay films on faces of peds; about 20 percent strongly weathered, brownish yellow (10YR 6/8) shale channers; strongly acid; clear wavy boundary.

Bt3—19 to 26 inches; strong brown (7.5YR 5/6) very channery silty clay loam; moderate fine subangular blocky structure; friable; few distinct clay films on faces of peds; about 50 percent shale channers; strongly acid; clear wavy boundary.

R—26 inches; fractured shale bedrock.

The thickness of the solum ranges from 18 to 36 inches. The depth to bedrock ranges from 20 to 40 inches. Rock fragments of mostly shale, siltstone, and sandstone make up 5 to 40 percent of individual horizons of the solum and 30 to 90 percent of the C horizon. The soils range from extremely acid to strongly acid unless limed.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 2 to 4. Some pedons in undisturbed areas have a brown E horizon. The A horizon is silt loam or loam in the fine-earth fraction.

The Bt horizon has hue of 7.5YR to 2.5Y, value of 5, and chroma of 4 to 8. It is silt loam, loam, or silty clay loam in the fine-earth fraction.

The C horizon, if it occurs, has colors ranging from dark brown to yellowish brown and from olive brown to light olive brown. It is silt loam, loam, or silty clay loam in the fine-earth fraction.

Gladehill Series

Soils of the Gladehill series are very deep and well drained. They formed in alluvium derived from limestone, sandstone, siltstone, and shale. They are on flood plains in the Shenandoah Valley. Slope is 0 to 2 percent.

Gladehill soils are associated with the Broadway, Derroc, Newmarc, and Nomberville soils. Broadway, Newmarc, and Nomberville soils have more silt in the subsoil than the Gladehill soils, and Derroc soils have more rock fragments in the subsoil.

Typical pedon of Gladehill fine sandy loam, 0 to 2 percent slopes, occasionally flooded, 3 miles south of Mt. Jackson, 730 yards northwest of the intersection of Virginia 730 and U.S. 11, and 150 feet east of the North Fork of the Shenandoah River:

Ap—0 to 10 inches; very dark grayish brown (10YR 3/2) fine sandy loam, dark brown (10YR 4/3) dry; weak fine granular structure; friable; common fine roots; common fine discontinuous pores; neutral; clear smooth boundary.

Bw—10 to 33 inches; dark brown (10YR 4/3) fine sandy loam; weak fine subangular blocky structure; friable; few fine and medium roots; common worm casts and worm channels; few vertical root channels that have faint very dark grayish brown (10YR 3/2) coatings; about 2 percent sandstone gravel; neutral; gradual smooth boundary.

C—33 to 62 inches; dark brown (7.5YR 4/4) fine sandy loam; massive; very friable; few fine roots; neutral.

The thickness of the solum ranges from 30 to more than 60 inches. Sandstone gravel and cobbles make up 0 to 15 percent of the A and B horizons and 0 to 35 percent of the C horizon. The soils range from slightly acid to moderately alkaline.

The Ap horizon has hue of 10YR and value and chroma of 2 or 3. It is fine sandy loam or loam.

The Bw horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 3 to 6. It is fine sandy loam or loam.

The C horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 3 to 6. It is sandy loam, fine sandy loam, or loam in the fine-earth fraction. It is commonly stratified.

Guyan Series

Soils of the Guyan series are very deep and somewhat poorly drained. They formed in alluvium derived from acid sandstone and shale. They are on low terraces in the Shenandoah Valley. Slope is 0 to 2 percent.

Guyan soils are associated with the Maurertown, Purdy, and Toms soils. The associated soils have more clay in the subsoil than the Guyan soils.

Typical pedon of Guyan silt loam, 0 to 2 percent slopes, rarely flooded, 0.75 mile southwest of Detrick, 400 feet east of Virginia 678, and 3,000 feet west of the Virginia 758 bridge over Passage Creek on Virginia 758:

Ap—0 to 7 inches; dark brown (10YR 4/3) silt loam; moderate medium granular structure; friable; many fine roots; common fine discontinuous pores; about

2 percent gravel; strongly acid; clear smooth boundary.

BA—7 to 14 inches; yellowish brown (10YR 5/4) silt loam; weak fine subangular blocky structure; friable; common fine and medium roots; many fine and medium discontinuous pores; strongly acid; clear wavy boundary.

Btg1—14 to 22 inches; light brownish gray (2.5Y 6/2) silt loam; common medium distinct yellowish brown (10YR 5/6) mottles; weak coarse columnar structure parting to moderate medium subangular blocky; firm, slightly sticky and slightly plastic; common fine roots; many fine and medium discontinuous pores; many distinct clay films on faces of peds; few dark concretions; about 3 percent gravel; strongly acid; gradual smooth boundary.

Btg2—22 to 31 inches; light brownish gray (2.5Y 6/2) silty clay loam; common medium distinct strong brown (7.5YR 5/6) and gray (10YR 6/1) mottles; weak coarse columnar structure parting to moderate fine subangular blocky; firm, sticky and plastic; few fine roots; many fine and medium discontinuous pores; many distinct clay films on faces of peds; few dark concretions; about 5 percent gravel; strongly acid; clear wavy boundary.

Btg3—31 to 36 inches; light brownish gray (2.5Y 6/2) clay loam; common medium distinct yellowish brown (10YR 5/6) and gray (10YR 6/1) mottles; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; few fine roots; common distinct clay films on vertical faces of peds; common dark concretions; about 10 percent gravel; strongly acid; clear smooth boundary.

Cg1—36 to 41 inches; gray (10YR 6/1) silty clay loam; many medium distinct strong brown (7.5YR 5/6) mottles; massive; firm, sticky and plastic; few very fine roots; few dark concretions; about 5 percent gravel; strongly acid; clear smooth boundary.

Cg2—41 to 54 inches; gray (10YR 5/1) silty clay loam; many coarse distinct yellowish brown (10YR 5/6) and dark yellowish brown (10YR 4/4) mottles; massive; firm, sticky and plastic; few dark concretions; strongly acid; clear wavy boundary.

Cg3—54 to 62 inches; light yellowish brown (2.5Y 6/4) silty clay loam; common coarse distinct yellowish brown (10YR 5/6) and dark grayish brown (10YR 4/2) mottles; massive; firm, sticky and plastic; strongly acid.

The thickness of the solum ranges from 30 to 60 inches. The depth to bedrock is more than 60 inches. The content of gravel-sized rock fragments ranges from 0 to 10 percent throughout the solum. Reaction ranges from very strongly acid to neutral in the Ap and BA horizons and is very strongly acid or strongly acid in the Bt and C horizons.

The A or Ap horizon has hue of 10YR or 2.5Y, value of 3 to 5, and chroma of 2 to 4. It is silt loam or loam.

The BA horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 2 to 4. It is silt loam or loam.

The Btg horizon has hue of 7.5YR to 2.5Y, value of 5 to 7, and chroma of 1 to 6. It is silt loam, loam, clay loam, or silty clay loam.

The Cg horizon has hue of 7.5YR to 2.5Y, value of 4 to 7, and chroma of 1 to 8. It is silt loam, loam, clay loam, or silty clay loam. In some pedons, it is stratified.

Jefferson Series

Soils of the Jefferson series are very deep and well drained. They formed in colluvium derived mainly from acid shale, siltstone, and sandstone. They are on uplands in the mountains. Slope ranges from 2 to 55 percent.

Jefferson soils are associated with the Coursey, Laidig, Lehew, Massanutten, Moomaw, Wallen, and Zepp soils. Coursey soils have gray mottles in the subsoil. Laidig and Moomaw soils have a fragipan. Lehew and Wallen soils have more rock fragments in the subsoil than the Jefferson soils, and Massanutten and Zepp soils have less clay in the subsoil.

Typical pedon of Jefferson sandy loam, 2 to 15 percent slopes, 0.5 mile southeast of the intersection of Virginia 675 and Taskers Gap Road and 30 feet east of Taskers Gap Road in the George Washington National Forest:

Oi—4 inches to 0; loose leaves and twigs and very dark grayish brown (10YR 3/2), highly decomposed organic material.

A—0 to 1 inch; very dark gray (10YR 3/1) sandy loam; weak fine granular structure; very friable; many fine and medium and common coarse roots; about 5 percent sandstone gravel; very strongly acid; abrupt smooth boundary.

E—1 to 5 inches; yellowish brown (10YR 5/4) sandy loam; weak fine subangular blocky structure; friable; many fine and medium and common coarse roots; few fine discontinuous pores; about 5 percent sandstone gravel; very strongly acid; clear smooth boundary.

BE—5 to 15 inches; yellowish brown (10YR 5/4) sandy loam; weak medium subangular blocky structure; friable; common fine and few medium and coarse roots; many fine and few medium discontinuous pores; few faint clay films on faces of peds and in pores; about 5 percent sandstone gravel; very strongly acid; clear smooth boundary.

Bt1—15 to 24 inches; strong brown (7.5YR 5/6) gravelly sandy clay loam; moderate medium subangular blocky structure; friable, sticky and slightly plastic; few fine to coarse roots; many distinct clay films on faces of peds; about 15 percent sandstone gravel; very strongly acid; clear wavy boundary.

Bt2—24 to 33 inches; strong brown (7.5YR 5/6) sandy clay loam; common medium prominent red (2.5YR 4/6) and few fine distinct very pale brown (10YR 7/4) and brownish yellow (10YR 6/8) mottles; moderate medium subangular blocky structure; friable, sticky and slightly plastic; few fine to coarse roots; common fine discontinuous pores; many distinct clay films on faces of peds; about 10 percent sandstone gravel; very strongly acid; clear wavy boundary.

Bt3—33 to 48 inches; strong brown (7.5YR 5/6) gravelly sandy clay loam; many prominent red (2.5YR 4/6) and common distinct very pale brown (10YR 7/4), brownish yellow (10YR 6/8), and light gray (10YR 7/1) mottles; moderate medium angular blocky structure; friable, slightly sticky and slightly plastic; few fine roots; common fine and few medium discontinuous pores; many distinct clay films on faces of peds; about 20 percent sandstone gravel; very strongly acid; clear wavy boundary.

C—48 to 72 inches; mottled strong brown (7.5YR 5/6), red (2.5YR 4/6), very pale brown (10YR 7/4), brownish yellow (10YR 6/8), and light gray (10YR 7/1) extremely gravelly sandy clay loam; massive; friable, slightly sticky and slightly plastic; clay coatings on cleavage faces; about 70 percent sandstone gravel; very strongly acid.

The thickness of the solum ranges from 40 to 60 inches. The depth to bedrock is more than 60 inches. The content of rock fragments of mostly sandstone gravel ranges from 5 to 35 percent to a depth of about 40 inches and from 20 to 80 percent below that depth. The soils are very strongly acid or strongly acid.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 1 to 3. The A horizon is loam, fine sandy loam, or sandy loam in the fine-earth fraction.

The E horizon has hue of 10YR, value of 4 to 6, and chroma of 3 or 4. The E horizon is loam, fine sandy loam, or sandy loam in the fine-earth fraction.

The BE horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 8. It is sandy loam or loam in the fine-earth fraction.

The Bt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 8. It has mottles in shades of brown, yellow, red, and gray in the lower part. This horizon is loam, sandy clay loam, or clay loam in the fine-earth fraction.

The C horizon is mottled in shades of brown, red, and gray. It is sandy loam, fine sandy loam, sandy clay loam, or clay loam in the fine-earth fraction.

Laidig Series

Soils of the Laidig series are very deep and well drained. They formed in colluvium derived mainly from sandstone and shale. They are on uplands in the Massanutten and Allegheny Mountains. Slope ranges from 2 to 55 percent.

Laidig soils are associated with the Drall, Jefferson, Lehew, Massanutten, Moomaw, Wallen, and Zepp soils. Drall, Jefferson, Lehew, Massanutten, Wallen, and Zepp soils do not have a fragipan. Moomaw soils have gray mottles in the subsoil.

Typical pedon of Laidig channery loam, 15 to 35 percent slopes, very stony, 70 feet east of Mill Creek and 300 feet north of Little Stony Creek Road in the George Washington National Forest:

Oi—2 inches to 0; loose leaf litter and twigs and very dark grayish brown (10YR 3/2), highly decomposed organic material.

A—0 to 2 inches; dark grayish brown (10YR 4/2) channery loam; weak fine granular structure; very friable; many fine and medium roots; about 15 percent sandstone channers; very strongly acid; abrupt smooth boundary.

E—2 to 7 inches; yellowish brown (10YR 5/6) channery loam; weak fine subangular blocky structure; friable; many fine and medium roots; few fine discontinuous pores; 15 percent sandstone channers; very strongly acid; clear smooth boundary.

Bt1—7 to 12 inches; yellowish brown (10YR 5/6) channery loam; few fine distinct strong brown (7.5YR 4/6) mottles; weak fine and medium subangular blocky structure; friable, nonsticky and nonplastic; common medium and few fine roots; common fine discontinuous pores; few faint clay films on faces of peds; about 20 percent sandstone channers; very strongly acid; clear smooth boundary.

Bt2—12 to 30 inches; yellowish brown (10YR 5/6) channery loam; weak fine and medium subangular blocky structure; friable, nonsticky and nonplastic; common fine and few medium roots; common fine discontinuous pores; many distinct clay films on faces of peds; about 25 percent sandstone channers; very strongly acid; clear wavy boundary.

Bx1—30 to 38 inches; yellowish brown (10YR 5/8) channery loam; common fine distinct pale brown (10YR 6/3), few fine faint light brownish gray (10YR 6/2), and common fine distinct strong brown (7.5YR

5/6) mottles; strong medium platy structure; brittle, nonsticky and nonplastic; many fine and medium discontinuous pores; few faint clay films on faces of plates; about 25 percent sandstone channers; strongly acid; gradual wavy boundary.

Bx2—38 to 65 inches; strong brown (7.5YR 5/6) channery loam; common medium distinct red (2.5YR 4/6), yellowish brown (10YR 5/6), and pale brown (10YR 6/3) mottles; moderate medium platy structure; brittle, nonsticky and nonplastic; many fine and medium discontinuous pores; few faint clay films along pores; about 20 percent sandstone channers; strongly acid.

The thickness of the solum ranges from 60 to more than 80 inches. Depth to the fragipan ranges from 30 to 50 inches. The depth to bedrock is more than 60 inches. Rock fragments of gravel and channer-sized sandstone and quartzite make up 15 to 35 percent of the Bt horizon and 15 to 70 percent of the individual subhorizons of the Bx and C horizons. The soils range from extremely acid to strongly acid.

The A horizon has hue of 10YR, value of 2 to 5, and chroma of 2 to 4. It is fine sandy loam or loam in the fine-earth fraction.

The E horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 2 to 6. The E horizon is fine sandy loam or loam in the fine-earth fraction.

The Bt horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 8. It is loam or clay loam in the fine-earth fraction.

The Bx horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 3 to 8. It is sandy loam, loam, clay loam, or sandy clay loam in the fine-earth fraction.

The C horizon, if it occurs, has hue of 5YR to 10YR, value of 5 or 6, and chroma of 3 to 8 and is mottled. It is sandy loam, loam, clay loam, or sandy clay loam in the fine-earth fraction.

Lehew Series

Soils of the Lehew series are moderately deep and somewhat excessively drained. They formed in material weathered from mostly sandstone with some interbedded siltstone and shale. They are on uplands in the Allegheny Mountains. Slope ranges from 2 to 70 percent.

Lehew soils are associated with the Gainesboro, Jefferson, Laidig, Massanutten, Wallen, and Zepp soils. Gainesboro soils have mixed mineralogy. Jefferson, Laidig, Massanutten, and Zepp soils have fewer rock fragments in the subsoil than the Lehew soils, and Wallen soils have a browner subsoil.

Typical pedon of Lehew channery loam, in an area of Wallen-Lehew complex, 2 to 15 percent slopes, very stony; 100 feet south of Virginia 691 on Devils Hole Mountain in the George Washington National Forest:

Oi—2 inches to 0; loose leaves, twigs, and partially decomposed organic material.

A—0 to 2 inches; dark gray (10YR 4/1) channery loam; weak fine granular structure; very friable; many fine and medium and common coarse roots; about 20 percent red sandstone channers; very strongly acid; clear smooth boundary.

E—2 to 4 inches; dark brown (7.5YR 5/4) channery loam; weak fine granular structure; friable; many fine and medium and common coarse roots; about 20 percent red sandstone channers; very strongly acid; abrupt smooth boundary.

Bw1—4 to 12 inches; reddish brown (5YR 4/4) channery fine sandy loam; weak fine subangular blocky structure parting to weak fine granular; friable; many fine and common medium roots; common fine discontinuous pores; about 30 percent red sandstone channers; very strongly acid; clear wavy boundary.

Bw2—12 to 20 inches; reddish brown (5YR 4/4) very channery fine sandy loam; weak fine and medium subangular blocky structure; friable; common fine and few medium roots; common fine discontinuous pores; few faint clay films on faces of peds and on rock fragments; about 40 percent red sandstone channers; very strongly acid; clear wavy boundary.

C—20 to 24 inches; reddish brown (5YR 4/4) very channery fine sandy loam; massive; common fine roots in fractures between rock fragments; about 55 percent red sandstone channers; very strongly acid; clear smooth boundary.

R—24 inches; red sandstone bedrock.

The thickness of the solum ranges from 15 to 30 inches. The depth to bedrock ranges from 20 to 40 inches. The sandstone rock fragments are mostly channers or flagstones. They make up 15 to 35 percent of the A horizon, 20 to 40 percent of the B horizon, and 35 to 70 percent of the C horizon. The soils are very strongly acid or strongly acid.

The A horizon has hue of 7.5YR or 10YR, value of 2 to 4, and chroma of 1 or 2. The Ap horizon, if it occurs, has chroma of 1 to 4. It is loam, fine sandy loam, or sandy loam in the fine-earth fraction.

The Bw horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 3 to 6. It is loam, fine sandy loam, or sandy loam in the fine-earth fraction.

The C horizon has hue of 2.5YR or 5YR, value of 3 to 5, and chroma of 2 to 4. It is sandy loam, loam, or fine sandy loam in the fine-earth fraction.

Massanetta Series

Soils of the Massanetta series are very deep and moderately well drained. They formed in alluvium derived from higher lying areas that are underlain by limestone and calcareous shales. They are on narrow flood plains along limestone, spring-fed streams in the Shenandoah Valley. Slope is 0 to 2 percent.

Massanetta soils are associated with the Carbo, Chilhowie, Edom, Endcav, Frederick, Opequon, Poplimento, and Timberville soils. The associated soils do not have secondary lime concretions or a mollic epipedon.

Typical pedon of Massanetta silt loam, 0 to 2 percent slopes, occasionally flooded, 0.5 mile northeast of Quicksburg, 375 feet southeast of the railroad trestle, and 80 feet northeast of Holman Creek:

Ap—0 to 11 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate fine granular structure; friable; common fine roots; few fine discontinuous vesicular pores; about 3 percent sandstone gravel; about 2 percent secondary lime concretions as much as ¼ inch in size; strong effervescence; moderately alkaline; gradual smooth boundary.

Bw1—11 to 22 inches; very dark gray (10YR 3/1) silt loam, gray (10YR 5/1) dry; weak fine subangular blocky structure; friable; common fine and very fine roots; many fine and medium discontinuous vesicular pores; about 2 percent secondary lime concretions as much as ¼ inch in size; common worm channels and casts; strong effervescence; moderately alkaline; gradual smooth boundary.

Bw2—22 to 32 inches; very dark grayish brown (10YR 3/2) loam, grayish brown (10YR 5/2) dry; weak fine subangular blocky structure; friable; few very fine roots; many fine and medium and few large discontinuous tubular pores; common worm channels and casts; about 20 percent secondary lime concretions and shells as much as ½ inch in size; light olive brown (2.5Y 5/4) silt coatings in old root channels; strong effervescence; moderately alkaline; gradual smooth boundary.

Bw3—32 to 40 inches; dark grayish brown (10YR 4/2) loam, gray (10YR 6/1) dry; common medium distinct olive brown (2.5Y 4/4) mottles; moderate fine subangular blocky structure; friable; few very fine roots; many fine and medium discontinuous tubular pores; about 10 percent secondary lime concretions and shells as much as ½ inch in size; strong effervescence; moderately alkaline; gradual smooth boundary.

C—40 to 63 inches; brown (10YR 5/3) loam, light gray (2.5Y 7/2) dry; common medium distinct olive brown (2.5Y 4/4) mottles; massive; friable; few very fine roots; common worm channels and casts filled with light brownish gray (10YR 6/2) loam; about 10 percent secondary lime concretions and shells as much as ½ inch in size; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 20 to 40 inches. The depth to bedrock is more than 60 inches. Secondary lime concretions and shells make up 0 to 20 percent of the A and B horizons and 0 to 30 percent of the C horizon. The soils are mildly alkaline or moderately alkaline and effervesce with dilute acid.

The Ap horizon has hue of 10YR, value of 3, and chroma of 1 to 3. It is loam or silt loam.

The BA horizon has hue of 10YR, value of 3, and chroma of 1 to 4. It is loam, silt loam, or clay loam.

The Bw horizon has hue of 10YR, value of 3 to 5, and chroma of 1 to 4. In some pedons it has mottles with chroma of 1 to 4. It is loam, silt loam, clay loam, or silty clay loam.

The C horizon is neutral in hue or has hue of 7.5YR or 10YR. It has value of 2 to 5 and chroma of 0 to 3. It is loam, silt loam, or clay loam.

Massanutten Series

Soils of the Massanutten series are moderately deep and well drained. They formed in material weathered from acid sandstone. They are on uplands in the mountains. Slope ranges from 15 to 55 percent.

Massanutten soils are associated with the Coursey, Jefferson, Laidig, Lehew, Moomaw, Wallen, and Zepp soils. Coursey, Jefferson, Laidig, and Moomaw soils have more clay in the subsoil than the Massanutten soils, and Lehew and Wallen soils have more rock fragments in the subsoil. Zepp soils are more than 60 inches deep over bedrock.

Typical pedon of Massanutten channery silt loam, 15 to 35 percent slopes, 5 miles east of U.S. 11 on Virginia 675, 0.8 mile south from the intersection of the fire trail and Virginia 675, and 500 feet east of the fire trail in the George Washington National Forest:

Oi—2 inches to 0; loose leaves, twigs, and very dark grayish brown (10YR 3/2), highly decomposed organic material.

A—0 to 2 inches; dark gray (10YR 4/1) channery silt loam; very weak very fine granular structure; very friable; many fine and medium roots; about 15 percent red sandstone channers; very strongly acid; clear smooth boundary.

BA—2 to 4 inches; yellowish brown (10YR 5/4)

channery silt loam; weak very fine and fine subangular blocky structure; very friable; many fine to coarse roots; common fine and medium discontinuous pores; about 15 percent red sandstone channers; strongly acid; clear smooth boundary.

Bt1—4 to 11 inches; brown (7.5YR 5/4) silt loam; weak fine and medium subangular blocky structure; friable, slightly sticky and nonplastic; many fine and medium and few coarse roots; many fine, common medium, and few coarse discontinuous pores; few faint clay films on faces of peds and in pores; about 10 percent red sandstone channers; strongly acid; gradual smooth boundary.

Bt2—11 to 21 inches; brown (7.5YR 4/4) channery silt loam; weak very fine subangular blocky structure; friable, slightly sticky and nonplastic; common fine and many medium roots; few fine and medium discontinuous pores; few faint clay films on faces of peds and in pores; about 30 percent red sandstone channers; strongly acid; clear smooth boundary.

C—21 to 24 inches; brown (7.5YR 5/4) extremely channery loam; massive; about 65 percent sandstone channers; strongly acid; clear smooth boundary.

R—24 inches; hard, red sandstone bedrock.

The thickness of the solum ranges from 18 to 36 inches. The depth to bedrock ranges from 20 to 40 inches. Rock fragments make up 0 to 30 percent of the A and B horizons and 0 to 70 percent of the C horizon. The soils range from extremely acid to strongly acid.

The A horizon has hue of 7.5YR or 10YR, value of 2 to 5, and chroma of 1 to 4. It is loam or silt loam in the fine-earth fraction.

The BA horizon, if it occurs, has hue of 7.5YR or 10YR, value of 3 to 6, and chroma of 2 to 5. It is loam or silt loam in the fine-earth fraction.

The Bt horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. It is silt loam or loam in the fine-earth fraction.

The C horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. It is sandy loam or loam in the fine-earth fraction.

Maurertown Series

Soils of the Maurertown series are very deep and poorly drained. They formed in alluvium. They are on low stream terraces. Slope is 0 to 2 percent.

Maurertown soils are associated with the Guyan, Purdy, and Toms soils. Guyan and Purdy soils have a lower base saturation than the Maurertown soils. Toms soils have a subhorizon with brown colors in the subsoil.

Typical pedon of Maurertown silty clay loam, 0 to 2 percent slopes, 0.5 mile south of Zion Church at the intersection of Virginia 645 and Virginia 654 and 2,000 feet east of Virginia 645:

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) silty clay loam; weak very fine and fine subangular blocky structure; friable, slightly sticky and slightly plastic; many fine roots; common fine and few medium discontinuous pores; slightly acid; abrupt smooth boundary.

Btg1—6 to 13 inches; olive gray (5Y 4/2) silty clay loam; common fine faint yellowish brown (10YR 5/6) mottles; moderate fine and medium subangular blocky structure; friable, slightly sticky and slightly plastic; many fine roots; many fine and medium and common coarse continuous pores; many distinct clay films on faces of peds; slightly acid; gradual smooth boundary.

Btg2—13 to 27 inches; dark gray (5Y 4/1) silty clay; many fine prominent strong brown (7.5YR 5/8) mottles; weak medium prismatic structure parting to moderate medium and coarse subangular blocky; firm, sticky and plastic; few fine roots; common fine and few medium discontinuous pores; many distinct clay films on faces of peds; common fine manganese concretions; moderately acid; gradual smooth boundary.

Btg3—27 to 43 inches; dark gray (5Y 4/1) silty clay loam; many medium and coarse prominent olive brown (2.5Y 4/4) and strong brown (7.5YR 5/6) mottles; weak medium prismatic structure parting to moderate medium and coarse subangular blocky; firm, sticky and plastic; few fine roots; common fine and few medium discontinuous pores; many distinct clay films on faces of peds; common fine manganese concretions; moderately acid; gradual smooth boundary.

Btg4—43 to 65 inches; gray (5Y 5/1) silty clay; many medium and coarse prominent strong brown (7.5YR 5/6) and olive brown (2.5Y 4/4) mottles; weak fine and medium subangular blocky structure; firm, sticky and plastic; few fine roots; few fine discontinuous pores; many distinct clay films on faces of peds; common fine manganese concretions; moderately acid.

The thickness of the solum ranges from 40 to more than 60 inches. The depth to bedrock or unconforming substrata is more than 60 inches. The soils range from moderately acid to neutral.

The A or Ap horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 1 or 2. It is loam, silt loam, or silty clay loam.

The Btg horizon is neutral in hue or has hue of 10YR to 5Y. It has value of 4 to 6 and chroma of 0 to 2. It is silty clay loam, silty clay, or clay. In some pedons clay loam is in the upper part.

The C horizon, if it occurs, has the same color and texture ranges as those of the Btg horizon.

Moomaw Series

Soils of the Moomaw series are very deep and moderately well drained. They formed in alluvium derived mainly from acid sandstone and shale. They are on river terraces in the Shenandoah Valley. Slope ranges from 2 to 15 percent.

Moomaw soils are associated with the Coursey, Jefferson, Laidig, Lehew, Massanutten, Wallen, and Zepp soils. Coursey, Jefferson, Lehew, Massanutten, Wallen, and Zepp soils do not have a fragipan. Laidig soils do not have gray mottles in the subsoil.

Typical pedon of Moomaw fine sandy loam, 2 to 7 percent slopes, 0.5 mile southeast of Chapmans Landing, 700 feet southwest of Virginia 672, and 600 feet southeast of the circular watering tank:

Ap—0 to 8 inches; dark brown (10YR 4/3) fine sandy loam; weak fine granular structure; friable; many fine roots; few fine discontinuous vesicular pores; about 1 percent rounded sandstone gravel; slightly acid; abrupt smooth boundary.

Bt—8 to 18 inches; yellowish brown (10YR 5/6) clay loam; common medium distinct pale brown (10YR 6/3) mottles; weak fine subangular blocky structure; friable; common fine roots; common very fine discontinuous vesicular pores; common distinct clay films on faces of peds; strongly acid; clear smooth boundary.

Bx1—18 to 27 inches; light yellowish brown (10YR 6/4) sandy clay loam; common medium distinct strong brown (7.5YR 5/6) and gray (10YR 6/1) mottles; moderate very coarse platy structure parting to moderate fine subangular blocky; firm and brittle; common fine discontinuous vesicular pores; few faint clay films along faces of plates; strongly acid; gradual smooth boundary.

Bx2—27 to 34 inches; yellowish brown (10YR 5/4) sandy clay loam; many coarse distinct strong brown (7.5YR 5/6), pale brown (10YR 6/3), and gray (10YR 6/1) mottles; moderate very coarse platy structure parting to moderate fine subangular blocky; firm and brittle; few fine discontinuous vesicular pores; few faint clay films along faces of plates; very strongly acid; gradual smooth boundary.

Bx3—34 to 65 inches; yellowish brown (10YR 5/6) sandy clay loam; many fine distinct brownish yellow (10YR 6/8), strong brown (7.5YR 5/6), and light yellowish brown (2.5Y 6/4) mottles; moderate coarse platy structure parting to moderate fine subangular blocky; firm and brittle; few fine discontinuous vesicular pores; few distinct dark brown (7.5YR 4/4) clay films along faces of plates; very strongly acid.

The thickness of the solum ranges from 40 to 72 inches. The depth to the fragipan ranges from 18 to 30 inches. The depth to bedrock is more than 60 inches. The content of rounded gravel- and cobble-sized rock fragments ranges from 0 to 30 percent above the fragipan and 0 to 35 percent in the fragipan. Some pedons have a C horizon. The content of cobbles and gravel in this horizon ranges from 10 to 35 percent. The soils are very strongly acid or strongly acid unless limed.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. It is loam or fine sandy loam in the fine-earth fraction.

The Bt horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 8. Low-chroma mottles are 10 inches or more below the top of the Bt horizon. This horizon is loam, clay loam, or sandy clay loam in the fine-earth fraction.

The Btx horizon has hue of 7.5YR to 2.5Y, value of 5 or 6, and chroma of 2 to 8. It is loam, clay loam, or sandy clay loam in the fine-earth fraction.

Some pedons have a C horizon, which has hue of 7.5YR to 2.5Y, value of 5 to 7, and chroma of 2 to 8. This horizon is sandy loam, loam, sandy clay loam, or clay loam in the fine-earth fraction.

Newmarc Series

Soils of the Newmarc series are very deep and somewhat poorly drained. They formed in alluvium derived largely from shale, sandstone, and limestone. They are on flood plains along the major streams and rivers in the Shenandoah Valley. Slope is 0 to 2 percent.

Newmarc soils are associated with the Broadway, Derroc, Gladehill, and Nomberville soils. The associated soils do not have gray mottles in the upper part of the subsoil.

Typical pedon of Newmarc silt loam, 0 to 2 percent slopes, occasionally flooded, 3 miles southeast of the intersection of U.S. 11 and Virginia 661 and 150 feet north of the North Fork of the Shenandoah River:

Ap—0 to 7 inches; dark brown (10YR 3/3) silt loam, yellowish brown (10YR 4/4) dry; weak fine and medium granular structure; friable; many fine and few medium roots; common fine discontinuous pores; moderately acid; clear smooth boundary.

A—7 to 14 inches; dark brown (10YR 3/3) silt loam, dark yellowish brown (10YR 4/4) dry; moderate medium subangular blocky structure; friable; common fine roots; common fine and medium discontinuous pores; common distinct silt coatings on faces of peds; moderately acid; clear smooth boundary.

Bg1—14 to 24 inches; grayish brown (10YR 5/2) silt loam; common fine faint gray (10YR 5/1) and many fine distinct strong brown (7.5YR 5/6) mottles; weak coarse prismatic structure parting to moderate medium subangular blocky; friable, slightly sticky and slightly plastic; few fine roots; many fine and medium discontinuous pores; many faint silt coatings on faces of peds; moderately acid; gradual smooth boundary.

Bg2—24 to 36 inches; dark grayish brown (10YR 4/2) silt loam; common fine faint gray (10YR 5/1) and common fine distinct strong brown (7.5YR 5/6) mottles; weak coarse prismatic structure parting to moderate medium subangular blocky; friable, slightly sticky and nonplastic; few fine roots; many fine and medium discontinuous pores; common faint silt coatings on faces of peds; moderately acid; gradual smooth boundary.

Cg—36 to 62 inches; dark grayish brown (10YR 4/2) loam; common fine distinct strong brown (7.5YR 5/6) mottles; massive; friable, slightly sticky and nonplastic; few fine roots; common fine and medium discontinuous pores; many faint silt coatings in pores; slightly acid.

The thickness of the solum ranges from 20 to 40 inches. The content of gravel-sized rock fragments ranges from 0 to 5 percent within a depth of 40 inches and from 0 to 60 percent below that depth. The soils range from moderately acid to mildly alkaline.

The Ap horizon has hue of 7.5YR to 2.5Y and value and chroma of 2 or 3. It is loam, silt loam, or silty clay loam.

The A horizon has hue of 7.5YR to 2.5Y, value of 3 to 5, and chroma of 2 to 4. It is silt loam or silty clay loam.

The Bg horizon has hue of 7.5YR to 2.5Y, value of 4 to 7, and chroma of 0 to 2. It is silt loam or silty clay loam.

The Cg horizon has the same color range as that of the Bg horizon. This horizon is fine sandy loam, loam, silt loam, or silty clay loam in the fine-earth fraction.

Nomberville Series

Soils of the Nomberville series are very deep and well drained. They formed in alluvium derived from limestone, sandstone, and calcareous shale. They are on flood plains in the Shenandoah Valley. Slope is 0 to 2 percent.

Nomberville soils are associated with the Broadway, Derroc, Gladehill, and Newmarc soils. Broadway soils have free carbonates within 40 inches of the surface. Derroc and Gladehill soils have less silt in the subsoil than the Nomberville soils. Newmarc soils have gray mottles in the subsoil.

Typical pedon of Nomberville loam, 0 to 2 percent slopes, rarely flooded, 1.5 miles southwest of Strasburg, 985 yards east of the intersection of Virginia 11 and Virginia 601, about 325 yards north of Virginia 601, and 95 yards south-southeast of the North Fork of the Shenandoah River:

Ap1—0 to 6 inches; dark brown (10YR 3/3) loam; moderate fine granular structure; friable; common fine roots; few fine discontinuous pores; about 2 percent gravel; common worm channels; neutral; clear smooth boundary.

Ap2—6 to 13 inches; dark brown (10YR 3/3) loam; weak fine subangular blocky structure; friable; few fine roots; common fine and medium discontinuous pores; common worm casts; about 2 percent sandstone cobbles; neutral; clear smooth boundary.

Bw1—13 to 20 inches; dark brown (7.5YR 4/4) silt loam; moderate fine subangular blocky structure; friable; few very fine and medium roots; common fine discontinuous pores; dark brown (7.5YR 3/2) organic coatings on faces of peds; common worm channels; neutral; clear smooth boundary.

Bw2—20 to 31 inches; dark brown (7.5YR 4/4) silt loam; moderate fine subangular blocky structure; friable, slightly sticky and slightly plastic; few very fine and medium roots; common fine discontinuous pores; common worm channels; dark brown (7.5YR 3/2) organic coatings on faces of peds; neutral; gradual smooth boundary.

Bw3—31 to 50 inches; dark brown (7.5YR 4/4) silt loam; moderate fine subangular blocky structure; friable; common fine discontinuous pores; few very fine and medium roots; common worm channels; about 2 percent shale gravel; neutral; gradual wavy boundary.

C—50 to 62 inches; dark brown (7.5YR 4/4) gravelly loam; massive; friable; few fine discontinuous pores; about 10 percent sandstone cobbles and 25 percent sandstone gravel; neutral.

The thickness of the solum is 40 inches or more. The depth to hard rock is more than 60 inches. Rock fragments of mostly gravel- and cobble-sized sandstone and shale make up 0 to 5 percent of the surface layer and subsoil and 0 to 35 percent of the substratum. The soils range from moderately acid to moderately alkaline.

The Ap horizon has hue of 10YR or 2.5Y and value and chroma of 2 or 3. It is loam or silt loam.

The Bw horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 or 4. It is silt loam or silty clay loam.

The C horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 to 4. It is fine sandy loam, sandy loam, or loam in the fine-earth fraction.

Opequon Series

Soils of the Opequon series are shallow and well drained. They formed in material weathered from limestone. They are on uplands in the Shenandoah Valley. Slope ranges from 2 to 25 percent.

Opequon soils are associated with the Carbo, Chilhowie, Edom, Endcav, Frederick, Massanetta, Poplimento, and Timberville soils. The associated soils have a thicker solum than that of the Opequon soils and are deeper over bedrock.

Typical pedon of Opequon silty clay loam, 2 to 15 percent slopes, rocky, 0.7 mile southwest of Virginia 639, about 660 feet northeast of the intersection of Virginia 601 and Tumbling Run Creek, and 75 feet southeast of the abandoned quarry pit:

A—0 to 3 inches; dark brown (7.5YR 4/4) silty clay loam; weak fine granular structure; friable, slightly sticky and slightly plastic; common fine and few medium roots; about 10 percent chert gravel; neutral; clear smooth boundary.

Bt1—3 to 9 inches; strong brown (7.5YR 5/6) silty clay loam; weak fine and medium subangular blocky structure; friable, sticky and plastic; common fine and medium roots; common fine and medium discontinuous pores; many distinct clay films on faces of peds; about 10 percent chert gravel; slightly acid; clear smooth boundary.

Bt2—9 to 20 inches; red (2.5YR 4/6) clay; moderate fine and medium angular blocky structure; friable, very sticky and very plastic; common fine and few medium roots; few fine discontinuous pores; many prominent strong brown (7.5YR 5/6) and dark brown (7.5YR 4/4) clay films on faces of peds; slightly acid; abrupt smooth boundary.

R—20 inches; limestone bedrock.

The thickness of the solum and the depth to limestone bedrock range from 12 to 20 inches. Rock fragments of mostly gravel-sized chert and limestone make up 0 to 20 percent of the soils. The soils range from moderately acid to mildly alkaline.

The A horizon has hue of 5YR to 10YR, value of 3 to 6, and chroma of 1 to 4. It is silty clay loam, silty clay, or clay in the fine-earth fraction.

The Bt horizon has hue of 2.5YR to 7.5YR, value of 4 or 5, and chroma of 4 to 8. It is silty clay loam, silty clay, or clay in the fine-earth fraction.

The C horizon, if it occurs, is 1 to 3 inches thick. It is calcareous and effervesces in diluted hydrochloric acid.

Poplimento Series

Soils of the Poplimento series are very deep and well drained. They formed in material weathered from a mixture of limestone, shale, and siltstone. They are on uplands in the Shenandoah Valley. Slope ranges from 2 to 35 percent.

Poplimento soils are associated with the Carbo, Chilhowie, Edom, Endcav, Frederick, Massanetta, Opequon, and Timberville soils. Carbo, Chilhowie, Edom, Endcav, Massanetta, and Opequon soils have higher base saturation than the Poplimento soils, and Frederick and Timberville soils have a lower base saturation.

Typical pedon of Poplimento silt loam, in an area of Frederick and Poplimento silt loams, 2 to 7 percent slopes; 1 mile west of Edinburg, 3,000 feet west of the intersection of U.S. 11 and Virginia 698, and 100 feet south of the sinkhole:

Ap—0 to 8 inches; dark brown (10YR 4/3) silt loam; common coarse distinct yellowish brown (10YR 5/4) mottles; weak fine granular structure; friable; common fine roots; about 10 percent chert gravel; slightly acid; clear smooth boundary.

BA—8 to 12 inches; yellowish brown (10YR 5/6) silt loam; common fine distinct brown (10YR 4/3) and light yellowish brown (10YR 6/4) mottles; moderate fine subangular blocky structure; friable; few fine and very fine roots; common fine pores; few faint clay films on faces of peds; about 2 percent chert gravel; slightly acid; clear smooth boundary.

Bt1—12 to 23 inches; strong brown (7.5YR 5/8) silty clay; moderate fine subangular blocky structure; friable; few very fine roots; common fine and medium pores; common distinct clay films on faces of peds; about 2 percent chert gravel; slightly acid; gradual smooth boundary.

Bt2—23 to 44 inches; strong brown (7.5YR 5/6) clay; common medium distinct brownish yellow (10YR 6/6) and common medium prominent red (2.5YR 4/6) mottles; moderate fine subangular blocky

structure; firm, sticky and plastic; few very fine roots; few fine pores; common distinct clay films on faces of peds; about 3 percent chert gravel; very strongly acid; gradual wavy boundary.

Bt3—44 to 54 inches; yellowish brown (10YR 5/8) clay; common medium prominent red (2.5YR 4/6) mottles; moderate medium subangular blocky structure; firm, sticky and plastic; common distinct strong brown (7.5YR 5/6) clay films on faces of peds; about 10 percent chert gravel; very strongly acid; clear wavy boundary.

Bt4—54 to 62 inches; reddish yellow (7.5YR 6/6) silty clay loam; weak fine subangular blocky structure; friable, slightly sticky and plastic; few faint strong brown (7.5YR 5/6) clay films on faces of peds; about 10 percent chert gravel; 15 percent brownish yellow (10YR 6/8), strongly weathered limestone gravel; very strongly acid.

The thickness of the solum ranges from 40 to more than 60 inches. The depth to hard limestone, shale, or siltstone bedrock is more than 60 inches and varies greatly over short horizontal distances. Rock fragments of mostly chert gravel and highly weathered limestone, shale, and porous siltstone make up 0 to 25 percent of the A horizon, 0 to 15 percent of the upper part of the B horizon, and 0 to 55 percent of the lower part of the B horizon and the C horizon. The soils range from very strongly acid to slightly acid.

The Ap horizon has hue of 7.5YR or 10YR, value of 3 to 6, and chroma of 2 to 6. It is loam, silt loam, or silty clay loam in the fine-earth fraction.

The BA horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8. It is loam, silt loam, or silty clay loam.

The Bt horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. It is clay, silty clay, or silty clay loam in the fine-earth fraction.

The C horizon, if it occurs, has colors similar to those of the Bt horizon. It is clay, silty clay loam, or silty clay in the fine-earth fraction.

Purdy Series

Soils of the Purdy series are very deep and poorly drained. They formed in alluvium derived from acid sandstone and shale material. They are on low terraces. Slope is 0 to 2 percent.

Purdy soils are associated with the Guyan, Maurertown, and Toms soils. Guyan soils have a light brownish gray subsoil. Maurertown and Toms soils have a higher base saturation than the Purdy soils.

Typical pedon of Purdy silty clay loam, 0 to 2 percent slopes, 1.4 miles north of St. Davids Church on Virginia 679, about 600 feet northwest of Virginia 769, and 900 feet southeast of Passage Creek in a pasture:

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) silty clay loam; moderate fine and medium granular structure; friable, slightly sticky and nonplastic; many fine roots; strongly acid; abrupt smooth boundary.

Btg1—6 to 11 inches; dark grayish brown (10YR 4/2) silty clay loam; common fine distinct strong brown (7.5YR 4/6) mottles; moderate fine subangular and angular blocky structure; friable, slightly sticky and slightly plastic; common fine roots; common fine discontinuous pores; common distinct clay films on faces of peds and inside pores; strongly acid; clear smooth boundary.

Btg2—11 to 30 inches; dark gray (10YR 4/1) silty clay; many medium distinct strong brown (7.5YR 4/6) and common fine distinct yellowish brown (10YR 5/6) mottles; strong medium and coarse prismatic structure parting to strong medium angular blocky; firm, sticky and slightly plastic; few fine roots; many fine discontinuous pores; many prominent clay films on vertical and horizontal faces of peds; strongly acid; clear smooth boundary.

Btg3—30 to 39 inches; very dark gray (5Y 4/1) silty clay loam; many medium distinct strong brown (7.5YR 4/6) and common fine distinct yellowish brown (10YR 5/6) mottles; strong coarse angular blocky structure; firm, sticky and slightly plastic; few fine roots; few fine discontinuous pores; many prominent clay films on vertical and horizontal faces of peds; strongly acid; clear smooth boundary.

Btg4—39 to 51 inches; dark gray (10YR 4/1) clay loam; common medium distinct gray (10YR 5/1), common fine prominent yellowish brown (10YR 5/6), and common medium prominent dark grayish brown (2.5Y 4/2) mottles; moderate medium angular blocky structure; firm, sticky and slightly plastic; few very fine roots; few fine discontinuous pores; many prominent clay films on vertical and horizontal faces of peds; strongly acid; clear smooth boundary.

C—51 to 65 inches; gray (10YR 5/1) clay loam; common medium prominent brown (10YR 5/6) mottles; massive; friable, slightly sticky and slightly plastic; very strongly acid.

The thickness of the solum ranges from 28 to more than 50 inches. The depth to bedrock is more than 60 inches. The soils range from extremely acid to strongly acid unless limed.

The A horizon is neutral in hue or has hue of 10YR or 2.5Y. It has value of 4 or 5 and chroma of 0 to 2. It is silt loam, loam, or silty clay loam.

The B horizon is neutral in hue or has hue of 10YR to 5Y. It has value of 4 or 5 and chroma of 0 to 2. It is silty clay, clay loam, clay, or silty clay loam.

The C horizon is neutral in hue or has hue of 10YR to 5Y, value of 4 to 6, and chroma of 0 to 3. It is silty clay, clay loam, or clay. In some pedons it contains gravel or cobbles.

Sequoia Series

Soils of the Sequoia series are moderately deep and well drained. These soils formed in material weathered from acid shale and siltstone. They are on uplands in the mountains and valleys. Slope ranges from 2 to 55 percent.

Sequoia soils are associated with the Berks, Braddock, Gainesboro, Gilpin, Trappist, Unison, and Weikert soils. Berks, Gainesboro, and Weikert soils have more rock fragments in the subsoil than the Sequoia soils, and Gilpin soils have less clay in the subsoil. Braddock and Unison soils are deeper over bedrock than the Sequoia soils, and Trappist soils have a yellower subsoil.

Typical pedon of Sequoia loam, 2 to 15 percent slopes, 0.2 mile southwest of the intersection of Virginia 675 and Forest Service Road Number 375 and 40 feet east of Forest Service Road Number 375 in the George Washington National Forest:

Oi—2 inches to 0; loose leaves, twigs, and stems and very dark grayish brown (10YR 3/2), highly decomposed organic material.

A—0 to 5 inches; yellowish brown (10YR 5/4) loam; weak fine granular structure; friable, slightly sticky and nonplastic; many fine and medium and few coarse roots; about 10 percent sandstone gravel; strongly acid; abrupt smooth boundary.

Bt1—5 to 13 inches; strong brown (7.5YR 5/6) silty clay loam; weak fine and medium subangular blocky structure; friable, slightly sticky and nonplastic; many fine and medium and few coarse roots; many fine and common medium discontinuous pores; common faint clay films on faces of peds; about 5 percent sandstone gravel; strongly acid; gradual smooth boundary.

Bt2—13 to 23 inches; yellowish red (5YR 5/6) clay; strong fine and medium subangular blocky structure; friable, sticky and plastic; few fine roots; common fine and medium discontinuous pores; common distinct clay films on faces of peds; about 3 percent sandstone gravel; strongly acid; clear smooth boundary.

Bt3—23 to 38 inches; yellowish brown (10YR 5/6), red (2.5YR 4/8), and yellowish red (5YR 5/6) channery clay; moderate fine and medium angular blocky structure; friable, sticky and plastic; few fine roots; many distinct clay films on faces of peds; about 20 percent shale channers; strongly acid; clear smooth boundary.

Cr—38 to 62 inches; yellowish red (5YR 5/6) and light red (2.5YR 6/8), weathered shale that has seams and coatings of silty clay loam; massive; few fine roots between shale fragments and along seams; strongly acid.

The thickness of the solum and the depth to soft shale range from 20 to 40 inches. The depth to hard shale bedrock is more than 60 inches. Rock fragments make up 0 to 10 percent of the A horizon and 5 to 25 percent of the B horizon. The content of unconsolidated rock fragments of channer-sized shale varies in the Cr horizon. The soils are very strongly acid or strongly acid.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 2 to 4. It is silt loam or loam.

The Bt horizon has hue of 2.5YR to 10YR, value of 5 or 6, and chroma of 6 to 8. It is silty clay, clay, or silty clay loam in the fine-earth fraction.

The Cr horizon has hue of 10YR to 2.5YR, value of 4 to 6, and chroma of 4 to 8. It is mostly consolidated weathered shale that crushes to loam or silt loam and consolidated channer-sized shale fragments.

Timberville Series

Soils of the Timberville series are very deep and well drained. They formed in colluvium and alluvium derived from limestone. They are on uplands and flood plains throughout the Shenandoah Valley. Slope ranges from 2 to 7 percent.

Timberville soils are associated with the Carbo, Chilhowie, Edom, Endcav, Frederick, Massanetta, Opequon, and Poplimento soils. Carbo, Chilhowie, and Endcav soils have more clay in the subsoil than the Timberville soils, and Frederick soils have a redder subsoil. Edom, Massanetta, Opequon, and Poplimento soils have a higher base saturation than the Timberville soils.

Typical pedon of Timberville silt loam, 2 to 7 percent slopes, frequently flooded, 1.5 miles southwest of Quicksburg, 1,000 feet northwest of Virginia 616, and 300 feet north of the airplane hangar:

Ap1—0 to 3 inches; dark brown (10YR 4/3) silt loam; weak fine and medium granular structure; friable; many fine roots; about 10 percent gravel; neutral; clear smooth boundary.

Ap2—3 to 8 inches; dark yellowish brown (10YR 4/4)

silt loam; common fine distinct yellowish brown (10YR 5/8) mottles; moderate fine and medium subangular blocky structure; friable; many fine roots; common fine discontinuous pores; about 3 percent gravel; neutral; abrupt smooth boundary.

Bw—8 to 22 inches; yellowish brown (10YR 5/6) gravelly silt loam; moderate fine and medium subangular blocky structure; friable, slightly sticky and nonplastic; common fine roots; common medium and few coarse continuous and many fine discontinuous pores; about 25 percent gravel; neutral; clear smooth boundary.

2Bt1—22 to 35 inches; strong brown (7.5YR 5/8) silty clay; moderate fine and medium blocky structure; friable, slightly sticky and slightly plastic; few fine roots; few fine discontinuous pores; many distinct clay films on faces of peds; black (10YR 2/1) manganese stains; about 10 percent gravel; moderately acid; clear smooth boundary.

2Bt2—35 to 65 inches; strong brown (7.5YR 5/8) gravelly clay; moderate fine and medium blocky structure; friable, slightly sticky and slightly plastic; few fine discontinuous pores; many distinct clay films on faces of peds; black (10YR 2/1) manganese stains; about 30 percent gravel; very strongly acid.

The thickness of the solum and the depth to bedrock are more than 60 inches. The depth to the 2Bt horizon ranges from 20 to 40 inches. Gravel-sized rock fragments of chert and sandstone make up 0 to 35 percent of the surface layer and 0 to 35 percent of the subsoil with individual subhorizons in the subsoil ranging to 60 percent. The soils range from extremely acid to moderately acid unless limed.

The Ap horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 5. It is silt loam or loam in the fine-earth fraction.

The Bw horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8. It is silt loam or loam in the fine-earth fraction.

The 2Bt horizon has hue of 5YR to 10YR, value of 4 or 5, and chroma of 4 to 8. It is clay loam, silty clay, or clay in the fine-earth fraction.

Toms Series

Soils of the Toms series are very deep and somewhat poorly drained. They formed in alluvium on low stream terraces. Slope is 0 to 2 percent.

Toms soils are associated with the Guyan, Maurertown, and Purdy soils. Guyan and Purdy soils have a lower base saturation than the Toms soils. Maurertown soils have gray colors throughout the subsoil.

Typical pedon of Toms silt loam, 0 to 2 percent slopes, about 0.2 mile northwest of the intersection of Virginia 747 and Virginia 651 and 1,000 feet north of Virginia 651:

Ap—0 to 10 inches; dark grayish brown (10YR 4/2) silt loam; many fine prominent yellowish red (5YR 4/6) and few fine faint brownish yellow (10YR 6/6) mottles; weak medium granular structure; friable, slightly sticky and nonplastic; many fine roots; common fine and medium discontinuous pores; common fine manganese concretions; about 2 percent gravel; moderately acid; clear smooth boundary.

BA—10 to 21 inches; pale brown (10YR 6/3) silt loam; common fine and medium distinct gray (10YR 6/1), common fine prominent red (2.5YR 4/6), and common fine distinct grayish brown (10YR 5/2) mottles; moderate medium angular blocky structure; friable, sticky and slightly plastic; few fine roots; common coarse and many fine and medium pores; few faint clay films on faces of peds; common fine manganese concretions; slightly acid; clear wavy boundary.

Bt1—21 to 26 inches; yellowish brown (10YR 5/4) clay; common fine distinct grayish brown (10YR 5/2) and gray (10YR 6/1) and common fine prominent red (2.5YR 4/6) mottles; moderate medium angular blocky structure; friable, sticky and plastic; few fine discontinuous pores; many distinct clay films on faces of peds; common fine manganese concretions; about 2 percent gravel; neutral; clear wavy boundary.

Bt2—26 to 32 inches; strong brown (7.5YR 5/8) very cobbly clay; many fine and medium prominent gray (N 5/0) mottles; moderate fine and medium angular blocky structure; friable, sticky and plastic; few fine roots; many distinct clay films on faces of peds; common fine manganese concretions; about 45 percent cobbles and gravel; neutral; abrupt smooth boundary.

2Btg—32 to 44 inches; gray (5Y 6/1) silty clay; many medium prominent strong brown (7.5YR 5/8) mottles; moderate medium subangular blocky structure; firm, sticky and plastic; common distinct clay films on faces of peds; about 5 percent strongly weathered shale channers; slightly acid; clear smooth boundary.

2C—44 to 62 inches; yellowish brown (10YR 5/8) and gray (5Y 6/1) very channery silty clay loam; massive; sticky and plastic; about 50 percent shale

channers; mildly alkaline; abrupt smooth boundary.
R—62 inches; hard shale bedrock.

The thickness of the solum ranges from 40 to more than 60 inches. The depth to bedrock is 60 inches or more. Gravel-sized rock fragments make up 0 to 5 percent of the A horizon and upper part of the Bt horizon. Gravel- and cobble-sized rock fragments make up 0 to 50 percent of the lower part of the Bt horizon. Rock fragments of channer-sized shale make up 0 to 60 percent of the 2B and 2C horizons. The soils range from moderately acid to mildly alkaline.

The A horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 to 4. It is silt loam or loam.

The BA horizon, if it occurs, has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 3 to 8. It is loam or silt loam.

The Bt horizon is neutral in hue or has hue of 7.5YR to 5Y. It has value of 5 to 7 and chroma of 1 to 8. It is clay loam, silty clay loam, silty clay, or clay in the fine-earth fraction.

The 2Bt horizon, if it occurs, has colors and textures similar to those of the Bt horizon. Lithologic discontinuities are common in the lower part.

The C and 2C horizons, if they occur, have the same color and texture as those of the Bt horizon. Lithologic discontinuities are common in the substratum.

Trappist Series

Soils of the Trappist series are moderately deep and well drained. They formed in material weathered from acid shale. They are on uplands in the Shenandoah Valley. Slope ranges from 2 to 15 percent.

Trappist soils are associated with the Berks, Blairton, Braddock, Gainesboro, Gilpin, Sequoia, Unison, and Weikert soils. Berks, Gainesboro, and Weikert soils have more rock fragments in the subsoil than the Trappist soils, and Gilpin soils have less clay in the subsoil. Braddock and Unison soils are deeper over bedrock than the Trappist soils, and Sequoia soils have a redder subsoil. Blairton soils have gray mottles in the subsoil.

Typical pedon of Trappist silt loam, 2 to 7 percent slopes, 2 miles east of Maurertown, 100 feet northwest of the intersection of Virginia 649 and Virginia 747, and 400 feet north of Virginia 649:

Ap—0 to 8 inches; yellowish brown (10YR 5/4) silt loam; weak fine subangular blocky structure parting to weak fine granular; friable; many fine and few medium roots; common fine and few medium discontinuous pores; about 2 percent shale channers; neutral; abrupt smooth boundary.

Bt1—8 to 15 inches; strong brown (7.5YR 5/8) silty clay loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; common fine roots; common fine and few medium discontinuous pores; few faint yellowish brown (10YR 5/4) clay films on faces of peds; strongly acid; clear smooth boundary.

Bt2—15 to 37 inches; strong brown (7.5YR 5/6) clay; moderate medium and coarse subangular blocky structure; firm, slightly sticky and plastic; few fine roots; few fine and medium discontinuous pores; about 5 percent partially weathered shale channers; many prominent clay films on faces of peds; very strongly acid; clear wavy boundary.

Cr—37 to 40 inches; yellowish red (5YR 5/6) weathered shale that crushes to very channery silt loam; massive; few fine roots in cracks; very strongly acid; abrupt smooth boundary.

R—40 inches; shale bedrock.

The thickness of the solum and the depth to hard bedrock range from 20 to 40 inches. Rock fragments of mostly shale channers make up as much as 0 to 20 percent of the solum and 25 to 75 percent of the substratum. The soils range from extremely acid to strongly acid unless limed.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 4. It is silt loam or loam in the fine-earth fraction.

The Bt horizon has hue of 5YR to 10YR, value of 4 or 5, and chroma of 4 to 8. It is clay, silty clay, or silty clay loam in the fine-earth fraction.

The C or Cr horizon has colors similar to those of the B horizon. The C horizon, if it occurs, is clay or silty clay in the fine-earth fraction. The Cr horizon crushes to loam, silt loam, or silty clay loam in the fine-earth fraction.

Udorthents

Udorthents are shallow to very deep and moderately well drained or well drained. They formed in loamy or clayey soil material. Areas of Udorthents are throughout the survey area, but most are in recreational developments, near urban and industrial centers, and along the major highways. Slope ranges from 0 to 80 percent.

Udorthents are associated with many of the major soil types, such as Alonzville, Berks, Carbo, Caverns, Coursey, Chilhowie, Endcav, Frederick, Gladehill, Poplimento, Moomaw, Opequon, and Weikert. The associated soils have a well defined subsoil.

Because of the variability of Udorthents, a typical pedon is not given. The material ranges mainly from

extremely acid to slightly acid. The content of chert, shale, or sandstone rock fragments ranges from 0 to 50 percent.

The surface layer has hue of 5YR to 2.5Y, value of 3 to 5, and chroma of 2 or 3. It ranges from sandy loam to clay. It commonly is about 4 to 8 inches thick but ranges from 2 to 10 inches in thickness.

The lower layers extend to varying depths. They have hue of 2.5YR to 10YR, value of 3 to 7, and chroma of 4 to 8. The soils range from fine sandy loam to clay. In some pedons they have mottles with hue of 5YR to 2.5Y, value of 3 to 8, and chroma of 1 to 8.

Unison Series

Soils of the Unison series are very deep and well drained. They formed in alluvium derived from acid crystalline rocks. They are on stream terraces in the Shenandoah Valley. Slope ranges from 2 to 15 percent.

Unison soils are associated with the Berks, Blairton, Braddock, Gainesboro, Gilpin, Sequoia, Trappist, and Weikert soils. Berks, Blairton, Gainesboro, Gilpin, Sequoia, Trappist, and Weikert soils have less clay in the subsoil than the Unison soils. Braddock soils have a reddish brown subsoil.

Typical pedon of Unison loam, 2 to 7 percent slopes, 0.1 mile north of the intersection of Virginia 657 and Virginia 600 and 165 feet east of Virginia 657 in a hayfield:

Ap—0 to 8 inches; brown (10YR 4/3) loam; weak fine and medium granular structure; friable; few fine roots; common fine and medium discontinuous pores; few worm channels; about 2 percent rounded sandstone gravel; moderately acid; abrupt smooth boundary.

Bt1—8 to 19 inches; yellowish brown (10YR 5/4) clay loam; weak coarse prismatic structure parting to moderate fine and medium subangular blocky; friable, sticky and slightly plastic; few fine roots; common fine and medium discontinuous pores; few worm channels; many distinct strong brown (7.5YR 5/6) clay films on faces of peds; about 2 percent sandstone gravel; strongly acid; clear wavy boundary.

Bt2—19 to 34 inches; yellowish brown (10YR 5/6) clay; many medium distinct strong brown (7.5YR 5/6) and many medium prominent yellowish red (5YR 5/6) mottles; weak medium platy structure parting to moderate medium subangular blocky; friable, sticky and plastic; few fine discontinuous and few coarse continuous pores; many prominent brown (10YR 5/3) clay films on faces of peds; very strongly acid; clear wavy boundary.

Bt3—34 to 52 inches; strong brown (7.5YR 5/6) cobbly clay loam; many fine and medium prominent red (2.5YR 4/6) mottles; weak medium platy structure parting to moderate medium blocky; friable, sticky and plastic; few fine and medium discontinuous pores; many prominent dark grayish brown (10YR 4/2) and yellowish brown (10YR 5/6) clay films on faces of peds; about 15 percent sandstone cobbles; very strongly acid; clear smooth boundary.

2BC—52 to 62 inches; red (2.5YR 4/6) clay loam; weak fine and medium angular blocky structure; friable, slightly sticky and slightly plastic; few distinct dark grayish brown (10YR 4/2) and yellowish brown (10YR 5/6) clay films on faces of peds; about 5 percent rounded gravel and 5 percent sandstone cobbles; very strongly acid.

The thickness of the solum ranges from 30 to more than 60 inches. The depth to hard bedrock is more than 60 inches. Rock fragments of mostly sandstone gravel and cobbles make up 0 to 30 percent of the A horizon, 0 to 35 percent of the Bt and BC horizons, and 0 to 50 percent of the C horizon. The soils range from very strongly acid to moderately acid.

The Ap horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6. It is loam in the fine-earth fraction.

The BA horizon, if it occurs, has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6. It is clay loam in the fine-earth fraction.

The Bt horizon has hue of 5YR to 10YR, value of 4 or 5, and chroma of 3 to 8. It is clay or clay loam in the fine-earth fraction.

The BC horizon has hue of 2.5YR to 7.5YR, value of 4 to 8, and chroma of 3 to 6. It is loam or clay loam in the fine-earth fraction.

The C horizon, if it occurs, has colors similar to those of the BC horizon. It is loam or clay loam in the fine-earth fraction.

Wallen Series

Soils of the Wallen series are moderately deep and somewhat excessively drained. They formed in residuum derived mainly from sandstone. They are on uplands. Slope ranges from 2 to 70 percent.

Wallen soils are associated with the Drall, Jefferson, Laidig, Lehew, Massanutten, and Zepp soils. Jefferson, Laidig, and Massanutten soils have fewer rock fragments in the subsoil than the Wallen soils, and Drall soils have more sand and less clay in the subsoil. Lehew soils have a reddish brown subsoil. Zepp soils have illuvial clay in the subsoil.

Typical pedon of Wallen channery sandy loam, 2 to

15 percent slopes, very stony, 30 feet west of Tibbets Knob Trail and 200 feet north of Virginia 691 in the George Washington National Forest:

Oi—3 inches to 0; loose leaves, twigs, and partially decomposed organic material.

A—0 to 2 inches; very dark gray (10YR 3/1) channery sandy loam; weak very fine granular structure; very friable; many fine and medium and few coarse roots; about 30 percent sandstone channers; very strongly acid; clear smooth boundary.

E—2 to 7 inches; dark yellowish brown (10YR 4/4) channery sandy loam; weak very fine granular structure; very friable; many fine and medium and few coarse roots; 30 percent sandstone channers; very strongly acid; clear smooth boundary.

Bw1—7 to 12 inches; yellowish brown (10YR 5/4) channery sandy loam; weak fine subangular blocky structure; very friable, nonsticky and nonplastic; many fine and medium and few coarse roots; about 30 percent sandstone channers; very strongly acid; clear smooth boundary.

Bw2—12 to 25 inches; yellowish brown (10YR 5/4) very channery sandy loam; weak fine and medium subangular blocky structure; friable, slightly sticky and nonplastic; common fine and medium and few coarse roots; few fine discontinuous pores; few faint clay films on faces of peds and common distinct clay films on rock fragments; about 45 percent sandstone channers; very strongly acid; clear wavy boundary.

C—25 to 35 inches; yellowish brown (10YR 5/4) extremely channery sandy loam; massive; few fine roots in rock fractures; about 65 percent sandstone channers; very strongly acid; clear smooth boundary.

R—35 inches; fractured sandstone bedrock.

The thickness of the solum and the depth to hard sandstone bedrock range from 20 to 40 inches. Rock fragments of mostly channer-sized sandstone make up 15 to 35 percent of the A horizon and 35 to 70 percent of the B and C horizons. The soils are very strongly acid or strongly acid.

The A horizon has hue of 10YR, value of 3 or 4, and chroma of 1 to 3. It is sandy loam or loam in the fine-earth fraction.

The E horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. It is sandy loam or loam in the fine-earth fraction.

The Bw horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 6. It is loam or sandy loam in the fine-earth fraction.

The C horizon has the same color range as that of the B horizon. This horizon is fine sandy loam or sandy loam in the fine-earth fraction. Some pedons have a thin Cr horizon.

Weikert Series

Soils of the Weikert series are shallow and somewhat excessively drained. They formed in material weathered from shale, siltstone, and sandstone. They are on uplands in the Shenandoah Valley. Slope ranges from 7 to 70 percent.

Weikert soils are associated with the Berks, Blairton, Braddock, Gainesboro, Gilpin, Sequoia, Trappist, and Unison soils. The associated soils are deeper over bedrock than the Weikert soils.

Typical pedon of Weikert channery silt loam, in an area of Weikert-Berks complex, 15 to 35 percent slopes; 3.5 miles southeast of Edinburg, 0.5 mile northwest of Edinburg Gap, and 150 feet northeast of Virginia 675:

Oi—1 inch to 0; loose leaves, twigs, pine needles, and partially decomposed organic material.

A—0 to 3 inches; yellowish brown (10YR 5/4) channery silt loam; weak fine granular structure; friable; many fine and medium roots; about 25 percent shale channers; strongly acid; abrupt smooth boundary.

Bw—3 to 16 inches; yellowish brown (10YR 5/6) very channery silt loam; weak fine subangular blocky structure; friable; common fine and medium roots; few fine discontinuous pores; about 40 percent shale channers; very strongly acid; abrupt wavy boundary.

R—16 inches; dark gray, acid shale bedrock.

The thickness of the solum ranges from 8 to 20 inches. The depth to bedrock ranges from 10 to 20 inches. Rock fragments of shale, siltstone, or fine-grained sandstone channers make up 5 to 50 percent of the A horizon, 35 to 60 percent of the B horizon, and 60 to 85 percent of the C horizon. The soils are very strongly acid or strongly acid.

The A horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 to 4. It is silt loam in the fine-earth fraction.

The Bw horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 6. It is silt loam or loam in the fine-earth fraction.

The C horizon, if it occurs, has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 8. It is silt loam or loam in the fine-earth fraction.

Wolfgap Series

Soils of the Wolfgap series are very deep and well drained. They formed in alluvium derived from acid

sandstone, siltstone, and shale mixed with some limestone. They are on flood plains in the Shenandoah Valley. Slope ranges from 1 to 5 percent.

Wolfgap soils are associated with the Alonzville and Caverns soils. Alonzville soils have a lower base saturation than the Wolfgap soils, and Caverns soils have less clay in the subsoil.

Typical pedon of Wolfgap loam, 1 to 5 percent slopes, rarely flooded, 1.3 miles southeast of Maurertown, 1,700 feet southeast of the intersection of Virginia 600 and Virginia 661, about 700 feet east of Virginia 661, and 150 feet north of the Shenandoah River:

Ap1—0 to 5 inches; dark yellowish brown (10YR 3/3) loam; weak fine granular structure; friable; many fine and medium roots; many fine and medium discontinuous pores; about 2 percent mounded gravel; mildly alkaline; clear smooth boundary.

Ap2—5 to 11 inches; dark yellowish brown (10YR 3/3) loam; weak very fine subangular blocky structure; friable; many fine and common medium roots; few fine and medium discontinuous pores; neutral; clear smooth boundary.

Bw1—11 to 24 inches; dark yellowish brown (10YR 4/4) loam; weak coarse prismatic structure parting to moderate medium subangular blocky; friable; common fine and medium roots; common fine discontinuous pores; about 1 percent rounded gravel; slightly acid; clear smooth boundary.

Bw2—24 to 35 inches; dark brown (7.5YR 4/4) loam; weak medium subangular blocky structure; friable, slightly sticky and nonplastic; few fine and common medium roots; common fine discontinuous pores; about 5 percent rounded gravel and cobbles; moderately acid; clear smooth boundary.

Bw3—35 to 57 inches; brown (7.5YR 4/4) clay loam; weak coarse prismatic structure parting to moderate medium subangular blocky; friable, slightly sticky and slightly plastic; few fine and medium roots; many fine and few medium discontinuous pores; about 5 percent rounded gravel and cobbles; moderately acid; clear smooth boundary.

C—57 to 65 inches; dark brown (10YR 4/3) loam; massive; friable, slightly sticky and nonplastic; few fine roots; few fine and medium discontinuous pores; about 5 percent rounded gravel and cobbles; moderately acid.

The thickness of the solum ranges from 40 to more than 60 inches. The depth to bedrock is more than 60 inches. Rock fragments of mostly rounded sandstone gravel and cobbles make up 0 to 25 percent of the solum. The soils are strongly acid or moderately acid unless limed.

The Ap horizon has hue of 10YR and value and chroma of 2 or 3. It is loam or silt loam in the fine-earth fraction.

The Bw horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. It is loam, silt loam, sandy clay loam, or clay loam in the fine-earth fraction.

The BC horizon, if it occurs, has colors similar to those of the Bw horizon. It is fine sandy loam, sandy loam, or loam in the fine-earth fraction.

Zepp Series

Soils of the Zepp series are very deep and well drained. They formed in colluvium derived mostly from sandstone and shale. They are on uplands in the mountains. Slope ranges from 15 to 55 percent.

Zepp soils are associated with the Coursey, Jefferson, Laidig, Lehew, Massanutten, Moomaw, and Wallen soils. Coursey and Jefferson soils have more clay in the subsoil than the Zepp soils, and Lehew and Wallen soils have more rock fragments in the subsoil. Laidig and Moomaw soils have a fragipan. Massanutten soils are moderately deep over bedrock.

Typical pedon of Zepp very channery loam, 15 to 35 percent slopes, very stony, on the west side of Little North Mountain, approximately 0.5 mile north of Virginia 600 and 75 feet east of Cove Run in the George Washington National Forest:

A—0 to 4 inches; brown (10YR 4/3) very channery loam; weak very fine and fine granular structure; friable; many fine and medium and common coarse roots; about 40 percent sandstone channers; very strongly acid; clear smooth boundary.

BA—4 to 10 inches; yellowish brown (10YR 5/4) channery loam; weak fine subangular blocky structure; friable; common fine and medium and few coarse roots; few medium discontinuous pores; about 20 percent sandstone channers; very strongly acid; clear smooth boundary.

Bt1—10 to 23 inches; brown (7.5YR 4/4) channery loam; moderate fine and medium subangular blocky structure; friable, slightly sticky and nonplastic; few fine roots; common fine discontinuous pores; about 20 percent sandstone channers; few distinct clay films on faces of peds; very strongly acid; clear smooth boundary.

Bt2—23 to 48 inches; reddish brown (5YR 4/4) very channery sandy loam; moderate fine and medium subangular blocky structure; friable, slightly sticky and nonplastic; few fine roots; few fine

discontinuous pores; common distinct clay films on faces of peds; about 40 percent sandstone channers; very strongly acid; gradual smooth boundary.

2Bt3—48 to 57 inches; yellowish red (5YR 4/6) channery clay loam; moderate fine and medium blocky and subangular blocky structure; friable, sticky and nonplastic; few fine roots; few fine discontinuous pores; many distinct clay films on faces of peds; about 30 percent shale channers; very strongly acid; clear wavy boundary.

2C—57 to 65 inches; yellowish red (5YR 4/6) extremely channery clay loam; massive; friable, slightly sticky and slightly plastic; about 60 percent shale channers; very strongly acid.

The thickness of the solum ranges from 40 to 60 inches. The depth to bedrock is more than 60 inches. Rock fragments of sandstone and shale channers make up 5 to 45 percent of individual horizons of the solum and 20 to 70 percent of the substratum. In most pedons colluvium or residuum discontinuities are common below a depth of 40 inches. The soils range from extremely acid to strongly acid.

The A horizon has hue of 10YR, value of 4 to 6, and chroma of 2 to 4. It is sandy loam, fine sandy loam, or loam in the fine-earth fraction.

The BA horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. It is sandy loam, fine sandy loam, or loam in the fine-earth fraction.

The Bt and 2Bt horizons have hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. They are sandy loam, fine sandy loam, loam, or clay loam in the fine-earth fraction.

The C horizon has the same color range as that of the Bt horizon. This horizon is fine sandy loam, loam, sandy clay loam, or clay loam in the fine-earth fraction. Discontinuities are in material that weathered from shale and that has matrix and mottle colors in shades of red, brown, and gray.

Formation of the Soils

Soil is formed by weathering and other processes that act upon parent material. The characteristics of the soil at any given point are determined by the interaction of the five factors of soil formation—parent material, climate, plants and animals, relief, and time. Climate and plants and animals are the active forces in soil formation. Their effects on parent material are modified by relief and the length of time the parent material has been weathered. In some areas one factor may dominate in the formation of a soil and determine most of its properties. Normally, however, the interaction of all five factors determines the kind of soil that forms.

Parent Material

Parent material is the unconsolidated material in which a soil forms. It is largely responsible for the chemical and mineralogical composition of the soil and the rate that soil-forming processes take place. The three kinds of parent material in Shenandoah County are residual, alluvial, and colluvial.

The common residual parent materials are limestone, shale, sandstone, and siltstone. Soils formed from limestone, including dolomite, and from shale are most extensive in the valley and have a wide range of characteristics. Limestone-derived soils, such as Edom and Frederick soils, typically have a silty surface layer and a clayey subsoil. Residuum from acid shale and siltstone is the parent material for the Weikert and Berks soils. Acid sandstone residuum is the parent material for Lehew soils.

The alluvial parent material is of local origin along the smaller streams and is of local and general origin along the major rivers. Soils on the alluvial bottom land vary widely in texture and stage of development. Examples of soils that formed in alluvial material are Broadway, Caverns, Maurertown, Moomaw, and Nomberville soils.

The colluvial parent material is dominantly on the lower mountain slopes. The soils that formed in this material are primarily coarse textured or medium textured. Examples of soils that formed in colluvial material are Laidig and Jefferson soils.

Climate

Precipitation and temperature are the main climatic influences on soil formation. Precipitation dissolves minerals, supports biological activity, and transports mineral and organic residue throughout the soil. Temperature determines the types of physical, chemical, and biological activities that take place in the soil and the speed at which they act.

Because the amount of precipitation in the county exceeds the amount of evapotranspiration, the soils have been leached. Much of the soluble material that originally was in the soil or released through weathering has been removed. Exceptions to this are soils in alluvial areas, such as the Massanetta soils, which are recharged with carbonates by limestone springs. Precipitation is mainly responsible for the clayey subsoil that characterizes most soils in the county. In addition to the leaching of soluble materials, water that percolates through the soil moves small amounts of clay from the surface layer to the subsoil. Consequently, the soils in the county have more clay in the subsoil than in the surface layer.

Plant and Animal Life

Plants influence the amount of organic matter in the soil, the color of the surface layer, and, to some extent, the amount of nutrients. Earthworms and other burrowing animals help to keep the soil open and porous. Micro-organisms help to decompose the plants and dead animal matter, thus releasing nutrients for plant food. The native vegetation of the area consists mainly of hardwoods. Soils that developed under this vegetation are generally less acid than those that developed under coniferous vegetation.

Human activities, including clearing the forests, cultivating, introducing new plants, and changing natural drainage, have had an effect on soil development. The greatest effects on soil development are caused by the mixing of the upper layers of the soil to form a plow layer, cultivating strongly sloping soils and thus accelerating erosion, and liming and applying fertilizer

to change the content of plant nutrients, especially in the upper layers of the soil.

Relief

The relief of an area is largely determined by the underlying geologic formations, the geologic history of the general region, and the effects of river and stream dissection. Relief influences soil formation through its effects on moisture in the soil, erosion, temperature, and plant cover.

Shenandoah County has mountains on the western and eastern borders that approach or exceed 3,000 feet in elevation. The mountain systems are underlain by resistant rocks, such as sandstone and quartzite. The valley relief is affected by the underlying geology. This geology includes the Edinburg limestone and Martinsburg shale, which form the lowest areas with the least relief. The more hilly valley areas are characteristically underlain by other rocks. The Beekmantown Dolomite, which generally contains massive chert beds, is an example. The areas of shale in the county have a more well defined drainage pattern than the other areas.

Soil drainage is commonly related to the position of the soil. Soils in low, nearly level areas, for example, commonly are poorly drained, while soils in the more sloping areas typically are well drained. Most soils on uplands are naturally well drained. Soils on terraces and flood plains range from well drained to poorly drained.

Time

The length of time that the soil has been subjected to soil-forming processes is commonly reflected in the degree of profile development or horizon differentiation. Soils that have little or no horizon development are considered young soils, while those that have strongly developed horizons are considered old.

The oldest soils in Shenandoah County mainly are those that formed in material weathered from shale and limestone. Frederick, Edom, and Endcav are examples of these soils. In general, these soils are in the less sloping, relatively stable areas; formed in easily weatherable material; and have a strong degree of horizon differentiation. Soils that formed in recent alluvium, such as Gladehill soils, have been in place only a relatively short time and show little or no development other than an accumulation of organic matter in the surface layer. Soils on terraces, such as Alonzville and Moomaw soils, have recognizable horizon development. Their degree of development is generally between that of the old residual soils and that of the very young alluvial soils. On very steep slopes the soil material generally has not been in place long enough to develop distinct horizons because of geologic erosion.

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Glossary

ABC soil. A soil having an A, a B, and a C horizon.

AC soil. A soil having only an A and a C horizon. Commonly, such soil formed in recent alluvium or on steep rocky slopes.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 40-inch profile or to a limiting layer is expressed as—

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation-exchange capacity.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bench terrace. A raised, level or nearly level strip of earth constructed on or nearly on the contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

Bisequum. Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Channery soil. A soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a channer.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard compacted layers to a depth below normal plow depth.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15 to 38 centimeters (6 to 15 inches) long.

Coarse textured soil. Sand or loamy sand.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons.

Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes the surface.

Excess fines (in tables). Excess silt and clay in the soil. The soil is not a source of gravel or sand for construction purposes.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grains are grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fine textured soil. Sandy clay, silty clay, and clay.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist, 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant not a grass or a sedge.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots.

When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Graded stripcropping. Growing crops in strips that grade toward a protected waterway.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.6 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric and the more decomposed sapric material.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. The major horizons are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, any plowed or disturbed surface layer.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an O, A, or E horizon. The B horizon is in part a layer of transition from the overlying horizon to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) granular, prismatic, or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Hard, consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon but can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake in inches per hour is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Karst (topography). The relief of an area underlain by limestone that dissolves in differing degrees, thus forming numerous depressions or small basins.

Lacustrine deposit (geology). Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine-grained material, dominantly of silt-sized particles, deposited by wind.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, and fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, and silty clay loam.

Morphology, soil. The physical makeup of the soil,

including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent.* The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Muck. Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan.*

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil, adversely affecting the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Poor filter (in tables). Because of rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are—

Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5

Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep-sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

Rippable. Bedrock or hardpan can be excavated using a single-tooth ripping attachment mounted on a tractor with a 200-300 draw bar horsepower rating.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Saprolite (soil science). Unconsolidated residual material underlying the soil and grading to hard bedrock below.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the substratum. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Sinkhole. A depression in the landscape where limestone has been dissolved.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of

climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the substratum. The living roots and plant and animal activities are largely confined to the solum.

Stone line. A concentration of coarse fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stripcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to soil blowing and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from soil blowing and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Breaking up a compact subsoil by pulling a special chisel through the soil.

Substratum. The part of the soil below the solum.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Summer fallow. The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from about 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Surface soil. The A, E, AB, and EB horizons. It includes all subdivisions of these horizons.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, are in soils in extremely small amounts. They are essential to plant growth.

Unstable fill (in tables). Risk of caving or sloughing on banks of fill material.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace;

land above the lowlands along streams.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse-grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

(Recorded in the period 1952-81 at Woodstock, Virginia)

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January-----	42.6	22.0	32.8	69	-5	41	2.28	1.11	3.07	6	8.1
February----	47.2	24.2	35.7	72	0	59	2.01	.99	2.87	5	6.8
March-------	56.2	31.4	43.8	81	14	185	2.81	1.65	3.60	7	5.3
April-------	68.3	41.3	54.8	89	22	441	2.67	1.86	3.94	7	.7
May---------	76.9	49.6	63.3	92	31	718	3.31	2.17	4.57	7	.0
June--------	84.2	57.4	70.8	97	40	917	3.44	1.99	4.37	7	.0
July--------	87.6	61.8	74.7	100	48	1058	3.51	1.93	4.72	7	.0
August------	86.8	60.5	73.7	98	44	1027	3.52	1.95	4.43	7	.0
September---	80.4	54.0	67.2	97	33	806	3.28	1.57	4.70	6	.0
October-----	69.4	42.3	55.9	86	23	484	2.87	1.63	3.59	5	.1
November----	57.8	34.4	46.1	80	13	218	2.23	1.14	3.42	5	1.8
December----	47.0	25.8	36.4	71	5	61	2.28	1.27	3.73	5	4.6
Yearly:											
Average---	66.8	41.8	54.3	---	---	---	---	---	---	---	---
Extreme---	---	---	---	105	-10	---	---	---	---	---	---
Total-----	---	---	---	---	---	6,015	34.21	19.3	47.0	74	27.4

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40 degrees F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

(Recorded in the period 1952-81 at Woodstock, Virginia)

Probability	Temperature		
	24° F or lower	28° F or lower	32° F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	Apr. 11	Apr. 24	May 8
2 years in 10 later than--	Apr. 4	Apr. 15	May 1
5 years in 10 later than--	Mar. 30	Apr. 14	Apr. 30
First freezing temperature in fall:			
1 year in 10 earlier than--	Oct. 24	Oct. 6	Sept. 31
2 years in 10 earlier than--	Nov. 6	Oct. 18	Oct. 6
5 years in 10 earlier than--	Nov. 7	Oct. 21	Oct. 8

TABLE 3.--GROWING SEASON

(Recorded in the period 1952-81 at Woodstock, Virginia)

Probability	Daily minimum temperature during growing season		
	Higher than 24° F	Higher than 28° F	Higher than 32° F
	Days	Days	Days
9 years in 10	193	168	145
8 years in 10	207	179	152
5 years in 10	222	192	171
2 years in 10	225	194	175
1 year in 10	237	206	186

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Shenandoah County	George Washington National Forest	Total-- Area	Total-- Extent
		Acres	Acres	Acres	Pct
1B	Alonzville loam, 2 to 7 percent slopes, rarely flooded	2,583	0	2,583	0.8
1C	Alonzville loam, 7 to 15 percent slopes	364	63	427	0.1
2B	Berks channery silt loam, 2 to 7 percent slopes	1,201	0	1,201	0.4
3C	Berks-Weikert complex, 7 to 15 percent slopes	9,829	86	9,915	3.1
4B	Blairton silt loam, 2 to 7 percent slopes	868	0	868	0.3
4C	Blairton silt loam, 7 to 15 percent slopes	1,137	0	1,137	0.3
5B	Braddock loam, 2 to 7 percent slopes	1,409	0	1,409	0.4
5C	Braddock loam, 7 to 15 percent slopes	789	0	789	0.2
6B	Braddock cobbly loam, 2 to 7 percent slopes	353	0	353	0.1
6C	Braddock cobbly loam, 7 to 15 percent slopes	597	0	597	0.2
6D	Braddock cobbly loam, 15 to 25 percent slopes	568	0	568	0.2
7A	Broadway silt loam, 0 to 2 percent slopes, occasionally flooded	1,464	0	1,464	0.4
8B	Carbo silty clay loam, 2 to 7 percent slopes	1,049	0	1,049	0.3
8C	Carbo silty clay loam, 7 to 15 percent slopes	779	0	779	0.2
9C	Carbo-Endcav complex, 2 to 15 percent slopes, very rocky	4,739	0	4,739	1.4
9D	Carbo-Endcav complex, 15 to 35 percent slopes, very rocky	814	0	814	0.2
10A	Caverns sandy loam, 0 to 2 percent slopes, rarely flooded	1,445	0	1,445	0.4
11B	Chilhowie silty clay loam, 2 to 7 percent slopes	1,217	0	1,217	0.4
11C	Chilhowie silty clay loam, 7 to 15 percent slopes	2,259	0	2,259	0.7
11D	Chilhowie silty clay loam, 15 to 25 percent slopes	986	10	996	0.3
11E	Chilhowie silty clay loam, 25 to 35 percent slopes	420	0	420	0.1
12C	Chilhowie silty clay loam, 7 to 15 percent slopes, rocky	1,544	6	1,550	0.5
12D	Chilhowie silty clay loam, 15 to 25 percent slopes, rocky	1,304	14	1,318	0.4
13C	Chilhowie silty clay loam, 7 to 15 percent slopes, very rocky	853	0	853	0.3
13D	Chilhowie silty clay loam, 15 to 35 percent slopes, very rocky	1,254	56	1,310	0.4
13E	Chilhowie silty clay loam, 35 to 55 percent slopes, very rocky	277	428	705	0.2
14B	Coursey loam, 2 to 7 percent slopes	3,698	0	3,698	1.1
14C	Coursey loam, 7 to 15 percent slopes	942	86	1,028	0.3
15A	Derroc cobbly sandy loam, 0 to 2 percent slopes, frequently flooded	1,402	117	1,519	0.5
16B	Edom silty clay loam, 2 to 7 percent slopes	605	0	605	0.2
16C	Edom silty clay loam, 7 to 15 percent slopes	549	4	553	0.2
17B	Endcav silt loam, 2 to 7 percent slopes	5,992	0	5,992	1.8
17C	Endcav silt loam, 7 to 15 percent slopes	3,598	0	3,598	1.1
17D	Endcav silt loam, 15 to 25 percent slopes	940	0	940	0.3
18B	Endcav silt loam, 2 to 7 percent slopes, rocky	736	0	736	0.2
18C	Endcav silt loam, 7 to 15 percent slopes, rocky	1,696	0	1,696	0.5
19D	Frederick gravelly silt loam, 15 to 35 percent slopes	177	285	462	0.1
20B	Frederick and Poplimento silt loams, 2 to 7 percent slopes	6,371	0	6,371	1.9
20C	Frederick and Poplimento silt loams, 7 to 15 percent slopes	15,631	0	15,631	4.8
20D	Frederick and Poplimento silt loams, 15 to 25 percent slopes	7,007	0	7,007	2.1
21B	Frederick and Poplimento gravelly silt loams, 2 to 7 percent slopes	2,123	0	2,123	0.6
21C	Frederick and Poplimento gravelly silt loams, 7 to 15 percent slopes	7,950	11	7,961	2.5
21D	Frederick and Poplimento gravelly silt loams, 15 to 25 percent slopes	5,606	65	5,671	1.7
21E	Frederick and Poplimento gravelly silt loams, 25 to 35 percent slopes	2,586	78	2,664	0.8
22B	Frederick and Poplimento silt loams, 2 to 7 percent slopes, rocky	372	0	372	0.1
22C	Frederick and Poplimento silt loams, 7 to 15 percent slopes, rocky	2,567	0	2,567	0.8
22D	Frederick and Poplimento silt loams, 15 to 25 percent slopes, rocky	2,078	0	2,078	0.6
23C	Frederick and Poplimento silt loams, 2 to 15 percent slopes, very rocky	3,476	0	3,476	1.1
23D	Frederick and Poplimento silt loams, 15 to 35 percent slopes, very rocky	5,638	0	5,638	1.7
24B	Gainesboro-Berks complex, 2 to 7 percent slopes	178	0	178	0.1

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Shenandoah County	George Washington National Forest	Total-- Area	Total-- Extent
		Acres	Acres	Acres	Pct
24C	Gainesboro-Berks complex, 7 to 15 percent slopes	212	0	212	0.1
24D	Gainesboro-Berks complex, 15 to 25 percent slopes	286	22	308	0.1
24E	Gainesboro-Berks complex, 25 to 35 percent slopes	745	47	792	0.2
25B	Gilpin silt loam, 2 to 7 percent slopes	630	5	635	0.2
25C	Gilpin silt loam, 7 to 15 percent slopes	2,045	29	2,074	0.6
25D	Gilpin silt loam, 15 to 25 percent slopes	745	68	813	0.2
26C	Gilpin channery silt loam, 2 to 15 percent slopes	1,000	175	1,175	0.4
26D	Gilpin channery silt loam, 15 to 35 percent slopes	1,377	590	1,967	0.6
27C	Gilpin channery silt loam, 7 to 15 percent slopes, stony	1,088	78	1,166	0.4
27D	Gilpin channery silt loam, 15 to 25 percent slopes, stony	1,339	57	1,396	0.4
27E	Gilpin channery silt loam, 25 to 35 percent slopes, stony	700	51	751	0.2
28C	Gilpin channery silt loam, 2 to 15 percent slopes, very stony	45	504	549	0.2
28D	Gilpin channery silt loam, 15 to 35 percent slopes, very stony	263	2,637	2,900	0.9
28E	Gilpin channery silt loam, 35 to 55 percent slopes, very stony	219	2,285	2,504	0.8
29A	Gladehill fine sandy loam, 0 to 2 percent slopes, occasionally flooded	258	0	258	0.1
30A	Guyan silt loam, 0 to 2 percent slopes, rarely flooded	394	0	394	0.1
31B	Jefferson sandy loam, 2 to 7 percent slopes	753	6	759	0.2
31C	Jefferson sandy loam, 7 to 15 percent slopes	796	7	803	0.2
32C	Jefferson sandy loam, 2 to 15 percent slopes	31	262	293	0.1
32D	Jefferson sandy loam, 15 to 35 percent slopes	508	570	1,078	0.3
33C	Jefferson sandy loam, 2 to 15 percent slopes, very stony	1,012	341	1,353	0.4
33D	Jefferson sandy loam, 15 to 35 percent slopes, very stony	475	1,085	1,560	0.5
33E	Jefferson sandy loam, 35 to 55 percent slopes, very stony	268	421	689	0.2
34B	Laidig channery loam, 2 to 7 percent slopes	1,541	6	1,547	0.5
34C	Laidig channery loam, 7 to 15 percent slopes	2,636	35	2,671	0.8
35C	Laidig channery loam, 2 to 15 percent slopes	148	675	823	0.3
35D	Laidig channery loam, 15 to 35 percent slopes	56	742	798	0.2
36B	Laidig channery loam, 2 to 7 percent slopes, stony	652	20	672	0.2
36C	Laidig channery loam, 7 to 15 percent slopes, stony	4,574	490	5,064	1.6
37C	Laidig channery loam, 2 to 15 percent slopes, very stony	3,563	3,177	6,740	2.1
37D	Laidig channery loam, 15 to 35 percent slopes, very stony	8,396	7,102	15,498	4.8
37E	Laidig channery loam, 35 to 55 percent slopes, very stony	37	2,612	2,649	0.8
38B	Lehew and Gainesboro soils, 2 to 7 percent slopes	437	0	437	0.1
38C	Lehew and Gainesboro soils, 7 to 15 percent slopes	1,414	0	1,414	0.4
38D	Lehew and Gainesboro soils, 15 to 25 percent slopes	1,127	0	1,127	0.3
38E	Lehew and Gainesboro soils, 25 to 35 percent slopes	2,289	107	2,396	0.7
39A	Massanetta silt loam, 0 to 2 percent slopes, occasionally flooded	377	0	377	0.1
40D	Massanutten channery silt loam, 15 to 35 percent slopes	355	527	882	0.3
40E	Massanutten channery silt loam, 35 to 55 percent slopes	0	345	345	0.1
41D	Massanutten channery silt loam, 15 to 35 percent slopes, very stony	750	1,306	2,056	0.6
41E	Massanutten channery silt loam, 35 to 55 percent slopes, very stony	0	1,453	1,453	0.4
42A	Maurertown silty clay loam, 0 to 2 percent slopes	545	60	605	0.2
43B	Moomaw fine sandy loam, 2 to 7 percent slopes	2,059	0	2,059	0.6
43C	Moomaw fine sandy loam, 7 to 15 percent slopes	679	0	679	0.2
44B	Moomaw cobbly fine sandy loam, 2 to 7 percent slopes	650	0	650	0.2
44C	Moomaw cobbly fine sandy loam, 7 to 15 percent slopes	639	0	639	0.2
45A	Newmarc silt loam, 0 to 2 percent slopes, occasionally flooded	534	3	537	0.2
46A	Nomberville loam, 0 to 2 percent slopes, rarely flooded	1,304	105	1,409	0.4
47C	Opequon silty clay loam, 2 to 15 percent slopes, rocky	687	0	687	0.2
48C	Opequon silty clay loam, 2 to 15 percent slopes, very rocky	988	0	988	0.3
48D	Opequon silty clay loam, 15 to 25 percent slopes, very rocky	694	0	694	0.2
49	Pits and Dumps	841	0	841	0.3
50A	Purdy silty clay loam, 0 to 2 percent slopes	286	38	324	0.1
51D	Rock outcrop-Carbo complex, 2 to 25 percent slopes	2,946	0	2,946	0.9
52F	Rock outcrop-Drall-Wallen complex, 15 to 70 percent slopes	1,808	11,589	13,397	4.1
53C	Sequoia loam, 2 to 15 percent slopes	657	245	902	0.3

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Shenandoah County	George Washington National Forest	Total-- Area	Total-- Extent
		Acres	Acres	Acres	Pct
53D	Sequoia loam, 15 to 35 percent slopes	524	1,200	1,724	0.5
53E	Sequoia loam, 35 to 55 percent slopes	0	120	120	*
54B	Timberville silt loam, 2 to 7 percent slopes, frequently flooded	1,325	0	1,325	0.4
55A	Toms silt loam, 0 to 2 percent slopes	1,279	0	1,279	0.4
56B	Trappist silt loam, 2 to 7 percent slopes	563	0	563	0.2
56C	Trappist silt loam, 7 to 15 percent slopes	627	11	638	0.2
57	Udorthents, loamy	219	0	219	0.1
58	Udorthents-Urban land complex	1,814	0	1,814	0.6
59B	Unison loam, 2 to 7 percent slopes	2,860	0	2,860	0.9
59C	Unison loam, 7 to 15 percent slopes	1,116	0	1,116	0.3
60B	Unison gravelly loam, 2 to 7 percent slopes	829	0	829	0.3
60C	Unison gravelly loam, 7 to 15 percent slopes	626	0	626	0.2
61B	Unison cobbly loam, 2 to 7 percent slopes	654	0	654	0.2
61C	Unison cobbly loam, 7 to 15 percent slopes	629	0	629	0.2
62C	Wallen channery sandy loam, 7 to 15 percent slopes	277	0	277	0.1
62D	Wallen channery sandy loam, 15 to 35 percent slopes	816	0	816	0.2
63C	Wallen channery sandy loam, 2 to 15 percent slopes, very stony	126	331	457	0.1
63D	Wallen channery sandy loam, 15 to 35 percent slopes, very stony	4,395	4,027	8,422	2.6
63E	Wallen channery sandy loam, 35 to 55 percent slopes, very stony	240	8,272	8,512	2.6
64D	Wallen channery sandy loam, 15 to 35 percent slopes, extremely stony	0	395	395	0.1
64E	Wallen channery sandy loam, 35 to 55 percent slopes, extremely stony	818	5,021	5,839	1.8
64F	Wallen channery sandy loam, 55 to 70 percent slopes, extremely stony	897	3,446	4,343	1.3
65C	Wallen-Lehew complex, 2 to 15 percent slopes, very stony	187	208	395	0.1
65D	Wallen-Lehew complex, 15 to 35 percent slopes, very stony	466	1,366	1,832	0.6
65E	Wallen-Lehew complex, 35 to 55 percent slopes, very stony	39	1,971	2,010	0.6
66E	Wallen-Lehew complex, 35 to 55 percent slopes, extremely stony	21	493	514	0.2
66F	Wallen-Lehew complex, 55 to 70 percent slopes, extremely stony	0	2,150	2,150	0.7
67F	Weikert channery silt loam, 55 to 70 percent slopes	274	194	468	0.1
68D	Weikert-Berks complex, 15 to 35 percent slopes	36,018	2,660	38,678	11.8
68E	Weikert-Berks complex, 35 to 55 percent slopes	383	1,524	1,907	0.6
69D	Weikert-Berks complex, 15 to 35 percent slopes, very stony	3,681	106	3,787	1.2
69F	Weikert-Berks complex, 35 to 70 percent slopes, very stony	3,331	411	3,742	1.2
70B	Wolfgap loam, 1 to 5 percent slopes, rarely flooded	1,959	0	1,959	0.6
71D	Zepp very channery loam, 15 to 35 percent slopes, very stony	788	1,238	2,026	0.6
71E	Zepp very channery loam, 35 to 55 percent slopes, very stony	86	453	539	0.2
72E	Zepp very channery loam, 35 to 55 percent slopes, extremely stony	42	917	959	0.3
	Water	1,413	0	1,413	0.4
	Total	250,200	77,700	327,900	100.0

* Less than 0.1 percent.

TABLE 5.--PRIME FARMLAND

(Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland)

Map symbol	Soil name
1B	Alonzville loam, 2 to 7 percent slopes, rarely flooded
4B	Blairton silt loam, 2 to 7 percent slopes
5B	Braddock loam, 2 to 7 percent slopes
7A	Broadway silt loam, 0 to 2 percent slopes, occasionally flooded
8B	Carbo silty clay loam, 2 to 7 percent slopes
10A	Caverns sandy loam, 0 to 2 percent slopes, rarely flooded
14B	Coursey loam, 2 to 7 percent slopes
16B	Edom silty clay loam, 2 to 7 percent slopes
17B	Endcav silt loam, 2 to 7 percent slopes
18B	Endcav silt loam, 2 to 7 percent slopes, rocky
20B	Frederick and Poplimento silt loams, 2 to 7 percent slopes
21B	Frederick and Poplimento gravelly silt loams, 2 to 7 percent slopes
22B	Frederick and Poplimento silt loams, 2 to 7 percent slopes, rocky
29A	Gladehill fine sandy loam, 0 to 2 percent slopes, occasionally flooded
30A	Guyan silt loam, 0 to 2 percent slopes, rarely flooded
31B	Jefferson sandy loam, 2 to 7 percent slopes
34B	Laidig channery loam, 2 to 7 percent slopes
39A	Massanetta silt loam, 0 to 2 percent slopes, occasionally flooded
43B	Moomaw fine sandy loam, 2 to 7 percent slopes
45A	Newmarc silt loam, 0 to 2 percent slopes, occasionally flooded
46A	Nomberville loam, 0 to 2 percent slopes, rarely flooded
54B	Timberville silt loam, 2 to 7 percent slopes, frequently flooded
55A	Toms silt loam, 0 to 2 percent slopes
56B	Trappist silt loam, 2 to 7 percent slopes
59B	Unison loam, 2 to 7 percent slopes
60B	Unison gravelly loam, 2 to 7 percent slopes
70B	Wolfgap loam, 1 to 5 percent slopes, rarely flooded

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE

(Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Soil name and map symbol	Land capability	Corn	Corn silage	Wheat	Barley	Alfalfa hay	Grass-legume hay	Pasture
		Bu	Tons	Bu	Bu	Tons	Tons	AUM*
1B---------- Alonzville	IIe	120	24	---	60	5.0	3.5	7.0
1C---------- Alonzville	IIIe	105	21	---	55	4.5	3.5	7.0
2B---------- Berks	IIIs	80	16	30	45	3.5	3.0	6.5
3C---------- Berks-Weikert	IVs	---	---	29	45	---	2.3	5.0
4B---------- Blairton	IVw	75	15	35	50	---	2.5	5.0
4C---------- Blairton	IVw	70	14	30	45	---	2.0	4.0
5B---------- Braddock	IIe	120	25	50	65	3.5	5.0	---
5C---------- Braddock	IIIe	120	23	45	60	3.5	4.5	---
6B---------- Braddock	IIIs	90	18	45	60	3.5	4.5	---
6C---------- Braddock	IVs	80	16	40	55	3.5	4.0	---
6D---------- Braddock	VIs	---	---	---	---	---	---	---
7A---------- Broadway	I	130	26	55	70	5.5	3.5	9.0
8B---------- Carbo	IIe	90	18	45	60	4.5	3.5	---
8C---------- Carbo	IIIe	80	17	40	55	4.0	3.0	---
9C---------- Carbo-Endcav	IVe	82	17	33	---	3.7	2.8	---
9D---------- Carbo-Endcav	VIe	---	---	---	---	---	---	---
10A---------- Caverns	I	120	24	45	60	5.0	3.5	7.0
11B---------- Chilhowie	IIe	75	16	40	55	---	2.5	---
11C---------- Chilhowie	IIIe	60	12	35	50	---	2.5	---

See footnotes at end of table.

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Corn silage	Wheat	Barley	Alfalfa hay	Grass-legume hay	Pasture
		Bu	Tons	Bu	Bu	Tons	Tons	AUM*
11D---------- Chilhowie	IVe	---	---	---	---	---	---	---
11E---------- Chilhowie	VIe	---	---	---	---	---	---	---
12C---------- Chilhowie	IIIe	70	15	35	50	---	2.5	---
12D---------- Chilhowie	IVe	---	---	---	---	---	---	---
13C---------- Chilhowie	VIs	70	15	35	50	---	2.5	---
13D, 13E-------- Chilhowie	VIIe	---	---	---	---	---	---	---
14B---------- Coursey	IIe	100	20	35	50	---	3.0	6.0
14C---------- Coursey	IIIe	95	19	25	45	---	2.5	5.0
15A---------- Derroc	IIw	55	11	25	45	2.0	1.5	4.0
16B---------- Edom	IIe	100	20	40	55	4.0	3.0	7.5
16C---------- Edom	IIIe	80	16	35	50	3.0	3.0	6.5
17B---------- Endcav	IIe	100	20	45	60	4.0	3.5	---
17C---------- Endcav	IIIe	90	18	40	55	3.5	3.0	---
17D---------- Endcav	IVe	80	16	35	---	3.0	3.0	---
18B---------- Endcav	IIe	100	20	45	60	4.0	3.5	---
18C---------- Endcav	IIIe	90	18	40	55	3.5	3.0	---
19D---------- Frederick	VIe	---	---	---	---	---	---	7.0
20B---------- Frederick and Poplimento	IIe	120	24	41	60	4.5	3.5	8.4
20C---------- Frederick and Poplimento	IIIe	110	22	38	55	4.0	3.0	8.0
20D---------- Frederick and Poplimento	IVe	90	18	30	---	3.5	3.0	7.7

See footnotes at end of table.

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Corn silage	Wheat	Barley	Alfalfa hay	Grass-legume hay	Pasture
		Bu	Tons	Bu	Bu	Tons	Tons	AUM*
21B---------- Frederick and Poplimento	IIe	110	22	45	60	4.5	3.5	8.4
21C---------- Frederick and Poplimento	IIIe	97	18	40	55	4.0	3.0	8.0
21D---------- Frederick and Poplimento	IVe	85	17	35	---	3.5	2.5	7.7
21E---------- Frederick and Poplimento	VIe	---	---	---	---	---	---	6.5
22B---------- Frederick and Poplimento	IIe	115	23	48	60	4.0	3.5	8.4
22C---------- Frederick and Poplimento	IIIe	105	20	40	55	3.8	3.0	8.0
22D---------- Frederick and Poplimento	IVe	95	19	40	45	3.5	3.0	7.7
23C---------- Frederick and Poplimento	VIs	95	19	40	45	3.5	3.0	7.7
23D---------- Frederick and Poplimento	VIs	---	---	---	---	---	---	6.6
24B---------- Gainesboro-Berks	IIe	89	18	30	45	3.0	3.0	7.1
24C---------- Gainesboro-Berks	IIIe	80	17	30	45	2.5	2.8	6.3
24D---------- Gainesboro-Berks	IVe	73	16	---	---	---	2.5	6.0
24E---------- Gainesboro-Berks	VIe	---	---	---	---	---	---	---
25B---------- Gilpin	IIe	90	18	40	55	3.0	3.0	7.0
25C---------- Gilpin	IIIs	80	16	35	50	3.0	2.8	7.0
25D---------- Gilpin	IVe	75	15	30	---	2.5	2.5	6.0

See footnotes at end of table.

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Corn silage	Wheat	Barley	Alfalfa hay	Grass-legume hay	Pasture
		Bu	Tons	Bu	Bu	Tons	Tons	AUM*
26C---------- Gilpin	IIIe	80	16	35	50	3.0	2.8	7.0
26D---------- Gilpin	VIe	75	15	30	---	2.5	2.5	6.0
27C---------- Gilpin	IVs	75	15	30	---	2.5	2.5	6.0
27D---------- Gilpin	VIs	---	---	---	---	---	---	5.0
27E---------- Gilpin	VIIs	---	---	---	---	---	---	---
28C---------- Gilpin	VIIs	---	---	---	---	---	---	3.0
28D, 28E-------- Gilpin	VIIe	---	---	---	---	---	---	---
29A---------- Gladehill	I	120	24	40	55	3.5	4.0	7.0
30A---------- Guyan	IVw	105	21	35	50	---	3.5	6.0
31B---------- Jefferson	IIe	95	---	35	50	4.0	4.0	6.0
31C, 32C-------- Jefferson	IIIe	85	---	35	45	4.0	4.0	6.0
32D---------- Jefferson	VIe	---	---	---	---	---	---	---
33C---------- Jefferson	VIIs	---	---	---	---	---	---	4.0
33D, 33E-------- Jefferson	VIIe	---	---	---	---	---	---	---
34B---------- Laidig	IIe	90	18	40	55	4.0	3.0	4.5
34C, 35C-------- Laidig	IIIe	80	16	35	50	4.0	3.0	4.5
35D---------- Laidig	VIe	---	---	---	---	---	---	---
36B---------- Laidig	IIIs	80	16	40	55	4.0	3.0	4.5
36C---------- Laidig	IVs	80	16	40	55	4.0	3.0	4.5
37C---------- Laidig	VIIs	---	---	---	---	---	---	---
37D, 37E-------- Laidig	VIIe	---	---	---	---	---	---	---

See footnotes at end of table.

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Corn silage	Wheat	Barley	Alfalfa hay	Grass-legume hay	Pasture
		Bu	Tons	Bu	Bu	Tons	Tons	AUM*
38B---------- Lehew and Gainesboro	IIe	80	16	35	50	---	2.5	4.5
38C---------- Lehew and Gainesboro	IIIe	70	14	35	45	---	2.0	4.5
38D---------- Lehew and Gainesboro	IVe	50	10	---	---	---	2.0	4.0
38E---------- Lehew and Gainesboro	VIe	---	---	---	---	---	---	---
39A---------- Massanetta	IIw	100	20	---	---	---	3.0	5.5
40D---------- Massanutten	VIe	---	---	---	---	---	---	2.5
40E---------- Massanutten	VIIe	---	---	---	---	---	---	---
41D---------- Massanutten	VIIs	---	---	---	---	---	---	2.5
41E---------- Massanutten	VIIe	---	---	---	---	---	---	---
42A---------- Maurertown	IVw	70	14	---	---	---	2.5	4.0
43B---------- Moomaw	IIe	100	20	40	55	---	3.0	6.0
43C---------- Moomaw	IIIe	80	16	35	50	---	2.5	5.5
44B---------- Moomaw	IIIs	95	18	40	55	---	3.0	6.0
44C---------- Moomaw	IVs	75	15	35	50	---	3.0	5.5
45A---------- Newmarc	IVw	85	17	---	---	---	3.0	6.0
46A---------- Nomberville	I	120	27	50	65	4.5	4.5	7.0
47C---------- Opequon	IVs	---	---	25	---	---	2.5	3.0
48C, 48D-------- Opequon	VIs	---	---	---	---	---	---	---
49**. Pits								

See footnotes at end of table.

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Corn silage	Wheat	Barley	Alfalfa hay	Grass-legume hay	Pasture
		Bu	Tons	Bu	Bu	Tons	Tons	AUM*
50A---------- Purdy	IVw	80	16	---	---	---	2.5	3.5
51D---------- Rock outcrop-Carbo	VIIs	---	---	---	---	---	---	---
52F---------- Rock outcrop-Drall-Wallen	VIIs	---	---	---	---	---	---	---
53C---------- Sequoia	IIIe	85	16	40	55	3.5	2.0	5.0
53D---------- Sequoia	VIe	---	---	---	---	---	---	4.5
53E---------- Sequoia	VIIe	---	---	---	---	---	---	---
54B---------- Timberville	IIw	100	20	50	65	---	2.5	5.5
55A---------- Toms	IVw	80	16	35	50	---	3.0	5.0
56B---------- Trappist	IIe	80	16	30	45	---	3.5	6.5
56C---------- Trappist	IIIe	75	15	30	45	---	3.5	6.5
57**. Udorthents								
58**. Udorthents-Urban land								
59B---------- Unison	IIe	110	25	50	65	3.5	5.0	9.2
59C---------- Unison	IIIe	105	23	45	60	3.5	4.7	9.2
60B---------- Unison	IIe	105	25	47	65	3.5	4.7	8.7
60C---------- Unison	IIIe	100	23	44	60	3.0	4.2	8.5
61B---------- Unison	IIIs	95	23	43	60	3.0	4.2	8.5
61C---------- Unison	IVs	90	21	40	55	2.5	3.7	8.0
62C---------- Wallen	IIIe	---	---	---	---	---	---	---

See footnotes at end of table.

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Corn silage	Wheat	Barley	Alfalfa hay	Grass-legume hay	Pasture
		Bu	Tons	Bu	Bu	Tons	Tons	AUM*
62D---------- Wallen	VIe	---	---	---	---	---	---	---
63C, 63D, 63E, 64D, 64E, 64F-- Wallen	VIIs	---	---	---	---	---	---	---
65C---------- Wallen-Lehew	VIIs	---	---	---	---	---	---	---
65D, 65E-------- Wallen-Lehew	VIIe	---	---	---	---	---	---	---
66E, 66F-------- Wallen-Lehew	VIIe	---	---	---	---	---	---	---
67F---------- Weikert	VIIe	---	---	---	---	---	---	---
68D---------- Weikert-Berks	VIe	---	---	---	---	---	---	---
68E, 69D, 69F--- Weikert-Berks	VIIe	---	---	---	---	---	---	---
70B---------- Wolfgap	IIe	125	21	45	60	5.0	5.0	8.5
71D---------- Zepp	VIIs	---	---	---	---	---	---	3.0
71E, 72E-------- Zepp	VIIe	---	---	---	---	---	---	---

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available)

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Productivity class*	Trees to plant
1B, 1C---------- Alonzville	4A	Slight	Slight	Slight	Slight	Northern red oak---- Yellow poplar------- Virginia pine-------	70 90 60	4 6 6	Eastern white pine, yellow poplar, shortleaf pine.
2B---------- Berks	4F	Slight	Slight	Moderate	Slight	Northern red oak---- Black oak---------- Virginia pine-------	70 70 70	4 4 8	Virginia pine, eastern white pine, Japanese larch, Norway spruce, red pine.
3C**:									
Berks----------	4F	Slight	Slight	Moderate	Slight	Northern red oak---- Black oak---------- Virginia pine-------	70 70 70	4 4 8	Virginia pine, eastern white pine, Japanese larch, Norway spruce, red pine.
Weikert--------	3D	Slight	Slight	Severe	Moderate	Northern red oak---- Virginia pine-------	59 56	3 6	Virginia pine, shortleaf pine, red pine, eastern white pine.
4B---------- Blairton	4W	Slight	Moderate	Slight	Slight	Northern red oak---- White ash---------- Sugar maple--------- Yellow poplar-------	70 70 70 80	4 3 3 5	Yellow poplar, Japanese larch, eastern white pine, Norway spruce.
4C---------- Blairton	4W	Slight	Moderate	Slight	Slight	Northern red oak---- White ash---------- Sugar maple--------- Yellow poplar-------	70 70 70 80	4 3 3 5	Yellow poplar, Japanese larch, eastern white pine, Norway spruce.
5B, 5C, 6B, 6C-- Braddock	4C	Slight	Moderate	Slight	Slight	Northern red oak---- Yellow poplar------- Eastern white pine-- Virginia pine------- Shortleaf pine------	80 90 95 76 76	4 6 12 8 8	Yellow poplar, eastern white pine.
6D---------- Braddock	4R	Moderate	Moderate	Slight	Slight	Northern red oak---- Yellow poplar------- Eastern white pine-- Virginia pine------- Shortleaf pine------	80 90 95 76 76	4 6 12 8 8	Yellow poplar, eastern white pine.

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Common trees	Site index	Productivity class*	Trees to plant
7A---------- Broadway	7A	Slight	Slight	Slight	Slight	Northern red oak----	80	4	Eastern white pine, black walnut, yellow poplar, shortleaf pine.
						Yellow poplar-------	95	7	
8B, 8C---------- Carbo	6C	Slight	Moderate	Slight	Moderate	Virginia pine-------	55	6	Virginia pine, yellow poplar, black walnut.
						Yellow poplar-------	80	5	
						Eastern white pine--	80	10	
9C**:									
Carbo----------	6C	Slight	Moderate	Slight	Moderate	Virginia pine-------	55	6	Virginia pine, yellow poplar, black walnut.
						Yellow poplar-------	80	5	
						Eastern white pine--	80	10	
Endcav---------	4C	Slight	Moderate	Slight	Slight	Northern red oak----	85	4	Yellow poplar, eastern white pine, black walnut.
						Yellow poplar-------	90	6	
						Eastern white pine--	90	12	
9D**:									
Carbo----------	6R	Moderate	Moderate	Slight	Moderate	Virginia pine-------	55	6	Virginia pine, yellow poplar, black walnut.
						Yellow poplar-------	80	5	
						Eastern white pine--	80	10	
Endcav---------	4R	Severe	Severe	Slight	Slight	Northern red oak----	85	4	Yellow poplar, eastern white pine, black walnut.
						Yellow poplar-------	90	6	
						Eastern white pine--	90	12	
10A---------- Caverns	4A	Slight	Slight	Slight	Slight	Northern red oak----	75	4	Eastern white pine, yellow poplar, shortleaf pine.
						Virginia pine-------	65	7	
						Yellow poplar-------	93	7	
11B, 11C-------- Chilhowie	3C	Slight	Moderate	Moderate	Moderate	Northern red oak----	60	3	Eastern white pine.
						Virginia pine-------	60	6	
						Shortleaf pine------	60	6	
11D, 11E-------- Chilhowie	3R	Moderate	Moderate	Moderate	Moderate	Northern red oak----	60	3	Eastern white pine.
						Virginia pine-------	60	6	
						Shortleaf pine------	60	6	
12C---------- Chilhowie	3C	Slight	Moderate	Moderate	Moderate	Northern red oak----	60	3	Eastern white pine.
						Virginia pine-------	60	6	
						Shortleaf pine------	60	6	
12D---------- Chilhowie	3R	Moderate	Moderate	Moderate	Moderate	Northern red oak----	60	3	Eastern white pine.
						Virginia pine-------	60	6	
						Shortleaf pine------	60	6	
13C---------- Chilhowie	3C	Slight	Moderate	Moderate	Moderate	Northern red oak----	60	3	Eastern white pine.
						Virginia pine-------	60	6	
						Shortleaf pine------	60	6	
13D---------- Chilhowie	3R	Moderate	Moderate	Moderate	Moderate	Northern red oak----	60	3	Eastern white pine.
						Virginia pine-------	60	6	
						Shortleaf pine------	60	6	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Common trees	Site index	Productivity class*	Trees to plant
13E---------- Chilhowie	3R	Severe	Severe	Moderate	Moderate	Northern red oak----	60	3	Eastern white pine.
						Virginia pine-------	60	6	
						Shortleaf pine------	60	6	
14B, 14C-------- Coursey	4A	Slight	Slight	Slight	Slight	Northern red oak----	70	4	Eastern white pine, yellow poplar, shortleaf pine.
						Virginia pine-------	60	6	
						Yellow poplar-------	90	6	
15A---------- Derroc	4F	Slight	Slight	Slight	Slight	Northern red oak----	70	4	
						Yellow poplar-------	90	6	
16B, 16C-------- Edom	4A	Slight	Slight	Slight	Slight	Northern red oak----	80	4	Eastern white pine, yellow poplar, Norway spruce, Virginia pine.
						Yellow poplar-------	90	6	
17B, 17C-------- Endcav	4C	Slight	Moderate	Slight	Slight	Northern red oak----	85	4	Yellow poplar, eastern white pine, black walnut.
						Yellow poplar-------	90	6	
						Eastern white pine--	90	12	
17D---------- Endcav	4R	Moderate	Severe	Slight	Slight	Northern red oak----	85	4	Yellow poplar, eastern white pine, black walnut.
						Yellow poplar-------	90	6	
						Eastern white pine--	90	12	
18B, 18C-------- Endcav	4C	Slight	Moderate	Slight	Slight	Northern red oak----	85	4	Yellow poplar, eastern white pine, black walnut.
						Yellow poplar-------	90	6	
						Eastern white pine--	90	12	
19D---------- Frederick	4S	Moderate	Moderate	Moderate	Slight	Northern red oak----	76	4	Eastern white pine, yellow poplar, black walnut, Scotch pine.
						Yellow poplar-------	86	6	
						Black locust--------	80	4	
						White oak----------	76	4	
						Black walnut--------	76	4	
20B**, 20C**:									
Frederick------	4C	Slight	Moderate	Slight	Slight	Northern red oak----	76	4	Eastern white pine, yellow poplar, black walnut, Scotch pine.
						Yellow poplar-------	86	6	
						Black locust--------	80	4	
						White oak----------	76	4	
						Black walnut--------	76	4	
Poplimento-----	4C	Slight	Moderate	Slight	Slight	Northern red oak----	80	4	Eastern white pine, yellow poplar, black walnut.
						Yellow poplar-------	90	6	
						Hickory----------	---	---	
						Black walnut--------	---	---	
						Ash----------	---	---	
20D**:									
Frederick------	4R	Moderate	Moderate	Slight	Slight	Northern red oak----	76	4	Eastern white pine, yellow poplar, black walnut, Scotch pine.
						Yellow poplar-------	86	6	
						Black locust--------	80	4	
						White oak----------	76	4	
						Black walnut--------	76	4	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Common trees	Site index	Productivity class*	Trees to plant
20D**:									
Poplimento-----	4R	Moderate	Severe	Slight	Slight	Northern red oak----	80	4	Eastern white pine, yellow poplar, black walnut.
						Yellow poplar-------	90	6	
						Hickory----------	---	---	
						Black walnut--------	---	---	
						Ash----------	---	---	
21B**, 21C**:									
Frederick------	4C	Slight	Moderate	Moderate	Slight	Northern red oak----	76	4	Eastern white pine, yellow poplar, black walnut, Scotch pine.
						Yellow poplar-------	86	6	
						Black locust--------	80	4	
						White oak----------	76	4	
						Black walnut--------	76	4	
Poplimento-----	4C	Slight	Moderate	Slight	Slight	Northern red oak----	80	4	Eastern white pine, yellow poplar, black walnut.
						Yellow poplar-------	90	6	
						Hickory----------	---	---	
						Black walnut--------	---	---	
						Ash----------	---	---	
21D**, 21E**:									
Frederick------	4S	Moderate	Moderate	Moderate	Slight	Northern red oak----	76	4	Eastern white pine, yellow poplar, black walnut, Scotch pine.
						Yellow poplar-------	86	6	
						Black locust--------	80	4	
						White oak----------	76	4	
						Black walnut--------	76	4	
Poplimento-----	4R	Moderate	Severe	Slight	Slight	Northern red oak----	80	4	Eastern white pine, yellow poplar, black walnut.
						Yellow poplar-------	90	6	
						Hickory----------	---	---	
						Black walnut--------	---	---	
						Ash----------	---	---	
22B**, 22C**:									
Frederick------	4C	Slight	Moderate	Slight	Slight	Northern red oak----	76	4	Eastern white pine, yellow poplar, black walnut, Scotch pine.
						Yellow poplar-------	86	6	
						Black locust--------	80	4	
						White oak----------	76	4	
						Black walnut--------	76	4	
Poplimento-----	4C	Slight	Moderate	Slight	Slight	Northern red oak----	80	4	Eastern white pine, yellow poplar, black walnut.
						Yellow poplar-------	90	6	
						Hickory----------	---	---	
						Black walnut--------	---	---	
						Ash----------	---	---	
22D**:									
Frederick------	4R	Moderate	Moderate	Slight	Slight	Northern red oak----	76	4	Eastern white pine, yellow poplar, black walnut, Scotch pine.
						Yellow poplar-------	86	6	
						Black locust--------	80	4	
						White oak----------	76	4	
						Black walnut--------	76	4	
Poplimento-----	4R	Moderate	Severe	Slight	Slight	Northern red oak----	80	4	Eastern white pine, yellow poplar, black walnut.
						Yellow poplar-------	90	6	
						Hickory----------	---	---	
						Black walnut--------	---	---	
						Ash----------	---	---	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Common trees	Site index	Productivity class*	Trees to plant
23C**:									
Frederick------	4C	Slight	Moderate	Slight	Slight	Northern red oak----	76	4	Eastern white pine, yellow poplar, black walnut, Scotch pine.
						Yellow poplar-------	86	6	
						Black locust--------	80	4	
						White oak----------	76	4	
						Black walnut--------	76	4	
Poplimento-----	4C	Slight	Moderate	Slight	Slight	Northern red oak----	80	4	Eastern white pine, yellow poplar, black walnut.
						Yellow poplar-------	90	6	
						Hickory----------	---	---	
						Black walnut--------	---	---	
						Ash----------	---	---	
23D**:									
Frederick------	4R	Moderate	Moderate	Slight	Slight	Northern red oak----	76	4	Eastern white pine, yellow poplar, black walnut, Scotch pine.
						Yellow poplar-------	86	6	
						Black locust--------	80	4	
						White oak----------	76	4	
						Black walnut--------	76	4	
Poplimento-----	4R	Moderate	Severe	Slight	Slight	Northern red oak----	80	4	Eastern white pine, yellow poplar, black walnut.
						Yellow poplar-------	90	6	
						Hickory----------	---	---	
						Black walnut--------	---	---	
						Ash----------	---	---	
24B**, 24C**:									
Gainesboro-----	4A	Slight	Slight	Slight	Slight	Northern red oak----	70	4	Eastern white pine, loblolly pine, Virginia pine.
						Virginia pine-------	80	8	
						Yellow poplar-------	80	5	
Berks----------	4F	Slight	Slight	Moderate	Slight	Northern red oak----	70	4	Virginia pine, eastern white pine, Japanese larch, Norway spruce, red pine.
						Black oak----------	70	4	
						Virginia pine-------	70	8	
24D**, 24E**:									
Gainesboro-----	4R	Slight	Moderate	Moderate	Slight	Northern red oak----	70	4	Eastern white pine, loblolly pine, Virginia pine.
						Virginia pine-------	80	8	
						Yellow poplar-------	80	5	
Berks----------	4F	Slight	Moderate	Moderate	Slight	Northern red oak----	70	4	Virginia pine, eastern white pine, Japanese larch, Norway spruce, red pine.
						Black oak----------	70	4	
						Virginia pine-------	70	8	
25B, 25C-------- Gilpin	4A	Slight	Slight	Slight	Slight	Northern red oak----	80	4	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow poplar.
						Yellow poplar-------	95	7	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Common trees	Site index	Productivity class*	Trees to plant
25D---------- Gilpin	4R	Moderate	Moderate	Slight	Slight	Northern red oak---- Yellow poplar--------	80 95	4 7	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow poplar.
26C---------- Gilpin	4A	Slight	Slight	Slight	Slight	Northern red oak---- Yellow poplar--------	80 95	4 7	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow poplar.
26D---------- Gilpin	4R	Moderate	Moderate	Slight	Slight	Northern red oak---- Yellow poplar--------	80 95	4 7	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow poplar.
27C---------- Gilpin	4A	Slight	Slight	Slight	Slight	Northern red oak---- Yellow poplar--------	80 95	4 7	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow poplar.
27D, 27E-------- Gilpin	4R	Moderate	Moderate	Slight	Slight	Northern red oak---- Yellow poplar--------	80 95	4 7	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow poplar.
28C---------- Gilpin	4A	Slight	Slight	Slight	Slight	Northern red oak---- Yellow poplar--------	80 95	4 7	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow poplar.
28D---------- Gilpin	4R	Moderate	Moderate	Slight	Slight	Northern red oak---- Yellow poplar--------	80 95	4 7	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow poplar.
28E---------- Gilpin	4R	Severe	Severe	Slight	Slight	Northern red oak---- Yellow poplar--------	80 95	4 7	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow poplar.
29A---------- Gladehill	4A	Slight	Slight	Slight	Slight	Northern red oak---- Yellow poplar-------- Virginia pine--------	80 95 70	4 7 8	Yellow poplar, eastern white pine, black walnut.

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Common trees	Site index	Productivity class*	Trees to plant
30A---------- Guyan	6W	Slight	Moderate	Moderate	Severe	Yellow poplar-------	90	6	Yellow poplar, eastern white pine, Norway spruce.
31B, 31C, 32C--- Jefferson	7A	Slight	Slight	Slight	Slight	Shortleaf pine------ Yellow poplar------- Pitch pine---------- Virginia pine------- White oak----------	65 98 --- 70 ---	7 7 --- 8 ---	Eastern white pine, yellow poplar, white oak, shortleaf pine, black walnut.
32D---------- Jefferson	4R	Moderate	Moderate	Slight	Slight	Northern red oak---- Yellow poplar------- Shortleaf pine------ White oak----------	85 108 --- ---	4 8 --- ---	Yellow poplar, eastern white pine, shortleaf pine, eastern white pine.
33C---------- Jefferson	7A	Slight	Slight	Slight	Slight	Shortleaf pine------ Yellow poplar------- Pitch pine---------- Virginia pine------- White oak----------	65 98 --- 70 65	7 7 --- 8 3	Eastern white pine, yellow poplar, white oak, shortleaf pine, black walnut.
33D---------- Jefferson	4R	Moderate	Moderate	Slight	Slight	Northern red oak---- Yellow poplar------- Shortleaf pine------ White oak---------- Cucumbertree--------	85 108 --- --- ---	4 8 --- --- ---	Yellow poplar, eastern white pine, shortleaf pine, white oak, eastern white pine.
33E---------- Jefferson	4R	Severe	Severe	Slight	Slight	Northern red oak---- Yellow poplar------- Shortleaf pine------ White oak---------- Cucumbertree--------	85 108 --- --- ---	4 8 --- --- ---	Yellow poplar, eastern white pine, shortleaf pine, white oak, eastern white pine.
34B, 34C, 35C--- Laidig	4A	Slight	Slight	Slight	Slight	Northern red oak---- Yellow poplar------- Eastern white pine-- Virginia pine-------	71 89 80 70	4 6 10 8	Eastern white pine, yellow poplar, black walnut.
35D---------- Laidig	4R	Severe	Severe	Slight	Slight	Northern red oak---- Yellow poplar------- Eastern white pine-- White ash----------	80 90 90 80	4 6 12 4	Eastern white pine, yellow poplar, black walnut.
36B, 36C-------- Laidig	4A	Slight	Slight	Slight	Slight	Northern red oak---- Yellow poplar------- Eastern white pine-- Virginia pine-------	71 89 80 70	4 6 10 8	Eastern white pine, yellow poplar, black walnut.

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Common trees	Site index	Productivity class*	Trees to plant
37C---------- Laidig	4A	Slight	Slight	Slight	Slight	Northern red oak----	80	4	Eastern white pine, yellow poplar, black walnut, Norway spruce, black locust, Japanese larch, black cherry.
						White oak----------	80	4	
						Yellow poplar-------	90	6	
						White ash----------	80	4	
						Sugar maple---------	80	4	
						Black cherry--------	80	4	
						Eastern white pine--	90	12	
						Black locust--------	80	---	
37D---------- Laidig	4R	Slight	Moderate	Slight	Slight	Northern red oak----	80	4	Eastern white pine, yellow poplar, black walnut, Norway spruce, black locust, Japanese larch, black cherry.
						White oak----------	80	4	
						Yellow poplar-------	90	6	
						White ash----------	80	4	
						Sugar maple---------	80	4	
						Black cherry--------	80	4	
						Eastern white pine--	90	12	
						Black locust--------	80	---	
37E---------- Laidig	4R	Moderate	Severe	Slight	Slight	Northern red oak----	80	4	Eastern white pine, yellow poplar, black walnut, Norway spruce, black locust, Japanese larch, black cherry.
						White oak----------	80	4	
						Yellow poplar-------	90	6	
						White ash----------	80	4	
						Sugar maple---------	80	4	
						Black cherry--------	80	4	
						Eastern white pine--	90	12	
						Black locust--------	80	---	
38B**, 38C**:									
Lehew----------	3A	Slight	Slight	Slight	Slight	Northern red oak----	62	3	Eastern white pine, Virginia pine, Japanese larch.
						Virginia pine-------	57	6	
						Eastern white pine--	---	---	
Gainesboro-----	4A	Slight	Slight	Slight	Slight	Northern red oak----	70	4	Eastern white pine, loblolly pine, Virginia pine.
						Virginia pine-------	80	8	
						Yellow poplar-------	80	5	
38D**, 38E**:									
Lehew----------	3R	Slight	Moderate	Slight	Slight	Northern red oak----	67	3	Eastern white pine, Virginia pine, Japanese larch.
						Virginia pine-------	70	8	
						Eastern white pine--	---	---	
Gainesboro-----	4R	Slight	Moderate	Moderate	Slight	Northern red oak----	70	4	Eastern white pine, loblolly pine, Virginia pine.
						Virginia pine-------	80	8	
						Yellow poplar-------	80	5	
39A---------- Massanetta	5W	Slight	Moderate	Slight	Slight	Northern red oak----	85	5	Black walnut, eastern white pine, yellow poplar.
						Virginia pine-------	85	9	
						Sweetgum----------	95	8	
40D---------- Massanutten	3R	Moderate	Moderate	Slight	Moderate	Northern red oak----	65	3	Eastern white pine, Virginia pine.
						Chestnut oak--------	65	3	
						Virginia pine-------	70	8	
						Shortleaf pine------	65	7	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Common trees	Site index	Productivity class*	Trees to plant
40E---------- Massanutten	3R	Severe	Severe	Slight	Moderate	Northern red oak----	65	3	Eastern white pine, Virginia pine.
						Chestnut oak--------	65	3	
						Virginia pine-------	70	8	
						Shortleaf pine------	65	7	
41D---------- Massanutten	3R	Moderate	Moderate	Slight	Moderate	Northern red oak----	65	3	Eastern white pine, Virginia pine.
						Chestnut oak--------	65	3	
						Virginia pine-------	70	8	
						Shortleaf pine------	65	7	
41E---------- Massanutten	3R	Severe	Severe	Slight	Moderate	Northern red oak----	65	3	Eastern white pine, Virginia pine.
						Chestnut oak--------	65	3	
						Virginia pine-------	70	8	
						Shortleaf pine------	65	7	
42A---------- Maurertown	6W	Slight	Severe	Severe	Severe	Yellow poplar-------	90	6	Yellow poplar, eastern white pine.
						Sweetgum----------	95	8	
						Water oak----------	---	---	
						Red maple----------	---	---	
						Willow----------	---	---	
43B, 43C, 44B, 44C---------- Moomaw	4A	Slight	Slight	Slight	Slight	Northern red oak----	68	4	Eastern white pine, shortleaf pine, yellow poplar.
						Yellow poplar-------	90	6	
						Virginia pine-------	60	6	
45A---------- Newmarc	5W	Slight	Moderate	Slight	Moderate	Pin oak----------	96	5	Eastern cottonwood, sweetgum, American sycamore.
						Eastern cottonwood--	89	7	
						Sweetgum----------	85	6	
						Green ash----------	---	---	
						Red maple----------	---	---	
46A---------- Nomberville	4A	Slight	Slight	Slight	Slight	Northern red oak----	80	4	Yellow poplar, eastern white pine, shortleaf pine.
47C---------- Opequon	3C	Moderate	Moderate	Severe	Severe	Northern red oak----	60	3	Virginia pine, eastern white pine.
						White oak----------	60	3	
						Sugar maple---------	---	---	
48C---------- Opequon	3X	Moderate	Severe	Severe	Severe	Northern red oak----	60	3	Virginia pine, eastern white pine.
						White oak----------	60	3	
						Sugar maple---------	---	---	
48D---------- Opequon	3R	Severe	Severe	Severe	Severe	Northern red oak----	60	3	Virginia pine, eastern white pine.
						White oak----------	60	3	
						Sugar maple---------	---	---	
50A---------- Purdy	4W	Slight	Severe	Severe	Severe	Pin oak----------	85	4	Virginia pine, eastern white pine, loblolly pine.
						Shortleaf pine------	75	8	
						Virginia pine-------	75	8	
						Yellow poplar-------	90	6	
						Sweetgum----------	85	6	
51D**: Rock outcrop.									

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Common trees	Site index	Productivity class*	Trees to plant
51D**:									
Carbo	6C	Slight	Moderate	Slight	Moderate	Virginia pine	55	6	Virginia pine, yellow poplar, black walnut.
						Yellow poplar	80	5	
						Eastern white pine	80	10	
52F**:									
Rock outcrop.									
Drall	4R	Severe	Severe	Moderate	Slight	Northern red oak	75	4	Virginia pine, pitch pine.
						Virginia pine	70	8	
						Eastern white pine	85	11	
Wallen	3R	Moderate	Severe	Moderate	Moderate	Northern red oak	60	3	Loblolly pine, shortleaf pine, Virginia pine.
						Shortleaf pine	60	6	
						Virginia pine	65	7	
53C Sequoia	4A	Slight	Slight	Slight	Slight	Northern red oak	70	4	Loblolly pine, shortleaf pine, Virginia pine.
						Loblolly pine	83	8	
						Shortleaf pine	63	7	
						Virginia pine	71	8	
53D Sequoia	4R	Moderate	Moderate	Slight	Slight	Northern red oak	70	4	Loblolly pine, shortleaf pine, Virginia pine.
						Loblolly pine	83	8	
						Shortleaf pine	63	7	
						Virginia pine	71	8	
53E Sequoia	4R	Severe	Severe	Slight	Slight	Northern red oak	70	4	Loblolly pine, shortleaf pine, Virginia pine.
						Loblolly pine	83	8	
						Shortleaf pine	63	7	
						Virginia pine	71	8	
54B Timberville	4A	Slight	Slight	Slight	Slight	Northern red oak	80	4	Yellow poplar, black walnut, eastern white pine.
						Yellow poplar	90	6	
						Shortleaf pine	80	9	
						Virginia pine	70	8	
55A Toms	7W	Slight	Moderate	Moderate	Moderate	Yellow poplar	95	7	Yellow poplar, eastern white pine.
						Sweetgum	95	8	
						Northern red oak	80	4	
						Red maple	---	---	
56B, 56C Trappist	7C	Slight	Moderate	Slight	Slight	Virginia pine	62	7	Virginia pine, white oak, northern red oak.
						White oak	62	3	
						Hickory	---	---	
						Black oak	68	4	
						Red maple	---	---	
						Eastern redcedar	---	---	
						Chestnut oak	58	3	
						Scarlet oak	---	---	
						American beech	---	---	
						Northern red oak	72	4	
59B, 59C Unison	4A	Slight	Slight	Slight	Slight	Northern red oak	85	4	Yellow poplar, black walnut, eastern white pine.
						Yellow poplar	95	7	
						Virginia pine	80	8	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Common trees	Site index	Productivity class*	Trees to plant
60B, 60C, 61B, 61C---------- Unison	4A	Slight	Slight	Slight	Slight	Northern red oak---- Yellow poplar------- Virginia pine-------	86 96 86	4 7 8	Yellow poplar, black walnut, eastern white pine.
62C---------- Wallen	3F	Slight	Slight	Moderate	Moderate	Northern red oak---- Shortleaf pine------ Virginia pine-------	60 60 65	3 6 7	Loblolly pine, shortleaf pine, Virginia pine.
62D---------- Wallen	3R	Slight	Moderate	Moderate	Moderate	Northern red oak---- Shortleaf pine------ Virginia pine-------	60 60 65	3 6 7	Loblolly pine, shortleaf pine, Virginia pine.
63C---------- Wallen	3F	Slight	Slight	Moderate	Moderate	Northern red oak---- Shortleaf pine------ Virginia pine-------	60 60 65	3 6 7	Loblolly pine, shortleaf pine, Virginia pine.
63D---------- Wallen	3R	Slight	Moderate	Moderate	Moderate	Northern red oak---- Shortleaf pine------ Virginia pine-------	60 60 65	3 6 7	Loblolly pine, shortleaf pine, Virginia pine.
63E---------- Wallen	3R	Moderate	Severe	Moderate	Moderate	Northern red oak---- Shortleaf pine------ Virginia pine-------	60 60 65	3 6 7	Loblolly pine, shortleaf pine, Virginia pine.
64D---------- Wallen	3R	Slight	Moderate	Moderate	Moderate	Northern red oak---- Shortleaf pine------ Virginia pine-------	60 60 65	3 6 7	Loblolly pine, shortleaf pine, Virginia pine.
64E, 64F-------- Wallen	3R	Moderate	Severe	Moderate	Moderate	Northern red oak---- Shortleaf pine------ Virginia pine-------	60 60 65	3 6 7	Loblolly pine, shortleaf pine, Virginia pine.
65C**:									
Wallen---------	3F	Slight	Slight	Moderate	Moderate	Northern red oak---- Shortleaf pine------ Virginia pine-------	60 60 65	3 6 7	Loblolly pine, shortleaf pine, Virginia pine.
Lehew----------	3A	Slight	Slight	Slight	Slight	Northern red oak---- Virginia pine------- Eastern white pine--	62 57 ---	3 6 ---	Eastern white pine, Virginia pine, Japanese larch.
65D**:									
Wallen---------	3R	Slight	Moderate	Moderate	Moderate	Northern red oak---- Shortleaf pine------ Virginia pine-------	60 60 65	3 6 7	Loblolly pine, shortleaf pine, Virginia pine.

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Common trees	Site index	Productivity class*	Trees to plant
65D**:									
Lehew	3R	Slight	Moderate	Slight	Slight	Northern red oak	67	3	Eastern white pine, Virginia pine, Japanese larch.
						Virginia pine	60	6	
						Eastern white pine	---	---	
65E**:									
Wallen	3R	Moderate	Severe	Moderate	Moderate	Northern red oak	60	3	Loblolly pine, shortleaf pine, Virginia pine.
						Shortleaf pine	60	6	
						Virginia pine	65	7	
Lehew	3R	Moderate	Severe	Slight	Slight	Northern red oak	67	3	Eastern white pine, Virginia pine, Japanese larch.
						Virginia pine	60	6	
						Eastern white pine	---	---	
66E**, 66F**:									
Wallen	3R	Moderate	Severe	Moderate	Moderate	Northern red oak	60	3	Loblolly pine, shortleaf pine, Virginia pine.
						Shortleaf pine	60	6	
						Virginia pine	65	7	
Lehew	3R	Moderate	Severe	Slight	Slight	Northern red oak	67	3	Eastern white pine, Virginia pine, Japanese larch.
						Virginia pine	60	6	
						Eastern white pine	---	---	
67F Weikert	3R	Moderate	Severe	Severe	Moderate	Northern red oak	64	3	Eastern white pine, shortleaf pine, Virginia pine.
						Virginia pine	60	6	
68D**:									
Weikert	3D	Slight	Moderate	Severe	Moderate	Northern red oak	64	3	Eastern white pine, shortleaf pine, Virginia pine.
						Virginia pine	60	6	
Berks	4F	Slight	Moderate	Moderate	Slight	Northern red oak	70	4	Virginia pine, eastern white pine, Japanese larch, Norway spruce, red pine.
						Black oak	70	4	
						Virginia pine	70	8	
68E**:									
Weikert	3R	Moderate	Severe	Severe	Moderate	Northern red oak	64	3	Eastern white pine, shortleaf pine, Virginia pine.
						Virginia pine	60	6	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Common trees	Site index	Productivity class*	Trees to plant
68E**:									
Berks----------	4R	Moderate	Severe	Moderate	Slight	Northern red oak---- Black oak---------- Virginia pine-------	70 70 70	4 4 8	Virginia pine, eastern white pine, Japanese larch, Norway spruce, red pine.
69D**:									
Weikert--------	3D	Slight	Moderate	Severe	Moderate	Northern red oak---- Virginia pine-------	64 60	3 6	Eastern white pine, shortleaf pine, Virginia pine.
Berks----------	4F	Slight	Moderate	Moderate	Slight	Northern red oak---- Black oak---------- Virginia pine-------	70 70 70	4 4 8	Virginia pine, eastern white pine, Japanese larch, Norway spruce, red pine.
69F**:									
Weikert--------	3R	Moderate	Severe	Severe	Moderate	Northern red oak---- Virginia pine-------	64 60	3 6	Eastern white pine, shortleaf pine, Virginia pine.
Berks----------	4R	Moderate	Severe	Moderate	Slight	Northern red oak---- Black oak---------- Virginia pine-------	70 70 70	4 4 8	Virginia pine, eastern white pine, Japanese larch, Norway spruce, red pine.
70B---------- Wolfgap	4A	Slight	Slight	Slight	Slight	Northern red oak---- Yellow poplar------- Virginia pine-------	80 95 70	4 7 8	Eastern white pine, yellow poplar, shortleaf pine.
71D---------- Zepp	4R	Moderate	Moderate	Slight	Slight	Northern red oak---- Virginia pine------- Yellow poplar------- Shortleaf pine------	68 72 75 65	4 8 4 7	Eastern white pine, yellow poplar, shortleaf pine.
71E, 72E-------- Zepp	4R	Severe	Severe	Slight	Slight	Northern red oak---- Virginia pine------- Yellow poplar------- Shortleaf pine------	68 72 75 65	4 8 4 7	Eastern white pine, yellow poplar, shortleaf pine.

* Productivity class is the yield in cubic meters per hectare per year calculated at the age of culmination of mean annual increment for fully stocked natural stands.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--RECREATIONAL DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
1B Alonzville	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.
1C Alonzville	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
2B Berks	Severe: small stones.	Severe: small stones.	Severe: small stones.	Slight	Severe: small stones.
3C*:					
Berks	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Slight	Severe: small stones.
Weikert	Severe: small stones, depth to rock.	Severe: small stones, depth to rock.	Severe: slope, small stones.	Slight	Severe: droughty, depth to rock.
4B Blairton	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
4C Blairton	Severe: wetness.	Severe: wetness.	Severe: slope, wetness.	Severe: wetness.	Severe: wetness.
5B Braddock	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.
5C Braddock	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
6B Braddock	Moderate: large stones, small stones.	Moderate: large stones, small stones.	Severe: large stones, small stones.	Moderate: large stones.	Severe: large stones.
6C Braddock	Moderate: slope, large stones, small stones.	Moderate: slope, large stones, small stones.	Severe: large stones, slope, small stones.	Moderate: large stones.	Severe: large stones.
6D Braddock	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Moderate: large stones, slope.	Severe: large stones, slope.
7A Broadway	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: flooding.
8B Carbo	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, depth to rock.	Severe: erodes easily.	Moderate: depth to rock.
8C Carbo	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope, depth to rock.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
9C*:					
Carbo	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope, depth to rock.
Endcav	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
9D*:					
Carbo	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
Endcav	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
10A Caverns	Severe: flooding.	Slight	Moderate: small stones.	Slight	Slight.
11B Chilhowie	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, small stones.	Slight	Moderate: large stones.
11C Chilhowie	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight	Moderate: large stones, slope.
11D Chilhowie	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
11E Chilhowie	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
12C Chilhowie	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight	Moderate: large stones, slope.
12D Chilhowie	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
13C Chilhowie	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight	Moderate: large stones, slope.
13D, 13E Chilhowie	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
14B Coursey	Moderate: wetness.	Moderate: wetness.	Moderate: slope, small stones.	Slight	Slight.
14C Coursey	Moderate: slope, wetness.	Moderate: slope, wetness.	Severe: slope.	Slight	Moderate: slope.
15A Derroc	Severe: flooding.	Moderate: flooding, large stones, small stones.	Severe: large stones, small stones, flooding.	Moderate: large stones, flooding.	Severe: large stones, flooding.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
16B Edom	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, small stones, percs slowly.	Slight	Slight.
16C Edom	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight	Moderate: slope.
17B Endcav	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight	Slight.
17C Endcav	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
17D Endcav	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
18B Endcav	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight	Slight.
18C Endcav	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
19D Frederick	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
20B*:					
Frederick	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.
Poplimento	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, small stones, percs slowly.	Slight	Slight.
20C*:					
Frederick	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
Poplimento	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight	Moderate: slope.
20D*:					
Frederick	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Poplimento	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
21B*:					
Frederick	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight	Moderate: small stones, large stones.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
21B*:					
Poplimento	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, small stones, percs slowly.	Slight	Slight.
21C*:					
Frederick	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight	Moderate: slope, small stones.
Poplimento	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight	Moderate: slope.
21D*:					
Frederick	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
Poplimento	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
21E*:					
Frederick	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Poplimento	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
22B*:					
Frederick	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.
Poplimento	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, small stones, percs slowly.	Slight	Slight.
22C*:					
Frederick	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
Poplimento	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight	Moderate: slope.
22D*:					
Frederick	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Poplimento	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
23C*:					
Frederick	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
23C*:					
Poplimento	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight	Moderate: slope.
23D*:					
Frederick	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Poplimento	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
24B*:					
Gainesboro	Slight	Slight	Moderate: slope, depth to rock.	Slight	Moderate: droughty.
Berks	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight	Severe: small stones.
24C*:					
Gainesboro	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: droughty, slope.
Berks	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: small stones, slope.	Slight	Severe: small stones.
24D*:					
Gainesboro	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Berks	Severe: slope.	Severe: slope.	Severe: small stones, slope.	Moderate: slope.	Severe: slope, small stones.
24E*:					
Gainesboro	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Berks	Severe: slope.	Severe: slope.	Severe: small stones, slope.	Severe: slope.	Severe: slope, small stones.
25B Gilpin	Slight	Slight	Moderate: small stones, slope.	Slight	Moderate: thin layer.
25C Gilpin	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope, thin layer.
25D Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
26C Gilpin	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: small stones, slope.	Moderate: large stones.	Moderate: slope, small stones.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
26D---------- Gilpin	Severe: slope.	Severe: slope.	Severe: small stones, slope.	Severe: slope.	Severe: slope.
27C---------- Gilpin	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Slight----------	Severe: small stones.
27D---------- Gilpin	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Moderate: slope.	Severe: small stones, slope.
27E---------- Gilpin	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope.	Severe: small stones, slope.
28C---------- Gilpin	Severe: small stones.	Severe: small stones.	Severe: large stones, slope, small stones.	Moderate: large stones.	Severe: small stones, large stones.
28D, 28E---------- Gilpin	Severe: slope, small stones.	Severe: slope, small stones.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: small stones, large stones, slope.
29A---------- Gladehill	Severe: flooding.	Slight----------	Moderate: small stones, flooding.	Slight----------	Moderate: droughty, flooding.
30A---------- Guyan	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
31B---------- Jefferson	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight----------	Moderate: small stones.
31C, 32C---------- Jefferson	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight----------	Moderate: small stones, slope.
32D---------- Jefferson	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
33C---------- Jefferson	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: large stones, small stones, slope.	Slight----------	Moderate: small stones, large stones, slope.
33D, 33E---------- Jefferson	Severe: slope.	Severe: slope.	Severe: large stones, small stones, slope.	Severe: slope.	Severe: slope.
34B---------- Laidig	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, small stones, percs slowly.	Slight----------	Moderate: droughty.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
34C, 35C Laidig	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight	Moderate: droughty, slope.
35D Laidig	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
36B Laidig	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, small stones, percs slowly.	Slight	Moderate: droughty.
36C Laidig	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight	Moderate: droughty, slope.
37C Laidig	Moderate: slope, large stones, small stones.	Moderate: slope, small stones, large stones.	Severe: slope, large stones, small stones.	Slight	Moderate: slope, large stones, small stones.
37D, 37E Laidig	Severe: slope.	Severe: slope.	Severe: slope, large stones, small stones.	Severe: slope.	Severe: slope.
38B*:					
Lehew	Slight	Slight	Severe: small stones.	Moderate: large stones.	Severe: small stones.
Gainesboro	Slight	Slight	Moderate: slope, depth to rock.	Slight	Moderate: droughty.
38C*:					
Lehew	Moderate: slope.	Moderate: slope.	Severe: slope, small stones.	Moderate: large stones.	Severe: small stones.
Gainesboro	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: droughty, slope.
38D*:					
Lehew	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: large stones.	Severe: small stones, slope.
Gainesboro	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
38E*:					
Lehew	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: small stones, slope.
Gainesboro	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
39A Massanetta	Severe: flooding.	Moderate: wetness.	Moderate: small stones, wetness.	Slight	Moderate: flooding.
40D, 40E Massanutten	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
41D, 41E Massanutten	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: slope.
42A Maurertown	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.
43B Moomaw	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, small stones, wetness.	Moderate: wetness.	Moderate: wetness.
43C Moomaw	Moderate: slope, wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Moderate: wetness.	Moderate: wetness, slope.
44B Moomaw	Moderate: large stones, wetness.	Moderate: wetness, large stones.	Severe: large stones.	Moderate: wetness.	Moderate: large stones, wetness.
44C Moomaw	Moderate: slope, large stones, wetness.	Moderate: slope, wetness, large stones.	Severe: large stones, slope.	Moderate: wetness.	Moderate: large stones, wetness, slope.
45A Newmarc	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
46A Nomberville	Severe: flooding.	Slight	Slight	Slight	Slight.
47C, 48C Opequon	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: erodes easily.	Severe: depth to rock.
48D Opequon	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: erodes easily.	Severe: slope, depth to rock.
49*. Pits					
50A Purdy	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, erodes easily.	Severe: wetness.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
51D*:					
Rock outcrop	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Slight	Severe: depth to rock.
Carbo	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope, depth to rock.
52F*:					
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: depth to rock.
Drall	Severe: slope, small stones.	Severe: slope, small stones.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: small stones, droughty.
Wallen	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: slope.
53C Sequoia	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: droughty, slope.
53D, 53E Sequoia	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
54B Timberville	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.	Severe: flooding.
55A Toms	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
56B Trappist	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, depth to rock, percs slowly.	Slight	Moderate: thin layer.
56C Trappist	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope, thin layer.
57*. Udorthents					
58*: Udorthents.					
Urban land.					
59B Unison	Slight	Slight	Moderate: slope, small stones.	Slight	Moderate: large stones.
59C Unison	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: large stones, slope.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
60B Unison	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight	Moderate: small stones.
60C Unison	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight	Moderate: small stones, slope.
61B Unison	Moderate: large stones.	Moderate: large stones.	Severe: large stones.	Moderate: large stones.	Moderate: large stones.
61C Unison	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: large stones, slope.	Moderate: large stones.	Moderate: large stones, slope.
62C Wallen	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight	Moderate: small stones, large stones, droughty.
62D Wallen	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
63C Wallen	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: large stones, slope, small stones.	Slight	Moderate: small stones, large stones, slope.
63D, 63E Wallen	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: slope.
64D, 64E, 64F Wallen	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: slope.
65C*:					
Wallen	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: large stones, slope, small stones.	Slight	Moderate: small stones, large stones, slope.
Lehew	Severe: small stones.	Severe: small stones.	Severe: slope, small stones, large stones.	Slight	Severe: small stones.
65D*, 65E*:					
Wallen	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: slope.
Lehew	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones, large stones.	Severe: slope.	Severe: small stones, slope.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
66E*, 66F*:					
Wallen	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: slope.
Lehew	Severe: slope, large stones, small stones.	Severe: slope, large stones, small stones.	Severe: slope, small stones, large stones.	Severe: slope.	Severe: small stones, large stones, slope.
67F Weikert	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe	Severe: droughty, depth to rock.
68D*, 68E*:					
Weikert	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe	Severe: droughty, depth to rock.
Berks	Severe: slope.	Severe: slope.	Severe: small stones, slope.	Severe: slope.	Severe: slope, small stones.
69D*, 69F*:					
Weikert	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope, depth to rock, small stones.	Severe: slope.	Severe: slope, small stones, thin layer.
Berks	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones, slope.	Severe: slope.	Severe: slope, small stones.
70B Wolfgap	Severe: flooding.	Slight	Slight	Slight	Moderate: droughty.
71D, 71E Zepp	Severe: slope.	Severe: slope.	Severe: large stones, small stones, slope.	Severe: slope.	Severe: slope.
72E Zepp	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, small stones, slope.	Severe: slope.	Severe: large stones, slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--WILDLIFE HABITAT

(See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
1B---------- Alonzville	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
1C---------- Alonzville	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
2B---------- Berks	Poor	Fair	Fair	Poor	Poor	Poor	Very poor.	Fair	Poor	Very poor.
3C*:										
Berks----------	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
Weikert----------	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
4B---------- Blairton	Fair	Fair	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
4C---------- Blairton	Fair	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
5B---------- Braddock	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
5C---------- Braddock	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
6B---------- Braddock	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
6C---------- Braddock	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
6D---------- Braddock	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
7A---------- Broadway	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
8B---------- Carbo	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
8C---------- Carbo	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
9C*:										
Carbo----------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Endcav----------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
9D*:										
Carbo----------	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
9D*:										
Endcav	Poor	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
10A Caverns	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
11B Chilhowie	Poor	Fair	Fair	Fair	Fair	Poor	Very poor.	Fair	Poor	Very poor.
11C, 11D Chilhowie	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Poor	Very poor.
11E Chilhowie	Very poor.	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Poor	Very poor.
12C, 12D, 13C Chilhowie	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Poor	Very poor.
13D Chilhowie	Very poor.	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Poor	Very poor.
13E Chilhowie	Very poor.	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Poor	Very poor.
14B Coursey	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
14C Coursey	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
15A Derroc	Poor	Fair	Fair	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.
16B Edom	Fair	Good	Fair	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
16C Edom	Fair	Good	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
17B Endcav	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
17C Endcav	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
17D Endcav	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
18B Endcav	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
18C Endcav	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
19D Frederick	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
20B*:										
Frederick	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Poplimento	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
20C*:										
Frederick	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Poplimento	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
20D*:										
Frederick	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Poplimento	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
21B*:										
Frederick	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Poplimento	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
21C*:										
Frederick	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Poplimento	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
21D*:										
Frederick	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Poplimento	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
21E*:										
Frederick	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Poplimento	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
22B*:										
Frederick	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Poplimento	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
22C*:										
Frederick	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
22C*:										
Poplimento	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
22D*:										
Frederick	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Poplimento	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
23C*:										
Frederick	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Poplimento	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
23D*:										
Frederick	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Poplimento	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
24B*:										
Gainesboro	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
Berks	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
24C*:										
Gainesboro	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
Berks	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
24D*:										
Gainesboro	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Berks	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
24E*:										
Gainesboro	Very poor.	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Berks	Very poor.	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
25B Gilpin	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
25C Gilpin	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
25D---------- Gilpin	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
26C---------- Gilpin	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
26D---------- Gilpin	Very poor.	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
27C, 27D---------- Gilpin	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
27E---------- Gilpin	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
28C---------- Gilpin	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
28D, 28E---------- Gilpin	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
29A---------- Gladehill	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
30A---------- Guyan	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
31B---------- Jefferson	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
31C, 32C---------- Jefferson	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
32D---------- Jefferson	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
33C, 33D, 33E------ Jefferson	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
34B---------- Laidig	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
34C, 35C. Laidig										
35D---------- Laidig	Very poor.	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
36B---------- Laidig	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
36C. Laidig										
37C---------- Laidig	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
37D, 37E---------- Laidig	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
38B*:										
Lehew	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
Gainesboro	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
38C*:										
Lehew	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
Gainesboro	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
38D*:										
Lehew	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Gainesboro	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
38E*:										
Lehew	Very poor.	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Gainesboro	Very poor.	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
39A Massanetta	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
40D Massanutten	Very poor.	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
40E Massanutten	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
41D Massanutten	Very poor.	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
41E Massanutten	Very poor.	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
42A Maurertown	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
43B Moomaw	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
43C Moomaw	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
44B Moomaw	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
44C Moomaw	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
45A Newmarc	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
46A---------- Nomberville	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
47C, 48C, 48D------ Opequon	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
49*. Pits										
50A---------- Purdy	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
51D*:										
Rock outcrop------	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
Carbo----------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
52F*:										
Rock outcrop------	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
Drall----------	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
Wallen----------	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
53C---------- Sequoia	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
53D---------- Sequoia	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
53E---------- Sequoia	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
54B---------- Timberville	Poor	Fair	Fair	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
55A---------- Toms	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
56B---------- Trappist	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
56C---------- Trappist	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
57*. Udorthents										
58*: Udorthents.										
Urban land.										
59B---------- Unison	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
59C---------- Unison	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
60B---------- Unison	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
60C---------- Unison	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
61B---------- Unison	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
61C---------- Unison	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
62C---------- Wallen	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
62D, 63C, 63D, 63E, 64D, 64E, 64F----- Wallen	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
65C*:										
Wallen----------	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Lehew----------	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
65D*, 65E*:										
Wallen----------	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Lehew----------	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
66E*, 66F*:										
Wallen----------	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Lehew----------	Very poor.	Very poor.	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
67F---------- Weikert	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
68D*:										
Weikert----------	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
Berks----------	Very poor.	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
68E*, 69D*, 69F*:										
Weikert----------	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
Berks----------	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
70B---------- Wolfgap	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
71D---------- Zepp	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
71E---------- Zepp	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
72E---------- Zepp	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--BUILDING SITE DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
1B---------- Alonzville	Slight---------	Slight---------	Slight---------	Moderate: slope.	Moderate: frost action.	Slight.
1C---------- Alonzville	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
2B---------- Berks	Moderate: depth to rock.	Slight---------	Moderate: depth to rock.	Moderate: slope.	Slight---------	Severe: small stones.
3C*:						
Berks----------	Moderate: slope, depth to rock.	Moderate: slope.	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope.	Severe: small stones.
Weikert----------	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope, frost action.	Severe: droughty, depth to rock.
4B---------- Blairton	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.
4C---------- Blairton	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, slope.	Severe: wetness, frost action.	Severe: wetness.
5B---------- Braddock	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
5C---------- Braddock	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, slope.	Severe: slope.	Severe: low strength.	Moderate: slope.
6B---------- Braddock	Moderate: too clayey, large stones.	Moderate: shrink-swell, large stones.	Moderate: shrink-swell, large stones.	Moderate: shrink-swell, slope, large stones.	Severe: low strength.	Severe: large stones.
6C---------- Braddock	Moderate: too clayey, large stones, slope.	Moderate: shrink-swell, slope, large stones.	Moderate: shrink-swell, slope, large stones.	Severe: slope.	Severe: low strength.	Severe: large stones.
6D---------- Braddock	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, low strength.	Severe: large stones, slope.
7A---------- Broadway	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding.	Moderate: flooding.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
8B---------- Carbo	Severe: depth to rock.	Severe: shrink-swell.	Severe: depth to rock, shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Moderate: depth to rock.
8C---------- Carbo	Severe: depth to rock.	Severe: shrink-swell.	Severe: depth to rock, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Moderate: slope, depth to rock.
9C*:						
Carbo----------	Severe: depth to rock.	Severe: shrink-swell.	Severe: depth to rock, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Moderate: slope, depth to rock.
Endcav----------	Moderate: depth to rock, too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Moderate: slope.
9D*:						
Carbo----------	Severe: slope, depth to rock.	Severe: shrink-swell, slope.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
Endcav----------	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
10A---------- Caverns	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding, frost action.	Slight.
11B---------- Chilhowie	Severe: depth to rock.	Severe: shrink-swell.	Severe: depth to rock, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Moderate: large stones.
11C---------- Chilhowie	Severe: depth to rock.	Severe: shrink-swell.	Severe: depth to rock, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell.	Moderate: large stones, slope.
11D, 11E---------- Chilhowie	Severe: depth to rock, slope.	Severe: shrink-swell, slope.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: slope.
12C---------- Chilhowie	Severe: depth to rock.	Severe: shrink-swell.	Severe: depth to rock, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell.	Moderate: large stones, slope.
12D---------- Chilhowie	Severe: depth to rock, slope.	Severe: shrink-swell, slope.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: slope.
13C---------- Chilhowie	Severe: depth to rock.	Severe: shrink-swell.	Severe: depth to rock, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell.	Moderate: large stones, slope.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
13D, 13E---------- Chilhowie	Severe: depth to rock, slope.	Severe: shrink-swell, slope.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: slope.
14B---------- Coursey	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Severe: frost action.	Slight.
14C---------- Coursey	Severe: wetness.	Moderate: wetness, slope.	Severe: wetness.	Severe: slope.	Severe: frost action.	Moderate: slope.
15A---------- Derroc	Severe: cutbanks cave, large stones.	Severe: flooding, large stones.	Severe: flooding, large stones.	Severe: flooding, large stones.	Severe: flooding, large stones.	Severe: large stones, flooding.
16B---------- Edom	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
16C---------- Edom	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
17B---------- Endcav	Moderate: depth to rock, too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight.
17C---------- Endcav	Moderate: depth to rock, too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Moderate: slope.
17D---------- Endcav	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
18B---------- Endcav	Moderate: depth to rock, too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight.
18C---------- Endcav	Moderate: depth to rock, too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Moderate: slope.
19D---------- Frederick	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: slope, shrink-swell.	Severe: shrink-swell, low strength, slope.	Severe: slope.
20B*:						
Frederick--------	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Severe: low strength.	Slight.
Poplimento-------	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Slight.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
20C*:						
Frederick	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
Poplimento	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength.	Moderate: slope.
20D*:						
Frederick	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Poplimento	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength, slope.	Severe: slope.
21B*:						
Frederick	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Moderate: small stones, large stones.
Poplimento	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Slight.
21C*:						
Frederick	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: slope, shrink-swell.	Severe: shrink-swell, low strength.	Moderate: slope, small stones.
Poplimento	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength.	Moderate: slope.
21D*, 21E*:						
Frederick	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: slope, shrink-swell.	Severe: shrink-swell, low strength, slope.	Severe: slope.
Poplimento	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength, slope.	Severe: slope.
22B*:						
Frederick	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Severe: low strength.	Slight.
Poplimento	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Slight.
22C*:						
Frederick	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
22C*:						
Poplimento	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength.	Moderate: slope.
22D*:						
Frederick	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Poplimento	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength, slope.	Severe: slope.
23C*:						
Frederick	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
Poplimento	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength.	Moderate: slope.
23D*:						
Frederick	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Poplimento	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength, slope.	Severe: slope.
24B*:						
Gainesboro	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.	Moderate: depth to rock, low strength.	Moderate: droughty.
Berks	Moderate: depth to rock.	Slight	Moderate: depth to rock.	Moderate: slope.	Slight	Severe: small stones.
24C*:						
Gainesboro	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, low strength, slope.	Moderate: droughty, slope.
Berks	Moderate: slope, depth to rock.	Moderate: slope.	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope.	Severe: small stones.
24D*, 24E*:						
Gainesboro	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
Berks	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, small stones.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
25B---------- Gilpin	Moderate: depth to rock.	Slight---------	Moderate: depth to rock.	Moderate: slope.	Moderate: frost action.	Moderate: thin layer.
25C---------- Gilpin	Moderate: slope, depth to rock.	Moderate: slope.	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope, thin layer.
25D---------- Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
26C---------- Gilpin	Moderate: slope, depth to rock.	Moderate: slope.	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope, small stones.
26D---------- Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
27C---------- Gilpin	Moderate: depth to rock, large stones, slope.	Moderate: slope, large stones.	Moderate: depth to rock, slope, large stones.	Severe: slope.	Moderate: slope, frost action, large stones.	Severe: small stones.
27D, 27E---------- Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
28C---------- Gilpin	Moderate: depth to rock, large stones, slope.	Moderate: slope, large stones.	Moderate: depth to rock, slope, large stones.	Severe: slope.	Moderate: slope, frost action, large stones.	Severe: small stones, large stones.
28D, 28E---------- Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, large stones, slope.
29A---------- Gladehill	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: droughty, flooding.
30A---------- Guyan	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, low strength, frost action.	Severe: wetness.
31B---------- Jefferson	Slight---------	Slight---------	Slight---------	Moderate: slope.	Slight---------	Moderate: small stones.
31C, 32C---------- Jefferson	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: small stones, slope.
32D---------- Jefferson	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
33C---------- Jefferson	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: small stones, large stones, slope.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
33D, 33E---------- Jefferson	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
34B---------- Laidig	Moderate: wetness.	Slight---------	Moderate: wetness.	Moderate: slope.	Moderate: frost action.	Moderate: droughty.
34C, 35C---------- Laidig	Moderate: wetness, slope.	Moderate: slope.	Moderate: wetness, slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: droughty, slope.
35D---------- Laidig	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
36B---------- Laidig	Moderate: wetness.	Slight---------	Moderate: wetness.	Moderate: slope.	Moderate: frost action.	Moderate: droughty.
36C---------- Laidig	Moderate: wetness, slope.	Moderate: slope.	Moderate: wetness, slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: droughty, slope.
37C---------- Laidig	Moderate: slope, wetness.	Moderate: slope.	Moderate: slope, wetness.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope, large stones, small stones.
37D, 37E---------- Laidig	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
38B*:						
Lehew----------	Severe: depth to rock.	Moderate: depth to rock, large stones.	Severe: depth to rock.	Moderate: slope, depth to rock, large stones.	Moderate: depth to rock, large stones.	Severe: small stones.
Gainesboro-------	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.	Moderate: depth to rock, low strength.	Moderate: droughty.
38C*:						
Lehew----------	Severe: depth to rock.	Moderate: slope, depth to rock, large stones.	Severe: depth to rock.	Severe: slope.	Moderate: slope, depth to rock, large stones.	Severe: small stones.
Gainesboro-------	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, low strength, slope.	Moderate: droughty, slope.
38D*, 38E*:						
Lehew----------	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
Gainesboro-------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
39A---------- Massanetta	Severe: wetness.	Severe: flooding.	Severe: wetness, flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
40D, 40E, 41D, 41E---------- Massanutten	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
42A---------- Maurertown	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, low strength, frost action.	Severe: wetness.
43B---------- Moomaw	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Moderate: wetness, frost action.	Moderate: wetness.
43C---------- Moomaw	Severe: wetness.	Moderate: wetness, slope.	Severe: wetness.	Severe: slope.	Moderate: wetness, slope, frost action.	Moderate: wetness, slope.
44B---------- Moomaw	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Moderate: wetness, frost action.	Moderate: large stones, wetness.
44C---------- Moomaw	Severe: wetness.	Moderate: wetness, slope.	Severe: wetness.	Severe: slope.	Moderate: wetness, slope, frost action.	Moderate: large stones, wetness, slope.
45A---------- Newmarc	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness.
46A---------- Nomberville	Slight---------	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, frost action.	Slight.
47C, 48C---------- Opequon	Severe: depth to rock.	Severe: depth to rock, shrink-swell.	Severe: depth to rock, shrink-swell.	Severe: slope, depth to rock, shrink-swell.	Severe: depth to rock, low strength, shrink-swell.	Severe: depth to rock.
48D---------- Opequon	Severe: slope, depth to rock.	Severe: slope, depth to rock, shrink-swell.	Severe: slope, depth to rock, shrink-swell.	Severe: slope, depth to rock, shrink-swell.	Severe: slope, depth to rock, low strength.	Severe: slope, depth to rock.
49*. Pits						
50A---------- Purdy	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, low strength, frost action.	Severe: wetness.
51D*: Rock outcrop-----	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: depth to rock.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
51D*:						
Carbo	Severe: depth to rock.	Severe: shrink-swell.	Severe: depth to rock, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Moderate: slope, depth to rock.
52F*:						
Rock outcrop	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.
Drall	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, droughty.
Wallen	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
53C Sequoia	Moderate: depth to rock, too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: depth to rock, slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: droughty, slope.
53D, 53E Sequoia	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
54B Timberville	Moderate: too clayey, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
55A Toms	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, wetness, frost action.	Severe: wetness.
56B Trappist	Severe: depth to rock.	Moderate: shrink-swell, depth to rock.	Severe: depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Severe: low strength.	Moderate: thin layer.
56C Trappist	Severe: depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Severe: low strength.	Moderate: slope, thin layer.
57*. Udorthents						
58*: Udorthents.						
Urban land.						
59B Unison	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Severe: low strength.	Moderate: large stones.
59C Unison	Moderate: too clayey, slope.	Moderate: slope, shrink-swell.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: large stones, slope.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
60B---------- Unison	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Moderate: small stones.
60C---------- Unison	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: small stones, slope.
61B---------- Unison	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Moderate: large stones.
61C---------- Unison	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: large stones, slope.
62C---------- Wallen	Severe: depth to rock.	Moderate: slope, depth to rock, large stones.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope, large stones.	Moderate: small stones, large stones, droughty.
62D---------- Wallen	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
63C---------- Wallen	Severe: depth to rock.	Moderate: slope, depth to rock, large stones.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope, large stones.	Moderate: small stones, large stones, slope.
63D, 63E, 64D, 64E, 64F--------- Wallen	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
65C*:						
Wallen----------	Severe: depth to rock.	Moderate: slope, depth to rock, large stones.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope, large stones.	Moderate: small stones, large stones, slope.
Lehew----------	Severe: depth to rock.	Moderate: slope, depth to rock, large stones.	Severe: depth to rock, slope.	Severe: slope.	Moderate: slope, depth to rock, large stones.	Severe: small stones.
65D*, 65E*:						
Wallen----------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
Lehew----------	Severe: slope, depth to rock.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
66E*, 66F*:						
Wallen----------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
66E*, 66F*:						
Lehew	Severe: slope, depth to rock.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: small stones, large stones, slope.
67F Weikert	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: droughty, depth to rock.
68D*, 68E*:						
Weikert	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: droughty, depth to rock.
Berks	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, small stones.
69D*, 69F*:						
Weikert	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope, small stones, thin layer.
Berks	Severe: slope.	Severe: slope.	Severe	Severe: slope.	Severe: slope.	Severe: slope, small stones.
70B Wolfgap	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding, frost action.	Moderate: droughty.
71D, 71E Zepp	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
72E Zepp	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: large stones, slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--SANITARY FACILITIES

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "good," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
1B---------- Alonzville	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight----------	Fair: too clayey.
1C---------- Alonzville	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, slope.
2B---------- Berks	Severe: depth to rock.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: seepage, depth to rock.	Poor: small stones, area reclaim.
3C*:					
Berks----------	Severe: depth to rock.	Severe: slope, seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: seepage, depth to rock.	Poor: small stones, area reclaim.
Weikert----------	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock.	Poor: depth to rock, seepage, small stones.
4B---------- Blairton	Severe: depth to rock, wetness, percs slowly.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Poor: area reclaim, small stones.
4C---------- Blairton	Severe: depth to rock, wetness, percs slowly.	Severe: depth to rock, slope, wetness.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Poor: area reclaim, small stones.
5B---------- Braddock	Moderate: percs slowly.	Severe: seepage.	Severe: seepage, too clayey.	Slight----------	Poor: too clayey, hard to pack.
5C---------- Braddock	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage, too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
6B---------- Braddock	Moderate: percs slowly, large stones.	Severe: seepage, large stones.	Severe: seepage, too clayey.	Slight----------	Poor: too clayey, hard to pack, large stones.
6C---------- Braddock	Moderate: percs slowly, slope, large stones.	Severe: seepage, slope, large stones.	Severe: seepage, too clayey.	Moderate: slope.	Poor: too clayey, hard to pack, large stones.
6D---------- Braddock	Severe: slope.	Severe: seepage, slope, large stones.	Severe: seepage, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, large stones.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
7A---------- Broadway	Severe: flooding.	Severe: seepage, flooding.	Severe: flooding, seepage.	Severe: flooding.	Fair: too clayey, thin layer.
8B---------- Carbo	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
8C---------- Carbo	Severe: depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
9C*:					
Carbo----------	Severe: depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
Endcav----------	Severe: percs slowly.	Severe: slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock, slope.	Poor: too clayey, hard to pack.
9D*:					
Carbo----------	Severe: depth to rock, percs slowly, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: depth to rock, too clayey, hard to pack.
Endcav----------	Severe: percs slowly, slope.	Severe: slope.	Severe: depth to rock, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
10A---------- Caverns	Moderate: flooding.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Good.
11B---------- Chilhowie	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
11C---------- Chilhowie	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
11D, 11E---------- Chilhowie	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: depth to rock, too clayey, hard to pack.
12C---------- Chilhowie	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
12D---------- Chilhowie	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: depth to rock, too clayey, hard to pack.
13C---------- Chilhowie	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
13D, 13E---------- Chilhowie	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: depth to rock, too clayey, hard to pack.
14B---------- Coursey	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: small stones.
14C---------- Coursey	Severe: wetness.	Severe: slope, wetness.	Severe: wetness.	Severe: wetness.	Poor: small stones.
15A---------- Derroc	Severe: flooding, poor filter, large stones.	Severe: seepage, flooding, large stones.	Severe: flooding, seepage, large stones.	Severe: flooding, seepage.	Poor: small stones.
16B---------- Edom	Severe: percs slowly.	Moderate: seepage, depth to rock, slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock.	Poor: too clayey, hard to pack.
16C---------- Edom	Severe: percs slowly.	Severe: slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock, slope.	Poor: too clayey, hard to pack.
17B---------- Endcav	Severe: percs slowly.	Moderate: slope, depth to rock.	Severe: depth to rock, too clayey.	Moderate: depth to rock.	Poor: too clayey, hard to pack.
17C---------- Endcav	Severe: percs slowly.	Severe: slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock, slope.	Poor: too clayey, hard to pack.
17D---------- Endcav	Severe: percs slowly, slope.	Severe: slope.	Severe: depth to rock, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
18B---------- Endcav	Severe: percs slowly.	Moderate: slope, depth to rock.	Severe: depth to rock, too clayey.	Moderate: depth to rock.	Poor: too clayey, hard to pack.
18C---------- Endcav	Severe: percs slowly.	Severe: slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock, slope.	Poor: too clayey, hard to pack.
19D---------- Frederick	Severe: slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
20B*:					
Frederick	Moderate: percs slowly.	Moderate: seepage, slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
Poplimento	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
20C*:					
Frederick	Moderate: percs slowly, slope.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
Poplimento	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
20D*:					
Frederick	Severe: slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
Poplimento	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
21B*:					
Frederick	Moderate: percs slowly.	Moderate: seepage, slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
Poplimento	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
21C*:					
Frederick	Moderate: percs slowly, slope.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
Poplimento	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
21D*, 21E*:					
Frederick	Severe: slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
Poplimento	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
22B*:					
Frederick	Moderate: percs slowly.	Moderate: seepage, slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
Poplimento	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
22C*:					
Frederick	Moderate: percs slowly, slope.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
Poplimento	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
22D*:					
Frederick	Severe: slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
Poplimento	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
23C*:					
Frederick	Moderate: percs slowly, slope.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
Poplimento	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
23D*:					
Frederick	Severe: slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
Poplimento	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
24B*:					
Gainesboro	Severe: depth to rock.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock, small stones.
Berks	Severe: depth to rock.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: seepage, depth to rock.	Poor: small stones, area reclaim.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
24C*:					
Gainesboro	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock, small stones.
Berks	Severe: depth to rock.	Severe: slope, seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: seepage, depth to rock.	Poor: small stones, area reclaim.
24D*, 24E*:					
Gainesboro	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, small stones, slope.
Berks	Severe: depth to rock, slope.	Severe: slope, seepage, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: seepage, slope, depth to rock.	Poor: small stones, slope, area reclaim.
25B Gilpin	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, thin layer.
25C Gilpin	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, thin layer.
25D Gilpin	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Poor: slope, area reclaim, thin layer.
26C Gilpin	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, thin layer.
26D Gilpin	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Poor: slope, area reclaim, thin layer.
27C Gilpin	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, small stones.
27D, 27E Gilpin	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, small stones, slope.
28C Gilpin	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, small stones.
28D, 28E Gilpin	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, small stones, slope.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
29A---------- Gladehill	Severe: flooding.	Severe: seepage, flooding.	Severe: flooding, seepage.	Severe: flooding, seepage.	Good.
30A---------- Guyan	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
31B---------- Jefferson	Slight----------	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: too clayey, small stones.
31C, 32C---------- Jefferson	Moderate: slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: too clayey, small stones, slope.
32D---------- Jefferson	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.
33C---------- Jefferson	Moderate: slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: too clayey, small stones, slope.
33D, 33E---------- Jefferson	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.
34B---------- Laidig	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Moderate: wetness.	Severe: seepage.	Poor: small stones.
34C, 35C---------- Laidig	Severe: wetness, percs slowly.	Severe: seepage, slope, wetness.	Moderate: wetness, slope.	Severe: seepage.	Poor: small stones.
35D---------- Laidig	Severe: wetness, percs slowly, slope.	Severe: seepage, slope, wetness.	Severe: slope.	Severe: seepage, slope.	Poor: small stones, slope.
36B---------- Laidig	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Moderate: wetness.	Severe: seepage.	Poor: small stones.
36C---------- Laidig	Severe: wetness, percs slowly.	Severe: seepage, slope, wetness.	Moderate: wetness, slope.	Severe: seepage.	Poor: small stones.
37C---------- Laidig	Severe: percs slowly, wetness.	Severe: seepage, slope, wetness.	Moderate: slope, wetness.	Severe: seepage.	Fair: slope, small stones, wetness.
37D, 37E---------- Laidig	Severe: slope, percs slowly, wetness.	Severe: seepage, slope, wetness.	Severe: slope.	Severe: slope, seepage.	Poor: slope.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
38B*:					
Lehew	Severe: depth to rock, poor filter.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Severe: seepage, depth to rock.	Poor: depth to rock, small stones.
Gainesboro	Severe: depth to rock.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock, small stones.
38C*:					
Lehew	Severe: depth to rock, poor filter.	Severe: slope, depth to rock, seepage.	Severe: depth to rock, seepage.	Severe: seepage, depth to rock.	Poor: depth to rock, small stones.
Gainesboro	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock, small stones.
38D*, 38E*:					
Lehew	Severe: slope, depth to rock, poor filter.	Severe: slope, depth to rock, seepage.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage, depth to rock.	Poor: depth to rock, small stones, slope.
Gainesboro	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, small stones, slope.
39A Massanetta	Severe: wetness, flooding.	Severe: wetness, flooding.	Severe: flooding, wetness.	Severe: wetness, flooding.	Fair: too clayey, small stones, wetness.
40D, 40E Massanutten	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, slope.
41D, 41E Massanutten	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, large stones, slope.
42A Maurertown	Severe: wetness, percs slowly.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
43B Moomaw	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Moderate: wetness.	Fair: small stones, wetness.
43C Moomaw	Severe: wetness, percs slowly.	Severe: slope, wetness.	Severe: wetness.	Moderate: wetness, slope.	Fair: small stones, slope, wetness.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
44B---------- Moomaw	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Moderate: wetness.	Fair: small stones, wetness.
44C---------- Moomaw	Severe: wetness, percs slowly.	Severe: slope, wetness.	Severe: wetness.	Moderate: wetness, slope.	Fair: small stones, slope, wetness.
45A---------- Newmarc	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
46A---------- Nomberville	Moderate: flooding, percs slowly.	Severe: seepage.	Severe: seepage.	Moderate: flooding.	Good.
47C, 48C---------- Opequon	Severe: depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
48D---------- Opequon	Severe: slope, depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: slope, depth to rock, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, slope.
49*. Pits					
50A---------- Purdy	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: wetness, too clayey, hard to pack.
51D*:					
Rock outcrop-------	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock.
Carbo----------	Severe: depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
52F*:					
Rock outcrop-------	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, slope.
Drall----------	Severe: slope, poor filter.	Severe: seepage, slope.	Severe: seepage, depth to rock, slope.	Severe: slope, seepage.	Poor: seepage, too sandy, small stones.
Wallen----------	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, small stones, slope.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
53C---------- Sequoia	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
53D, 53E---------- Sequoia	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: depth to rock, too clayey, hard to pack.
54B---------- Timberville	Severe: flooding.	Severe: flooding.	Severe: flooding, too clayey.	Severe: flooding.	Poor: too clayey, hard to pack, small stones.
55A---------- Toms	Severe: wetness, percs slowly.	Slight----------	Severe: wetness, too clayey, large stones.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
56B---------- Trappist	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
56C---------- Trappist	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
57*. Udorthents					
58*: Udorthents.					
Urban land.					
59B---------- Unison	Moderate: percs slowly.	Severe: seepage.	Severe: too clayey, seepage.	Slight----------	Poor: too clayey, hard to pack.
59C---------- Unison	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: too clayey, seepage.	Moderate: slope.	Poor: too clayey, hard to pack.
60B---------- Unison	Moderate: percs slowly.	Severe: seepage.	Severe: too clayey, seepage.	Slight----------	Poor: too clayey, hard to pack.
60C---------- Unison	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: too clayey, seepage.	Moderate: slope.	Poor: too clayey, hard to pack.
61B---------- Unison	Moderate: percs slowly.	Severe: seepage.	Severe: too clayey, seepage.	Slight----------	Poor: too clayey, hard to pack.
61C---------- Unison	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: too clayey, seepage.	Moderate: slope.	Poor: too clayey, hard to pack.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
62C---------- Wallen	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock, small stones.
62D---------- Wallen	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, small stones, slope.
63C---------- Wallen	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: area reclaim, small stones.
63D, 63E, 64D, 64E, 64F---------- Wallen	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, small stones, slope.
65C*:					
Wallen----------	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: area reclaim, small stones.
Lehew----------	Severe: depth to rock, poor filter.	Severe: slope, depth to rock, seepage.	Severe: depth to rock, seepage.	Severe: seepage, depth to rock.	Poor: depth to rock, small stones.
65D*, 65E*, 66E*, 66F*:					
Wallen----------	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, small stones, slope.
Lehew----------	Severe: slope, depth to rock, poor filter.	Severe: slope, depth to rock, seepage.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage, depth to rock.	Poor: depth to rock, small stones, slope.
67F---------- Weikert	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, slope.	Poor: depth to rock, seepage, small stones.
68D*, 68E*:					
Weikert----------	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, slope.	Poor: depth to rock, seepage, small stones.
Berks----------	Severe: depth to rock, slope.	Severe: slope, seepage, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: seepage, slope, depth to rock.	Poor: small stones, slope, area reclaim.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
69D*, 69F*:					
Weikert	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage, depth to rock.	Poor: slope, area reclaim, seepage.
Berks	Severe: depth to rock, slope.	Severe: slope, depth to rock, seepage.	Severe: slope, depth to rock, seepage.	Severe: seepage, slope, depth to rock.	Poor: small stones, slope, area reclaim.
70B Wolfgap	Moderate: flooding, percs slowly.	Severe: seepage.	Severe: seepage.	Moderate: flooding.	Fair: too clayey, small stones, thin layer.
71D, 71E, 72E Zepp	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--CONSTRUCTION MATERIALS

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
1B Alonzville	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
1C Alonzville	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, slope.
2B Berks	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
3C*:				
Berks	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Weikert	Poor: depth to rock.	Improbable: small stones.	Improbable: thin layer.	Poor: depth to rock, small stones.
4B, 4C Blairton	Poor: area reclaim, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, wetness.
5B, 5C Braddock	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, area reclaim, small stones.
6B, 6C Braddock	Fair: large stones.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: too clayey, large stones, area reclaim.
6D Braddock	Fair: large stones, slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: too clayey, large stones, area reclaim.
7A Broadway	Good	Probable	Improbable: too sandy.	Fair: too clayey, small stones, area reclaim.
8B, 8C Carbo	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
9C*:				
Carbo	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
9C*:				
Endcav	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
9D*:				
Carbo	Poor: depth to rock, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Endcav	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
10A Caverns	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
11B, 11C Chilhowie	Poor: depth to rock, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones.
11D Chilhowie	Poor: depth to rock, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, slope.
11E Chilhowie	Poor: depth to rock, slope, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, slope.
12C Chilhowie	Poor: depth to rock, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones.
12D Chilhowie	Poor: depth to rock, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, slope.
13C Chilhowie	Poor: depth to rock, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones.
13D, 13E Chilhowie	Poor: depth to rock, slope, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, slope.
14B, 14C Coursey	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
15A Derroc	Poor: large stones.	Improbable: large stones.	Improbable: large stones.	Poor: area reclaim, small stones.
16B, 16C Edom	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
17B, 17C, 17D, 18B, 18C---------- Endcav	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
19D---------- Frederick	Poor: shrink-swell, slope, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope, small stones.
20B*, 20C*:				
Frederick----------	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, thin layer.
Poplimento----------	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, area reclaim.
20D*:				
Frederick----------	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey, thin layer.
Poplimento----------	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, area reclaim.
21B*, 21C*:				
Frederick----------	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones.
Poplimento----------	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, area reclaim.
21D*:				
Frederick----------	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope, small stones.
Poplimento----------	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, area reclaim.
21E*:				
Frederick----------	Poor: shrink-swell, slope, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope, small stones.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
21E*:				
Poplimento	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, area reclaim.
22B*, 22C*:				
Frederick	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, thin layer.
Poplimento	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, area reclaim.
22D*:				
Frederick	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey, thin layer.
Poplimento	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, area reclaim.
23C*:				
Frederick	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, thin layer.
Poplimento	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, area reclaim.
23D*:				
Frederick	Poor: slope, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey, thin layer.
Poplimento	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, area reclaim.
24B*, 24C*:				
Gainesboro	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Berks	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
24D*:				
Gainesboro	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
24D*:				
Berks	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
24E*:				
Gainesboro	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Berks	Poor: slope, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
25B, 25C Gilpin	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
25D Gilpin	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
26C Gilpin	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
26D Gilpin	Poor: thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
27C Gilpin	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
27D Gilpin	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
27E Gilpin	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
28C Gilpin	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
28D, 28E Gilpin	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
29A Gladehill	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
30A Guyan	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
31B, 31C, 32C Jefferson	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
32D Jefferson	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
33C---------- Jefferson	Good----------	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
33D, 33E---------- Jefferson	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
34B, 34C, 35C--------- Laidig	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
35D---------- Laidig	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
36B, 36C, 37C--------- Laidig	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
37D, 37E---------- Laidig	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
38B*, 38C*:				
Lehew----------	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Gainesboro----------	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
38D*:				
Lehew----------	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
Gainesboro----------	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
38E*:				
Lehew----------	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
Gainesboro----------	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
39A---------- Massanetta	Fair: low strength, thin layer, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
40D, 40E, 41D, 41E---- Massanutten	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
42A---------- Maurertown	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
43B, 43C, 44B, 44C---- Moomaw	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
45A---------- Newmarc	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
46A---------- Nomberville	Good----------	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, area reclaim.
47C, 48C, 48D--------- Opequon	Poor: area reclaim, low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, too clayey, small stones.
49*. Pits				
50A---------- Purdy	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, too clayey.
51D*:				
Rock outcrop---------	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock.
Carbo----------	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
52F*:				
Rock outcrop---------	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
Drall----------	Poor: slope.	Improbable: thin layer.	Improbable: thin layer.	Poor: small stones, area reclaim, slope.
Wallen----------	Poor: area reclaim, slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: small stones, slope.
53C---------- Sequoia	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
53D, 53E---------- Sequoia	Poor: depth to rock, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
54B---------- Timberville	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
55A---------- Toms	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines, large stones.	Poor: too clayey, large stones, area reclaim.
56B, 56C---------- Trappist	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
57*. Udorthents				
58*: Udorthents.				
Urban land.				
59B, 59C---------- Unison	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
60B, 60C, 61B, 61C---- Unison	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, thin layer.
62C---------- Wallen	Poor: depth to rock.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: small stones.
62D---------- Wallen	Poor: depth to rock, slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: small stones, slope.
63C---------- Wallen	Poor: area reclaim.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: small stones.
63D, 63E, 64D, 64E, 64F---------- Wallen	Poor: area reclaim, slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: small stones, slope.
65C*:				
Wallen----------	Poor: area reclaim.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: small stones.
Lehew----------	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
65D*, 65E*, 66E*, 66F*:				
Wallen----------	Poor: area reclaim, slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: small stones, slope.
Lehew----------	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
67F: Weikert	Poor: depth to rock, slope.	Improbable: small stones.	Improbable: thin layer.	Poor: depth to rock, small stones, slope.
68D*, 68E*:				
Weikert	Poor: depth to rock, slope.	Improbable: small stones.	Improbable: thin layer.	Poor: depth to rock, small stones, slope.
Berks	Poor: slope, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
69D*, 69F*:				
Weikert	Poor: slope, area reclaim.	Improbable: small stones.	Improbable: thin layer.	Poor: slope, small stones, area reclaim.
Berks	Poor: slope, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
70B: Wolfgap	Good	Probable	Probable	Poor: small stones.
71D, 71E: Zepp	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
72E: Zepp	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, area reclaim, slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--WATER MANAGEMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
1B Alonzville	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope	Favorable	Favorable.
1C Alonzville	Severe: slope.	Severe: piping.	Deep to water	Slope	Slope	Slope.
2B Berks	Severe: seepage.	Severe: seepage.	Deep to water	Slope, droughty, depth to rock.	Depth to rock, large stones.	Droughty, depth to rock, large stones.
3C*:						
Berks	Severe: seepage, slope.	Severe: seepage.	Deep to water	Slope, droughty, depth to rock.	Depth to rock, slope, large stones.	Droughty, depth to rock, slope.
Weikert	Severe: depth to rock, slope.	Severe: seepage.	Deep to water	---	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
4B Blairton	Moderate: seepage, depth to rock, slope.	Severe: piping, wetness.	Depth to rock, frost action, slope.	Slope, wetness, depth to rock.	Depth to rock, wetness.	Wetness, droughty.
4C Blairton	Severe: slope.	Severe: piping, wetness.	Depth to rock, frost action, slope.	Slope, wetness, depth to rock.	Slope, depth to rock, wetness.	Wetness, slope, droughty.
5B Braddock	Severe: seepage.	Severe: hard to pack.	Deep to water	Slope	Favorable	Favorable.
5C Braddock	Severe: seepage, slope.	Severe: hard to pack.	Deep to water	Slope	Slope	Slope.
6B Braddock	Severe: seepage.	Severe: hard to pack, large stones.	Deep to water	Large stones, slope.	Large stones	Large stones.
6C, 6D Braddock	Severe: seepage, slope.	Severe: hard to pack, large stones.	Deep to water	Large stones, slope.	Slope, large stones.	Large stones, slope.
7A Broadway	Severe: seepage.	Severe: piping.	Deep to water	Flooding	Favorable	Favorable.
8B Carbo	Moderate: depth to rock, slope.	Severe: hard to pack.	Deep to water	Percs slowly, depth to rock.	Depth to rock, erodes easily.	Erodes easily, depth to rock.
8C Carbo	Severe: slope.	Severe: hard to pack.	Deep to water	Percs slowly, depth to rock.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
9C*, 9D*:						
Carbo	Severe: slope.	Severe: hard to pack.	Deep to water	Percs slowly, depth to rock.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Endcav	Severe: slope.	Severe: hard to pack.	Deep to water	Percs slowly, slope, erodes easily.	Slope	Slope, erodes easily, percs slowly.
10A Caverns	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing	Soil blowing	Favorable.
11B Chilhowie	Moderate: depth to rock, slope.	Severe: seepage.	Deep to water	Slope, droughty.	Large stones, depth to rock.	Large stones, erodes easily.
11C, 11D, 11E, 12C, 12D, 13C, 13D, 13E Chilhowie	Severe: slope.	Severe: seepage.	Deep to water	Slope, droughty.	Slope, large stones, depth to rock.	Large stones, slope, erodes easily.
14B Coursey	Moderate: seepage, slope.	Severe: piping.	Frost action, slope.	Slope, wetness.	Wetness	Favorable.
14C Coursey	Severe: slope.	Severe: piping.	Frost action, slope.	Slope, wetness.	Slope, wetness.	Slope.
15A Derroc	Severe: seepage.	Severe: seepage, large stones.	Deep to water	Large stones, droughty.	Large stones	Large stones, droughty.
16B Edom	Moderate: seepage, depth to rock, slope.	Moderate: hard to pack, thin layer.	Deep to water	Slope	Favorable	Favorable.
16C Edom	Severe: slope.	Moderate: hard to pack, thin layer.	Deep to water	Slope	Slope	Slope.
17B Endcav	Moderate: depth to rock, slope.	Severe: hard to pack.	Deep to water	Percs slowly, slope, erodes easily.	Erodes easily	Erodes easily, percs slowly.
17C, 17D Endcav	Severe: slope.	Severe: hard to pack.	Deep to water	Percs slowly, slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily, percs slowly.
18B Endcav	Moderate: depth to rock, slope.	Severe: hard to pack.	Deep to water	Percs slowly, slope, erodes easily.	Erodes easily	Erodes easily, percs slowly.
18C Endcav	Severe: slope.	Severe: hard to pack.	Deep to water	Percs slowly, slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily, percs slowly.
19D Frederick	Severe: slope.	Severe: hard to pack.	Deep to water	Slope	Slope	Slope.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
20B*:						
Frederick	Moderate: seepage, slope.	Severe: hard to pack.	Deep to water	Slope	Favorable	Favorable.
Poplimento	Moderate: slope.	Severe: hard to pack.	Deep to water	Slope	Favorable	Favorable.
20C*, 20D*:						
Frederick	Severe: slope.	Severe: hard to pack.	Deep to water	Slope	Slope	Slope.
Poplimento	Severe: slope.	Severe: hard to pack.	Deep to water	Slope	Slope	Slope.
21B*:						
Frederick	Moderate: seepage, slope.	Severe: hard to pack.	Deep to water	Slope	Favorable	Favorable.
Poplimento	Moderate: slope.	Severe: hard to pack.	Deep to water	Slope	Favorable	Favorable.
21C*, 21D*, 21E*:						
Frederick	Severe: slope.	Severe: hard to pack.	Deep to water	Slope	Slope	Slope.
Poplimento	Severe: slope.	Severe: hard to pack.	Deep to water	Slope	Slope	Slope.
22B*:						
Frederick	Moderate: seepage, slope.	Severe: hard to pack.	Deep to water	Slope	Favorable	Favorable.
Poplimento	Moderate: slope.	Severe: hard to pack.	Deep to water	Slope	Favorable	Favorable.
22C*, 22D*, 23C*, 23D*:						
Frederick	Severe: slope.	Severe: hard to pack.	Deep to water	Slope	Slope	Slope.
Poplimento	Severe: slope.	Severe: hard to pack.	Deep to water	Slope	Slope	Slope.
24B*:						
Gainesboro	Severe: seepage.	Severe: thin layer.	Deep to water	Droughty, depth to rock, slope.	Large stones, depth to rock.	Large stones, droughty, depth to rock.
Berks	Severe: seepage.	Severe: seepage.	Deep to water	Slope, droughty, depth to rock.	Depth to rock, large stones.	Droughty, depth to rock, large stones.
24C*, 24D*, 24E*:						
Gainesboro	Severe: seepage, slope.	Severe: thin layer.	Deep to water	Droughty, depth to rock, slope.	Slope, large stones, depth to rock.	Large stones, slope, droughty.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
24C*, 24D*, 24E*: Berks	Severe: seepage, slope.	Severe: seepage.	Deep to water	Slope, droughty, depth to rock.	Depth to rock, slope, large stones.	Droughty, depth to rock, slope.
25B Gilpin	Moderate: seepage, depth to rock, slope.	Severe: thin layer.	Deep to water	Slope, depth to rock.	Depth to rock, large stones.	Depth to rock, large stones.
25C, 25D, 26C, 26D Gilpin	Severe: slope.	Severe: thin layer.	Deep to water	Slope, depth to rock.	Slope, depth to rock, large stones.	Slope, depth to rock, large stones.
27C, 27D, 27E, 28C, 28D, 28E Gilpin	Severe: slope.	Severe: piping.	Deep to water	Slope, large stones, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
29A Gladehill	Severe: seepage.	Severe: piping.	Deep to water	Droughty, soil blowing.	Soil blowing	Droughty.
30A Guyan	Moderate: seepage.	Severe: wetness.	Frost action	Wetness	Wetness	Wetness.
31B Jefferson	Severe: seepage.	Severe: piping.	Deep to water	Slope	Favorable	Favorable.
31C, 32C Jefferson	Severe: seepage.	Severe: piping.	Deep to water	Slope	Slope	Slope.
32D Jefferson	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope	Slope	Slope.
33C Jefferson	Severe: seepage.	Severe: piping.	Deep to water	Slope	Slope, large stones.	Slope, large stones.
33D, 33E Jefferson	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope	Slope, large stones.	Slope, large stones.
34B Laidig	Severe: seepage.	Severe: piping.	Percs slowly, slope.	Slope, wetness, droughty.	Large stones, wetness.	Large stones, droughty.
34C, 35C, 35D Laidig	Severe: seepage, slope.	Severe: piping.	Percs slowly, slope.	Slope, wetness, droughty.	Slope, large stones, wetness.	Large stones, slope, droughty.
36B Laidig	Severe: seepage.	Severe: piping.	Percs slowly, slope.	Slope, wetness, droughty.	Large stones, wetness.	Large stones, droughty.
36C Laidig	Severe: seepage, slope.	Severe: piping.	Percs slowly, slope.	Slope, wetness, droughty.	Slope, large stones, wetness.	Large stones, slope, droughty.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
37C, 37D, 37E----- Laidig	Severe: seepage, slope.	Severe: piping.	Deep to water	Droughty, rooting depth, slope.	Slope, large stones, rooting depth.	Slope, large stones, droughty.
38B*:						
Lehew----------	Severe: seepage.	Severe: seepage, large stones.	Deep to water	Slope, large stones, depth to rock.	Large stones, depth to rock.	Large stones, droughty, depth to rock.
Gainesboro-------	Severe: seepage.	Severe: thin layer.	Deep to water	Droughty, depth to rock, slope.	Large stones, depth to rock.	Large stones, droughty, depth to rock.
38C*, 38D*, 38E*:						
Lehew----------	Severe: seepage, slope.	Severe: seepage, large stones.	Deep to water	Slope, large stones, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Gainesboro-------	Severe: seepage, slope.	Severe: thin layer.	Deep to water	Droughty, depth to rock, slope.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
39A---------- Massanetta	Moderate: seepage.	Severe: piping.	Flooding-------	Wetness, erodes easily.	Erodes easily, wetness.	Erodes easily.
40D, 40E---------- Massanutten	Severe: seepage, slope.	Severe: thin layer, piping.	Deep to water	Slope, depth to rock.	Slope, droughty, depth to rock.	Slope, droughty, depth to rock.
41D, 41E---------- Massanutten	Severe: seepage, slope.	Severe: thin layer, piping.	Deep to water	Slope, droughty, depth to rock.	Slope, depth to rock.	Slope, droughty, depth to rock.
42A---------- Maurertown	Slight---------	Severe: hard to pack, wetness.	Percs slowly, frost action.	Wetness, percs slowly, erodes easily.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
43B---------- Moomaw	Moderate: slope.	Severe: piping.	Percs slowly, slope.	Slope, wetness, soil blowing.	Wetness, soil blowing, rooting depth.	Percs slowly, rooting depth.
43C---------- Moomaw	Severe: slope.	Severe: piping.	Percs slowly, slope.	Slope, wetness, soil blowing.	Slope, wetness, rooting depth.	Slope, percs slowly, rooting depth.
44B---------- Moomaw	Moderate: slope.	Severe: piping.	Percs slowly, slope.	Slope, wetness, percs slowly.	Wetness, percs slowly.	Percs slowly.
44C---------- Moomaw	Severe: slope.	Severe: piping.	Percs slowly, slope.	Slope, wetness, percs slowly.	Slope, wetness, percs slowly.	Slope, percs slowly.
45A---------- Newmarc	Moderate: seepage.	Severe: piping, wetness.	Flooding, frost action.	Wetness, flooding.	Erodes easily, wetness.	Wetness, erodes easily.
46A---------- Nomberville	Severe: seepage.	Severe: piping.	Deep to water	Favorable------	Favorable------	Favorable.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
47C, 48C, 48D----- Opequon	Severe: depth to rock, slope.	Severe: hard to pack, thin layer.	Deep to water	Slope, depth to rock.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
49*. Pits						
50A---------- Purdy	Slight---------	Severe: piping, hard to pack, wetness.	Percs slowly, frost action.	Wetness, percs slowly.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
51D*:						
Rock outcrop-----	Severe: depth to rock, slope.	Slight---------	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
Carbo----------	Severe: slope.	Severe: hard to pack.	Deep to water	Percs slowly, depth to rock.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
52F*:						
Rock outcrop-----	Severe: depth to rock, slope.	Slight---------	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
Drall----------	Severe: seepage.	Severe: seepage.	Deep to water	Large stones, droughty, fast intake.	Large stones, too sandy, slope.	Droughty, large stones, slope.
Wallen----------	Severe: seepage, slope.	Severe: seepage, large stones.	Deep to water	Large stones, droughty, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
53C, 53D, 53E----- Sequoia	Severe: slope.	Severe: hard to pack.	Deep to water	Slope, depth to rock.	Slope, depth to rock, erodes easily.	Slope, erodes easily, droughty.
54B---------- Timberville	Moderate: seepage, slope.	Moderate: piping, hard to pack.	Deep to water	Slope, flooding.	Favorable------	Favorable.
55A---------- Toms	Slight---------	Severe: hard to pack, wetness.	Percs slowly, large stones, frost action.	Wetness, percs slowly, erodes easily.	Large stones, erodes easily, wetness.	Large stones, wetness, erodes easily.
56B---------- Trappist	Moderate: depth to rock.	Severe: thin layer, hard to pack.	Deep to water	Percs slowly, depth to rock, erodes easily.	Depth to rock, erodes easily.	Erodes easily, depth to rock.
56C---------- Trappist	Moderate: depth to rock.	Severe: thin layer, hard to pack.	Deep to water	Percs slowly, depth to rock, erodes easily.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
57*. Udorthents						
58*: Udorthents.						
Urban land.						

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
59B---------- Unison	Moderate: seepage, slope.	Severe: hard to pack.	Deep to water	Slope----------	Favorable------	Favorable.
59C---------- Unison	Severe: slope.	Severe: hard to pack.	Deep to water	Slope----------	Slope----------	Slope.
60B---------- Unison	Moderate: seepage, slope.	Severe: hard to pack.	Deep to water	Slope----------	Favorable------	Favorable.
60C---------- Unison	Severe: slope.	Severe: hard to pack.	Deep to water	Slope----------	Slope----------	Slope.
61B---------- Unison	Moderate: seepage, slope.	Severe: hard to pack.	Deep to water	Slope----------	Large stones---	Large stones.
61C---------- Unison	Severe: slope.	Severe: hard to pack.	Deep to water	Slope----------	Large stones, slope.	Large stones, slope.
62C, 62D---------- Wallen	Severe: seepage, slope.	Severe: seepage, large stones.	Deep to water	Slope, large stones, droughty.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
63C, 63D, 63E, 64D, 64E, 64F---- Wallen	Severe: seepage, slope.	Severe: seepage, large stones.	Deep to water	Large stones, droughty, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
65C*, 65D*, 65E*, 66E*, 66F*:						
Wallen----------	Severe: seepage, slope.	Severe: seepage, large stones.	Deep to water	Large stones, droughty, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Lehew----------	Severe: seepage, slope.	Severe: seepage, large stones.	Deep to water	Slope, large stones, depth to rock.	Slope, large stones, depth to rock.	Slope, large stones, droughty.
67F---------- Weikert	Severe: depth to rock, slope.	Severe: seepage.	Deep to water	---	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
68D*, 68E*:						
Weikert----------	Severe: depth to rock, slope.	Severe: seepage.	Deep to water	---	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
Berks----------	Severe: seepage, slope.	Severe: seepage.	Deep to water	Slope, droughty, depth to rock.	Depth to rock, slope, large stones.	Droughty, depth to rock, slope.
69D*, 69F*:						
Weikert----------	Severe: depth to rock, slope, seepage.	Severe: seepage, thin layer.	Deep to water	Slope, droughty, depth to rock.	Slope, depth to rock.	Slope, droughty, depth to rock.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
69D*, 69F*:						
Berks	Severe: seepage, slope.	Severe: seepage.	Deep to water	Droughty, slope, depth to rock.	Slope, depth to rock, large stones.	Depth to rock, large stones, slope.
70B Wolfgap	Severe: seepage.	Severe: piping.	Deep to water	Slope, droughty.	Favorable	Droughty.
71D, 71E, 72E Zepp	Severe: seepage, slope.	Moderate: large stones.	Deep to water	Slope	Slope, large stones.	Large stones, slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--ENGINEERING INDEX PROPERTIES

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
1B, 1C---------- Alonzville	0-9	Loam----------	ML	A-4	0	90-100	80-100	65-95	50-75	<35	2-10
	9-54	Clay loam, loam, sandy clay loam.	ML, CL, SM, SC	A-4, A-6	0	90-100	80-100	65-95	35-80	<35	NP-15
	54-65	Clay loam, sandy clay loam, gravelly sandy loam.	SM, GC, ML, CL	A-1, A-2, A-4, A-6	0-5	65-100	55-100	35-95	20-75	<35	NP-15
2B---------- Berks	0-7	Channery silt loam.	GM, ML, GC, SC	A-2, A-4	0-30	50-80	45-70	40-60	30-55	25-36	5-10
	7-33	Channery loam, very channery loam, channery silt loam.	GM, SM, GC, SC	A-1, A-2, A-4	0-30	40-80	35-70	25-60	20-45	25-36	5-10
	33-37	Channery loam, very channery loam, extremely channery silt loam.	GM, SM	A-1, A-2	0-40	35-65	25-55	20-40	15-35	24-38	2-10
	37-41	Weathered bedrock	---	---	---	---	---	---	---	---	---
3C*:											
Berks----------	0-7	Channery silt loam.	GM, ML, GC, SC	A-2, A-4	0-30	50-80	45-70	40-60	30-55	25-36	5-10
	7-33	Channery loam, very channery loam, channery silt loam.	GM, SM, GC, SC	A-1, A-2, A-4	0-30	40-80	35-70	25-60	20-45	25-36	5-10
	33-37	Channery loam, very channery loam, extremely channery silt loam.	GM, SM	A-1, A-2	0-40	35-65	25-55	20-40	15-35	24-38	2-10
	37-41	Weathered bedrock	---	---	---	---	---	---	---	---	---
Weikert---------	0-3	Channery silt loam.	GM, ML, SM	A-1, A-2, A-4	0-10	35-70	35-70	25-65	20-55	30-40	4-10
	3-16	Very channery loam, very channery silt loam, extremely channery loam.	GM, GP-GM	A-1, A-2	0-20	15-60	10-55	5-45	5-35	28-36	3-9
	16-20	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
4B, 4C---------- Blairton	0-9	Silt loam--------	ML, CL-ML	A-4	0	80-100	75-100	65-90	50-80	20-35	2-10
	9-31	Silt loam, channery silty clay loam, very channery loam.	ML, CL, GM	A-4, A-6, A-7, A-2	0-5	50-90	35-90	30-85	25-70	25-42	2-20
	31-35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
5B, 5C---------- Braddock	0-7	Loam----------	CL, SM, ML, SC	A-2, A-4	0-5	85-100	75-95	50-85	25-65	<30	NP-10
	7-37	Clay loam, gravelly clay, very gravelly sandy clay.	CH, CL, SC, GC	A-7, A-2	0-15	80-95	30-90	45-90	20-80	42-60	15-33
	37-65	Loam, very cobbly sandy clay loam, extremely cobbly clay.	SC, CL, GM, GC	A-2, A-4, A-6, A-7	0-75	75-95	60-90	55-85	30-70	25-50	8-28
6B, 6C, 6D------- Braddock	0-7	Cobbly loam------	SM, SC, CL, ML	A-2, A-4	25-50	75-100	70-95	50-85	25-65	<30	NP-10
	7-37	Cobbly sandy clay, cobbly clay loam, very cobbly clay.	SC, CL, CH, GC	A-2, A-7	25-50	75-95	70-90	60-85	30-80	42-60	15-33
	37-65	Cobbly loam, very cobbly sandy clay loam, extremely cobbly clay.	SC, CL, GM, GC	A-2, A-4, A-6, A-7	25-75	70-85	30-80	25-70	20-65	25-50	8-28
7A---------- Broadway	0-11	Silt loam--------	CL, ML, SM, SC	A-4, A-6	0-2	95-100	95-100	80-100	45-90	<30	NP-15
	11-46	Silt loam, silty clay loam, loam.	CL	A-4, A-6, A-7	0-2	95-100	95-100	80-100	55-90	25-45	7-20
	46-72	Loamy sand, sandy loam, gravelly fine sandy loam.	SM, SM-SC, SP-SM, ML	A-1, A-2, A-4, A-6	0-15	75-100	70-100	35-85	10-55	<20	NP-7
8B, 8C---------- Carbo	0-8	Silty clay loam	CL	A-6, A-7	0-2	95-100	90-100	85-95	75-85	30-50	10-25
	8-37	Clay----------	CH	A-7	0-5	95-100	85-100	80-95	70-90	60-80	35-55
	37-41	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
9C*:											
Carbo----------	0-8	Silty clay loam	CL	A-6, A-7	0-2	95-100	90-100	85-95	75-85	30-50	10-25
	8-37	Clay----------	CH	A-7	0-5	95-100	85-100	80-95	70-90	60-80	35-55
	37-41	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Endcav----------	0-8	Silty clay loam	CL	A-6, A-7	0	90-100	90-100	85-100	75-95	30-50	10-25
	8-58	Clay----------	CH	A-7	0	80-100	75-100	70-100	60-95	60-85	35-55
	58-62	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
9D*:											
Carbo----------	0-8	Silty clay loam	CL	A-6, A-7	0-2	95-100	90-100	85-95	75-85	30-50	10-25
	8-37	Clay----------	CH	A-7	0-5	95-100	85-100	80-95	70-90	60-80	35-55
	37-41	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Endcav----------	0-8	Silty clay loam	CL	A-6, A-7	0	90-100	90-100	85-100	75-95	30-50	10-25
	8-58	Clay----------	CH	A-7	0	80-100	75-100	70-100	60-95	60-85	35-55
	58-67	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
10A---------- Caverns	0-10	Sandy loam-------	SM, SM-SC, ML, CL-ML	A-2, A-4	0	85-100	75-100	40-90	25-55	<25	NP-5
	10-39	Fine sandy loam, silt loam, loam.	SM, ML	A-4	0	85-100	75-100	65-95	45-85	<35	NP-8
	39-72	Sandy loam, loamy sand, gravelly silt loam.	SM, SM-SC, ML, CL-ML	A-1-b, A-2, A-4	0-5	70-100	60-100	40-85	20-75	<25	NP-5
11B, 11C, 11D, 11E, 12C, 12D, 13C, 13D, 13E--- Chilhowie	0-6	Silty clay loam	CL	A-6, A-7	0-10	90-100	85-100	80-100	75-95	30-50	10-25
	6-18	Clay, silty clay	CH	A-7	0-10	90-100	85-100	80-100	75-95	50-65	30-45
	18-35	Extremely channery clay, very channery silty clay, flaggy clay.	CH, GC, SM, GM	A-7, A-2	10-30	25-80	15-65	15-65	15-60	50-65	20-35
	35-39	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
14B---------- Coursey	0-12	Loam----------	ML	A-4	0-5	80-100	80-100	60-95	50-85	<30	NP-7
	12-58	Gravelly sandy clay loam, clay loam, loam.	SC, SM, GC, CL	A-1-b, A-2, A-4, A-6	0-10	60-100	50-100	40-90	20-80	<35	NP-15
	58-60	Gravelly sandy clay loam, sandy clay loam, loam.	SC, SM, GC, CL	A-1-b, A-2, A-4, A-6	0-10	60-100	40-100	40-90	20-80	<35	NP-15
14C---------- Coursey	0-12	Loam----------	ML	A-4	0-5	80-100	80-100	60-95	50-85	<30	NP-7
	12-58	Gravelly sandy clay loam, clay loam, loam.	SC, SM, GC, CL	A-1-b, A-2, A-4, A-6	0-10	60-100	50-100	40-90	20-80	<35	NP-15
	58-63	Gravelly sandy clay loam, sandy clay loam, loam.	SC, SM, GC, CL	A-1-b, A-2, A-4, A-6	0-10	60-100	40-100	40-90	20-80	<35	NP-15
15A---------- Derroc	0-3	Cobbly sandy loam	ML, SM, CL-ML, SC	A-2, A-4	15-40	80-95	65-95	50-80	25-60	<25	NP-10
	3-37	Gravelly sandy loam, very cobbly sandy loam, extremely cobbly sandy loam.	SM, GM, GC, SC	A-1, A-2, A-4	25-60	50-80	30-65	25-60	15-40	<25	NP-10
	37-65	Very cobbly loamy sand, very cobbly sandy loam, extremely cobbly sandy loam.	GC, GM, GP-GM, GM-GC	A-1, A-2	35-70	35-55	30-50	20-45	10-25	<25	NP-8
16B, 16C--------- Edom	0-7	Silty clay loam	ML, CL	A-4, A-6	0	85-100	80-100	75-95	70-90	---	---
	7-34	Silty clay, channery clay, shaly silty clay loam.	CH, CL	A-7, A-6	0-10	70-90	65-85	65-85	55-80	35-55	12-30
	34-65	Channery silty clay loam, channery silty clay, shaly clay.	GM, ML, SM	A-7, A-6, A-2	5-20	25-80	20-70	15-60	15-55	35-49	10-20

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
17B, 17C, 17D, 18B, 18C-------- Endcav	0-8	Silt loam--------	CL-ML, CL	A-4, A-6	0	90-100	90-100	80-100	65-90	20-35	5-15
	8-58	Clay----------	CH	A-7	0	80-100	75-100	70-100	60-95	60-85	35-55
	58-62	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
19D---------- Frederick	0-7	Gravelly silt loam.	GM, GC, ML, CL	A-4, A-6	0-10	60-80	50-75	40-70	35-65	<35	NP-15
	7-16	Gravelly silty clay loam, silty clay, clay.	CH, MH, SM, SC	A-7	0-5	80-100	50-95	45-90	35-85	50-70	20-40
	16-47	Clay, silty clay	CH	A-7	0-5	90-100	85-100	70-100	60-85	60-85	30-50
	47-65	Clay, silty clay	CH	A-7	0-5	90-100	85-100	70-100	50-75	50-75	25-45
20B*, 20C*, 20D*: Frederick-------	0-7	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0-5	80-100	75-100	75-95	75-90	<35	NP-15
	7-16	Silty clay loam, silty clay, clay.	CH, MH	A-7	0-5	80-100	75-100	70-95	60-90	50-70	20-40
	16-47	Clay, silty clay	CH	A-7	0-5	90-100	85-100	70-100	60-95	60-85	30-55
	47-65	Clay, silty clay	CH	A-7	0-5	90-100	85-100	75-100	65-95	50-75	24-45
Poplimento------	0-12	Silt loam--------	CL, CL-ML	A-4, A-6	0-5	80-100	75-100	65-100	50-90	25-40	5-15
	12-23	Silty clay loam, silty clay, clay.	CL, CH	A-7	0-5	80-100	75-100	65-95	60-90	35-65	15-50
	23-54	Channery silty clay loam, very channery silty clay, clay.	CL, CH, GC, SC	A-6, A-7, A-2-6	0-10	45-90	40-100	35-80	30-75	35-60	15-35
	54-62	Channery silty clay, very channery silty clay loam, clay.	CL, CH, GC, SC	A-2, A-6, A-7	0-15	45-90	40-100	35-80	30-75	35-55	15-30
21B*, 21C*, 21D*, 21E*: Frederick------	0-7	Gravelly silt loam.	GM, GC, ML, CL	A-4, A-6	0-10	60-80	50-75	40-70	35-65	<35	NP-15
	7-16	Gravelly silty clay loam, silty clay, clay.	CH, MH, SM, SC	A-7	0-5	80-100	50-95	45-90	35-85	50-70	20-40
	16-47	Clay, silty clay	CH	A-7	0-5	90-100	85-100	70-100	60-85	60-85	30-50
	47-65	Clay, silty clay	CH	A-7	0-5	90-100	85-100	70-100	50-75	50-75	25-45

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
21B*, 21C*, 21D*, 21E*:											
Poplimento-----	0-12	Gravelly silt loam.	GM, GC, SM, SC	A-2, A-4, A-6	0-10	50-85	40-75	35-60	30-50	<30	NP-15
	12-23	Silty clay loam, silty clay, clay.	CL, CH	A-7	0-5	80-100	75-100	65-95	60-90	35-65	15-50
	23-54	Channery silty clay loam, very channery silty clay, clay.	CL, CH, GC, SC	A-6, A-7, A-2-6	0-10	45-90	40-100	35-80	30-75	35-60	15-35
	54-62	Channery silty clay, very channery silty clay loam, clay.	CL, CH, GC, SC	A-2, A-6, A-7	0-15	45-90	40-100	35-80	30-75	35-55	15-35
22B*, 22C*, 22D*, 23C*, 23D*:											
Frederick------	0-7	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0-5	80-100	75-100	75-95	75-90	<35	NP-15
	7-16	Silty clay loam, silty clay, clay.	CH, MH	A-7	0-5	80-100	75-100	70-95	60-90	50-70	20-40
	16-47	Clay, silty clay	CH	A-7	0-5	90-100	85-100	70-100	60-95	60-85	30-55
	47-65	Clay, silty clay	CH	A-7	0-5	90-100	85-100	75-100	65-95	50-75	24-45
Poplimento-----	0-12	Silt loam--------	CL, CL-ML	A-4, A-6	0-5	80-100	75-100	65-100	50-90	25-40	5-15
	12-23	Silty clay loam, silty clay, clay.	CL, CH	A-7	0-5	80-100	75-100	65-95	60-90	35-65	15-50
	23-54	Channery silty clay loam, very channery silty clay, clay.	CL, CH, GC, SC	A-6, A-7, A-2-6	0-10	45-90	40-100	35-80	30-75	35-60	15-35
	54-62	Channery silty clay, very channery silty clay loam, clay.	CL, CH, GC, SC	A-2, A-6, A-7	0-15	45-90	40-100	35-80	30-75	35-55	15-30
24B*, 24C*, 24D*, 24E*:											
Gainesboro-----	0-7	Silt loam--------	ML, CL-ML, CL	A-4, A-6	1-5	90-100	80-90	70-100	50-80	<35	NP-15
	7-24	Very channery clay loam, very channery silty clay loam, silt loam.	CL, SC, GC	A-6, A-2, A-4	5-20	50-90	30-85	40-80	30-75	25-45	10-25
	24-30	Very channery silty clay loam, extremely channery silt loam.	GC, CL, SC, GM-GC	A-2, A-1-b	10-35	35-55	10-30	10-25	5-20	20-40	6-15
	30-34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
24B*, 24C*, 24D*, 24E*:											
Berks----------	0-7	Channery silt loam.	GM, ML, GC, SC	A-2, A-4	0-20	50-80	45-70	40-60	30-55	25-36	5-10
	7-33	Channery loam, very channery loam, channery silt loam.	GM, GC, SM, SC	A-1, A-2, A-4	0-30	40-80	35-70	25-60	20-45	25-36	5-10
	33-37	Channery loam, very channery loam, extremely channery silt loam.	GM, SM	A-1, A-2	0-40	35-65	25-55	20-40	15-35	24-38	2-10
	37-41	Weathered bedrock	---	---	---	---	---	---	---	---	---
25B, 25C, 25D---- Gilpin	0-3	Silt loam--------	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	3-10	Channery loam, very channery silt loam, silty clay loam.	GC, SC, CL, CL-ML	A-2, A-4, A-6	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	10-26	Channery loam, very channery silt loam, extremely channery silty clay loam.	GC, GM-GC	A-1, A-2, A-4, A-6	0-35	25-55	20-50	15-45	15-40	20-40	4-15
	26-30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
26C, 26D--------- Gilpin	0-3	Channery silt loam.	GC, SC, CL, CL-ML	A-2, A-4, A-6	0-30	50-90	45-85	35-75	30-70	20-40	4-15
	3-10	Channery loam, very channery silt loam, silty clay loam.	GC, SC, CL, CL-ML	A-2, A-4, A-6	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	10-26	Channery loam, very channery silt loam, extremely channery silty clay loam.	GC, GM-GC	A-1, A-2, A-4, A-6	0-35	25-55	20-50	15-45	15-40	20-40	4-15
	26-30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
27C, 27D, 27E---- Gilpin	0-3	Stony silt loam	GC, CL, SC, CL-ML	A-2, A-4, A-6	2-10	50-90	45-85	35-75	30-70	20-40	4-15
	3-10	Channery silt loam, very channery loam, silty clay loam.	GM-GC, CL, CL-ML, SC	A-2, A-4, A-5	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	10-26	Channery loam, very channery silt loam, extremely channery silty clay loam.	GC, GM-GC	A-1, A-2, A-4, A-5	0-35	25-55	20-50	15-45	15-40	20-40	4-15
	26-30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
28C, 28D, 28E---- Gilpin	0-3	Very stony silt loam.	GC, CL, SC, CL-ML	A-2, A-4, A-6	10-40	50-90	45-85	35-75	30-70	20-40	4-15
	3-10	Channery silt loam, very channery loam, silty clay loam.	GM-GC, CL, CL-ML, SC	A-2, A-4, A-5	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	10-26	Channery loam, very channery silt loam, extremely channery silty clay loam.	GC, GM-GC	A-1, A-2, A-4, A-5	0-35	25-55	20-50	15-45	15-40	20-40	4-15
	26-30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
29A---------- Gladehill	0-5	Fine sandy loam	SM, SM-SC	A-2, A-4	0-5	80-100	80-100	50-85	25-50	<20	NP-5
	5-42	Loam, fine sandy loam, sandy loam.	ML, SM, SC, CL	A-2, A-4	0-5	80-100	80-100	50-95	30-70	<25	NP-10
	42-72	Fine sandy loam, loam, gravelly sandy loam.	SM, SM-SC, ML, GM-GC	A-1, A-2, A-4	0-30	60-100	50-100	25-100	20-70	<20	NP-5
30A---------- Guyan	0-7	Silt loam--------	ML, CL-ML	A-4	0	95-100	95-100	95-100	65-80	20-30	5-10
	7-62	Loam, clay loam, silty clay loam.	ML, CL	A-4, A-6	0	85-100	85-100	80-100	70-95	25-40	8-17
31B, 31C, 32C, 32D---------- Jefferson	0-5	Sandy loam-------	SM, SC, ML, CL	A-2, A-4	0-5	85-95	80-90	40-80	25-65	20-35	2-10
	5-48	Gravelly loam, gravelly clay loam, gravelly sandy clay loam.	SM, SC, ML, CL	A-4, A-2, A-6	0-5	75-90	50-90	50-80	30-70	15-35	2-15
	48-72	Very gravelly loam, very gravelly clay loam, very gravelly sandy clay loam.	GM, SM, ML, GM-GC	A-2, A-4, A-1	0-5	55-75	25-75	20-70	10-60	20-35	2-10
33C---------- Jefferson	0-5	Very stony sandy loam.	SM, GM, ML, CL	A-2, A-4	5-20	65-90	60-90	40-75	25-50	<25	NP-10
	5-48	Channery loam, gravelly clay loam, gravelly sandy clay loam.	SM, SC, ML, CL	A-2, A-4, A-6	5-20	75-90	70-90	50-80	30-70	15-35	2-15
	48-60	Very channery loam, gravelly clay loam, gravelly sandy clay loam.	GM, SM, ML, GM-GC	A-1, A-2, A-4	5-25	55-75	50-75	35-70	20-60	20-35	2-10

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
33D, 33E--------- Jefferson	0-5	Very stony sandy loam.	SM, GM, ML, CL	A-2, A-4	5-20	65-90	60-90	40-75	25-50	<25	NP-10
	5-48	Channery loam, gravelly clay loam, gravelly sandy clay loam.	SM, SC, ML, CL	A-2, A-4, A-6	5-20	75-90	70-90	50-80	30-70	15-35	2-15
	48-72	Very channery loam, gravelly clay loam, gravelly sandy clay loam.	GM, SM, ML, GM-GC	A-1, A-2, A-4	5-25	55-75	50-75	35-70	20-60	20-35	2-10
34B, 34C, 35C, 35D, 36B, 36C--- Laidig	0-7	Channery loam----	ML, CL-ML, CL	A-4	5-20	55-80	50-75	45-70	40-55	15-30	1-10
	7-30	Very channery loam, channery sandy clay loam, channery sandy loam.	SM, SC, CL, ML	A-2, A-4, A-6	5-20	70-95	50-90	40-80	20-70	15-40	2-18
	30-65	Channery sandy clay loam, very channery loam, channery sandy loam.	GC, SC, GM-GC, CL-ML	A-2, A-4, A-6	5-20	50-90	40-85	30-80	15-70	15-35	2-16
37C, 37D, 37E---- Laidig	0-7	Very stony loam	GM-GC, SM, CL-ML, SM-SC	A-4	3-15	65-90	50-80	45-80	35-70	15-30	NP-10
	7-30	Very channery loam, channery sandy clay loam, channery sandy loam.	SM, SC, ML, CL	A-2, A-4, A-6	5-20	70-95	50-90	40-80	20-70	15-40	2-18
	30-65	Channery sandy clay loam, very channery loam, channery sandy loam.	SC, GM-GC, CL-ML, GC	A-2, A-4, A-6	5-20	50-90	40-85	30-80	15-70	15-35	2-16
38B*, 38C*, 38D*, 38E*: Lehew----------	0-4	Channery loam----	GM, ML, CL-ML, SM	A-2, A-4	5-30	50-80	45-70	40-65	25-60	15-30	NP-7
	4-20	Very channery sandy loam, channery fine sandy loam, extremely channery loam.	SM, GM, GM-GC, SM-SC	A-2, A-4	5-40	45-75	30-65	20-55	10-40	15-30	NP-7
	20-24	Very channery sandy loam, very channery fine sandy loam, extremely channery loam.	SM, GM, GM-GC, SM-SC	A-2, A-4	10-50	45-75	30-65	20-55	10-40	15-30	NP-7
	24-28	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
38B*, 38C*, 38D*, 38E*:											
Gainesboro-----	0-7	Silt loam--------	ML, CL-ML, CL	A-4, A-6	1-5	90-100	80-90	70-100	50-80	<35	NP-15
	7-24	Very channery clay loam, very channery silty clay loam, silt loam.	CL, SC, GC	A-6, A-2, A-4	5-20	50-90	30-85	40-80	30-75	25-45	10-25
	24-30	Very channery silty clay loam, extremely channery silt loam.	GC, CL, SC, GM-GC	A-2, A-1-b	10-35	35-55	10-30	10-25	5-20	20-40	6-15
	30-34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
39A---------- Massanetta	0-11	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0-5	90-100	85-100	75-95	55-80	<30	2-12
	11-22	Clay loam, silty clay loam, silt loam.	CL	A-6	0-5	90-100	85-100	75-95	55-85	25-40	10-20
	22-40	Loam, silty clay loam, gravelly clay loam.	CL, CL-ML, SM-SC, SC	A-4, A-6	0-10	75-100	60-100	50-95	40-90	20-40	5-20
	40-62	Variable---------	---	---	---	---	---	---	---	---	---
40D, 40E--------- Massanutten	0-2	Channery silt loam.	SM, ML	A-4	0-2	65-80	55-75	45-70	35-70	<20	NP
	2-4	Channery silt loam, channery loam.	SM, SM-SC, ML	A-4	0-2	65-80	55-100	45-100	35-85	<25	NP-7
	4-21	Silt loam, channery silt loam, channery loam.	SM, SM-SC, ML	A-4	0-2	65-80	55-100	45-100	35-85	<25	3-10
	21-24	Extremely channery loam, sandy loam, very channery loam.	SM, GM	A-4, A-1-b, A-2	0-2	60-95	20-100	20-90	15-75	<20	NP
	24-28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
41D, 41E--------- Massanutten	0-2	Very stony silt loam.	SM, ML	A-4	50-75	60-75	50-70	45-65	35-60	<20	NP
	2-4	Very stony silt loam, very stony loam.	SM, SM-SC, ML	A-4	50-75	60-75	50-90	45-65	35-60	<25	NP-7
	4-21	Channery silt loam, channery loam, silt loam.	SM, SM-SC, ML	A-4	5-10	60-75	55-100	45-70	35-65	<25	3-10
	21-24	Extremely channery loam, sandy loam, very channery loam.	SM, GM	A-2, A-4, A-1-b	0-2	60-95	25-100	20-80	15-50	<20	NP
	24-28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
42A---------- Maurertown	0-6	Silty clay loam	CL, CH	A-6, A-7	0	95-100	95-100	90-100	70-90	30-55	12-30
	6-65	Silty clay loam, silty clay, clay.	CL, CH	A-7	0	95-100	95-100	85-100	75-95	40-75	15-45

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
43B, 43C--------- Moomaw	0-8	Fine sandy loam	ML	A-4	0-5	90-100	80-100	65-100	50-90	20-35	NP-10
	8-18	Silt loam, clay loam, gravelly loam.	CL, CL-ML	A-4, A-6	0-15	90-100	80-100	75-100	70-90	20-40	5-15
	18-65	Silt loam, sandy clay loam, gravelly loam.	ML, CL, SM, SC	A-4, A-6	0-10	80-100	60-100	55-95	45-90	20-40	3-15
44B, 44C--------- Moomaw	0-8	Cobbly fine sandy loam.	ML, SM	A-4	10-20	85-95	80-90	70-80	45-75	20-35	NP-10
	8-18	Silt loam, clay loam, gravelly loam.	CL, CL-ML	A-4, A-6	0-15	90-100	80-100	75-100	70-90	20-40	5-15
	18-65	Silt loam, sandy clay loam, gravelly loam.	ML, CL, SM, SC	A-4, A-6	0-10	80-100	60-100	55-95	45-95	20-40	3-15
45A---------- Newmarc	0-14	Silt loam--------	ML, CL-ML, CL	A-4	0	95-100	90-100	80-100	55-95	<32	NP-10
	14-36	Silt loam, silty clay loam.	ML, CL-ML, CL	A-4, A-6, A-7	0	95-100	90-100	85-100	70-100	22-42	3-20
	36-62	Loam, silt loam, silty clay loam.	ML, CL-ML, CL	A-4, A-6, A-7	0-3	75-100	70-100	65-100	55-95	22-42	3-20
46A---------- Nomberville	0-13	Loam----------	ML	A-4	0	100	95-100	80-95	60-80	<30	NP-7
	13-50	Silt loam, silty clay loam.	CL-ML, CL	A-4, A-6, A-7	0	100	95-100	85-100	65-100	25-50	5-25
	50-62	Gravelly silt loam, very gravelly sandy loam, silty clay loam.	ML, CL, CL-ML, GM	A-4, A-6	0-10	50-100	35-100	20-95	15-95	<30	NP-15
47C, 48C, 48D---- Opequon	0-3	Silty clay loam	CL, MH, CH	A-6, A-7	0-5	85-100	80-100	80-100	75-95	30-55	10-30
	3-20	Silty clay loam, clay, silty clay.	CH, MH, CL	A-6, A-7	0-10	80-100	60-100	60-100	55-95	35-65	15-40
	20-24	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
49*. Pits											
50A---------- Purdy	0-6	Silty clay loam	ML, CL	A-4, A-6, A-7	0	95-100	90-100	90-100	90-100	25-50	4-20
	6-51	Silty clay, clay, clay loam.	CL, CH, MH	A-6, A-7	0	95-100	90-100	85-100	75-85	30-65	11-30
	51-65	Silty clay, clay loam, clay.	CL, CH, MH	A-6, A-7	0	95-100	90-100	85-100	70-95	30-65	11-30
51D*:											
Rock outcrop----	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Carbo----------	0-8	Silty clay loam	CL	A-6, A-7	0-2	95-100	90-100	85-95	75-85	30-50	10-25
	8-37	Clay----------	CH	A-7	0-5	95-100	85-100	80-95	70-90	60-80	35-55
	37-41	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
52F*:											
Rock outcrop----	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Drall----------	0-4	Very stony loamy sand.	SW-SM, SM	A-1	10-25	70-85	40-75	25-50	5-25	<25	NP-5
	4-22	Very channery sand, very channery loamy sand.	SW, SM, GW, GM	A-1, A-2-4	20-30	50-65	20-55	10-45	2-20	<25	NP-5
	22-42	Channery sand, very channery sand, channery loamy sand.	SM, SW, GW, GM	A-1	20-30	50-65	20-55	10-45	2-20	<25	NP-5
	42-46	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Wallen----------	0-7	Very stony sandy loam.	SM, GM, ML, SM-SC	A-2, A-4	5-20	50-90	50-80	45-75	25-55	<35	NP-10
	7-35	Very channery sandy loam, very cobbly loam, very cobbly fine sandy loam.	SM, GM, GM-GC, SM-SC	A-2, A-4, A-1	20-55	35-65	30-60	20-50	10-40	<35	NP-10
	35-39	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
53C---------- Sequoia	0-5	Loam----------	CL, CL-ML	A-4, A-6	0	95-100	95-100	85-100	80-95	23-35	5-15
	5-38	Silty clay, clay, shaly silty clay.	CL, MH, CH	A-7	0	70-100	65-100	60-100	55-95	43-74	20-40
	38-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
53D, 53E--------- Sequoia	0-5	Loam----------	CL, CL-ML	A-4, A-6	0	95-100	95-100	85-100	80-95	23-35	5-15
	5-38	Silty clay, clay, shaly silty clay.	CL, MH, CH	A-7	0	70-100	65-100	60-100	55-95	43-74	20-40
	38-42	Weathered bedrock	---	---	---	---	---	---	---	---	---
54B---------- Timberville	0-8	Silt loam--------	ML, CL-ML	A-4	0-3	85-100	75-100	55-95	35-85	<25	NP-7
	8-22	Silt loam, silty clay loam, gravelly loam.	CL, CL-ML, GC, GM-GC	A-4, A-6	0-5	55-100	50-100	40-90	35-85	15-40	5-20
	22-65	Clay, silty clay loam, gravelly clay loam.	CL, CH, SC, GC	A-6, A-7	0-10	55-95	50-95	45-90	40-85	35-60	14-32
55A---------- Toms	0-10	Silt loam--------	ML, CL-ML	A-4	0-1	90-100	85-100	80-90	55-80	<25	NP-7
	10-21	Silt loam, loam	ML, CL-ML	A-4	0-1	90-100	85-100	80-95	60-85	<25	NP-7
	21-32	Clay, very cobbly clay, silty clay.	CL, CH	A-7	0-55	85-100	85-100	80-90	75-90	40-75	15-45
	32-44	Silty clay, silty clay loam, very channery clay.	CL, CH	A-7	0-55	90-100	90-100	85-100	75-95	40-75	15-45
	44-62	Very channery silty clay loam, clay loam, silty clay.	CL, CH	A-7	0-65	80-100	80-100	75-90	70-90	40-75	15-45
	62-66	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
56B, 56C--------- Trappist	0-8	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0	95-100	90-100	80-100	60-95	20-35	2-14
	8-37	Silty clay, clay, channery silty clay.	CL, CH	A-7, A-6	0	80-100	60-100	55-100	50-95	35-60	12-30
	37-40	Very channery clay, very channery silty clay, channery clay.	GC, CL, CH, SC	A-2, A-7, A-6	0-5	30-75	20-65	20-60	15-60	35-60	12-30
	40-44	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
57*. Udorthents											
58*: Udorthents.											
Urban land.											
59B, 59C--------- Unison	0-8	Loam----------	CL, ML, CL-ML, SM	A-4, A-6	0-25	75-100	75-100	60-95	50-90	20-38	2-15
	8-52	Clay loam, clay, gravelly silty clay.	CL, CH	A-6, A-7	0-25	75-100	65-100	60-100	55-95	35-65	15-35
	52-62	Cobbly clay loam, silty clay loam, very gravelly loam.	CL-ML, CL, ML, GM-GC	A-1, A-2, A-6, A-7	10-45	30-90	25-85	20-85	15-80	20-50	5-20
60B, 60C--------- Unison	0-8	Gravelly loam----	SM, ML, CL, GM	A-4, A-6	0-25	60-80	55-75	55-65	40-60	20-35	2-15
	8-52	Clay, clay loam, gravelly silty clay.	CL, CH	A-6, A-7	0-25	75-100	65-100	60-100	55-95	35-65	15-35
	52-62	Cobbly clay loam, silty clay loam, very gravelly loam.	CL-ML, CL, ML, GM-GC	A-1, A-2, A-6, A-7	10-45	30-90	25-85	20-85	15-80	20-50	5-20
61B, 61C--------- Unison	0-8	Cobbly loam------	ML, CL, CL-ML	A-4, A-6	25-45	80-90	75-90	60-85	55-80	20-35	2-15
	8-52	Clay, clay loam, gravelly silty clay.	CL, CH	A-6, A-7	0-25	75-100	65-100	60-100	55-95	35-65	15-35
	52-62	Cobbly clay loam, silty clay loam, very gravelly loam.	CL-ML, CL, ML, GM-GC	A-1, A-2, A-6, A-7	10-45	30-90	25-85	20-85	15-80	20-50	5-20
62C, 62D--------- Wallen	0-7	Channery sandy loam.	SM, SM-SC	A-2, A-4, A-1	2-20	70-85	60-80	40-60	20-40	<35	NP-10
	7-35	Very cobbly loam, very cobbly silt loam, very channery fine sandy loam.	GM, GM-GC, SM-SC, SM	A-2, A-4, A-1	25-55	35-65	30-60	20-50	10-40	<35	NP-10
	35-39	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
63C, 63D, 63E---- Wallen	0-7	Very stony sandy loam.	SM, GM, ML, SM-SC	A-2, A-4	5-20	50-90	50-80	45-75	25-55	<35	NP-10
	7-35	Very channery sandy loam, very cobbly loam, very cobbly fine sandy loam.	SM, GM, GM-GC, SM-SC	A-2, A-4, A-1	20-55	35-65	30-60	20-50	10-40	<35	NP-10
	35-39	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
64D, 64E, 64F---- Wallen	0-7	Extremely stony sandy loam.	SM, GM, ML, SM-SC	A-2, A-4	15-30	50-90	50-80	45-75	25-55	<35	NP-10
	7-35	Very channery sandy loam, very cobbly loam, very cobbly fine sandy loam.	SM, GM, GM-GC, SM-SC	A-2, A-4, A-1	20-55	35-65	30-60	20-50	10-40	<35	NP-10
	35-39	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
65C*, 65D*, 65E*:											
Wallen----------	0-7	Very stony sandy loam.	SM, GM, ML, SM-SC	A-2, A-4	5-20	50-90	50-80	45-75	25-55	<35	NP-10
	7-35	Very channery sandy loam, very cobbly loam, very cobbly fine sandy loam.	SM, GM, GM-GC, SM-SC	A-2, A-4, A-1	20-55	35-65	30-60	20-50	10-40	<35	NP-10
	35-39	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Lehew----------	0-4	Very stony loam	SM, GM, ML, CL-ML	A-2, A-4	5-25	50-90	45-80	40-75	20-55	15-30	NP-7
	4-20	Very channery sandy loam, channery fine sandy loam, extremely channery loam.	SM, GM, GM-GC, SM-SC	A-2, A-4	5-40	45-75	30-65	20-55	10-40	15-30	NP-7
	20-24	Very channery sandy loam, very channery fine sandy loam, extremely channery loam.	SM, GM, GM-GC, SM-SC	A-2, A-4	10-50	45-75	30-65	20-55	10-40	15-30	NP-7
	24-28	Weathered bedrock	---	---	---	---	---	---	---	---	---
66E*, 66F*:											
Wallen----------	0-7	Extremely stony sandy loam.	SM, GM, ML, SM-SC	A-2, A-4	15-30	50-90	50-80	45-75	25-55	<35	NP-10
	7-35	Very channery sandy loam, very cobbly loam, very cobbly fine sandy loam.	SM, GM, GM-GC, SM-SC	A-2, A-4, A-1	20-55	35-65	30-60	20-50	10-40	<35	NP-10
	35-39	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
66E*, 66F*:											
Lehew----------	0-4	Extremely stony loam.	SM, GM, ML, CL-ML	A-2, A-4	20-50	50-90	45-80	40-75	20-55	15-30	NP-7
	4-20	Very channery sandy loam, channery fine sandy loam, extremely channery loam.	SM, GM, GM-GC, SM-SC	A-2, A-4	5-40	45-75	30-65	20-55	10-40	15-30	NP-7
	20-24	Very channery sandy loam, very channery fine sandy loam, extremely channery loam.	SM, GM, GM-GC, SM-SC	A-2, A-4	10-50	45-75	30-65	20-55	10-40	15-30	NP-7
	24-28	Weathered bedrock	---	---	---	---	---	---	---	---	---
67F---------- Weikert	0-3	Channery silt loam.	GM, ML, SM	A-1, A-2, A-4	0-10	35-70	35-70	25-65	20-55	30-40	4-10
	3-16	Shaly loam, very shaly silt loam, cherty loam.	GM, GP-GM	A-1, A-2	0-20	15-60	10-55	5-45	5-35	28-36	3-9
	16-20	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
68D*, 68E*:											
Weikert---------	0-3	Channery silt loam.	GM, ML, SM	A-1, A-2, A-4	0-10	35-70	35-70	25-65	20-55	30-40	4-10
	3-16	Very channery loam, very channery silt loam, extremely channery loam.	GM, GP-GM	A-1, A-2	0-20	15-60	10-55	5-45	5-35	28-36	3-9
	16-20	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Berks----------	0-7	Channery silt loam.	GM, ML, GC, SC	A-2, A-4	0-20	50-80	45-70	40-60	30-55	25-36	5-10
	7-33	Channery loam, very channery loam, channery silt loam.	GM, GC, SM, SC	A-1, A-2, A-4	0-30	40-80	35-70	25-60	20-45	25-36	5-10
	33-37	Channery loam, very channery loam, extremely channery silt loam.	GM, SM	A-1, A-2	0-40	35-65	25-55	20-40	15-35	24-38	2-10
	37-41	Weathered bedrock	---	---	---	---	---	---	---	---	---
69D*, 69F*:											
Weikert---------	0-3	Very stony silt loam.	GM, ML, SM	A-1, A-2, A-4	3-15	35-70	35-70	25-65	20-55	30-40	4-10
	3-16	Very channery loam, very channery silt loam, extremely channery loam.	GM, GP-GM	A-1, A-2	0-20	15-60	10-55	5-45	5-35	28-36	3-9
	16-20	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
69D*, 69F*:											
Berks----------	0-7	Very stony silt loam.	GM, SM, GC, SC	A-2, A-4	15-30	40-80	35-70	30-60	25-45	25-36	5-10
	7-33	Channery loam, very channery loam, extremely channery silt loam.	GM, GC, SM, SC	A-1, A-2, A-4	0-30	40-80	35-70	25-60	20-45	25-36	5-10
	33-37	Channery loam, very channery loam, extremely channery silt loam.	GM, SM	A-1, A-2	0-40	35-65	25-55	20-40	15-35	24-38	2-10
	37-41	Weathered bedrock	---	---	---	---	---	---	---	---	---
70B---------- Wolfgap	0-11	Loam----------	ML, CL, CL-ML	A-4	0	90-100	90-100	75-100	55-90	20-35	2-10
	11-58	Clay loam, sandy clay loam, gravelly sandy loam.	ML, CL, SM, SC	A-4, A-6	0-5	90-100	70-100	65-100	45-80	20-40	2-20
	58-72	Very gravelly loamy sand, extremely gravelly fine sandy loam, extremely gravelly loam.	GM, SM, GP, GW	A-1, A-2, A-3, A-4	10-20	35-90	20-75	10-65	4-45	<20	NP-10
71D, 71E--------- Zepp	0-4	Very stony loam	SM, GM	A-2, A-4	5-25	60-75	50-70	45-65	30-55	<20	NP-10
	4-10	Channery loam, channery fine sandy loam, very stony sandy loam.	SM, SM-SC, GM	A-2, A-4	5-20	60-75	50-70	40-65	25-50	<25	NP-7
	10-48	Channery loam, very channery sandy loam, stony fine sandy loam.	SM, SM-SC, GM	A-2, A-4	0-15	60-75	55-70	40-70	25-55	<25	NP-10
	48-57	Channery clay loam, channery loam.	SM, SM-SC, GM	A-2, A-4	0	60-75	55-70	45-70	35-55	<35	3-15
	57-65	Extremely channery clay loam, channery loam.	SM, SM-SC, GM	A-2, A-4, A-1-b	0	45-75	25-70	20-70	15-50	<35	3-15

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
72E---------- Zepp	0-4	Extremely stony loam.	SM, GM	A-2, A-4	15-50	60-75	50-70	45-65	30-55	<20	NP-10
	4-10	Channery loam, channery fine sandy loam, extremely stony sandy loam.	SM, SM-SC, GM	A-2, A-4	15-50	60-70	50-70	40-65	25-50	<25	NP-7
	10-48	Channery loam, very channery sandy loam, stony fine sandy loam.	SM, SM-SC, GM	A-2, A-4	0-15	60-75	55-70	40-70	25-55	<25	NP-10
	48-57	Channery clay loam, channery loam.	SM, SM-SC, GM	A-2, A-4	0	60-75	55-70	45-70	35-55	<35	3-15
	57-65	Extremely channery clay loam, channery loam.	SM, SM-SC, GM	A-2, A-4, A-1-b	0	45-75	25-70	20-70	15-50	<35	3-15

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

(The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated)

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
1B, 1C---------- Alonzville	0-9	15-27	1.45-1.65	0.6-2.0	0.15-0.19	3.6-5.5	Low----------	0.32	5	1-4
	9-54	18-34	1.45-1.70	0.6-2.0	0.13-0.18	3.6-5.5	Low----------	0.28		
	54-65	10-34	1.45-1.70	0.6-2.0	0.08-0.17	3.6-5.5	Low----------	0.28		
2B---------- Berks	0-7	5-23	1.20-1.50	0.6-6.0	0.08-0.12	3.6-6.5	Low----------	0.17	3	.5-3
	7-33	5-32	1.20-1.60	0.6-6.0	0.04-0.10	3.6-6.5	Low----------	0.17		
	33-37	5-20	1.20-1.60	2.0-6.0	0.04-0.10	3.6-6.5	Low----------	0.17		
	37-41	---	---	---	---	---	----------	----		
3C*:										
Berks----------	0-7	5-23	1.20-1.50	0.6-6.0	0.08-0.12	3.6-6.5	Low----------	0.17	3	.5-3
	7-33	5-32	1.20-1.60	0.6-6.0	0.04-0.10	3.6-6.5	Low----------	0.17		
	33-37	5-20	1.20-1.60	2.0-6.0	0.04-0.10	3.6-6.5	Low----------	0.17		
	37-41	---	---	---	---	---	----------	----		
Weikert---------	0-3	15-27	1.20-1.40	2.0-6.0	0.08-0.14	4.5-6.0	Low----------	0.28	2	1-3
	3-16	15-27	1.20-1.40	2.0-6.0	0.04-0.08	4.5-6.0	Low----------	0.28		
	16-20	---	---	---	---	---	----------	----		
4B, 4C---------- Blairton	0-9	10-27	1.40-1.60	0.6-2.0	0.14-0.18	3.6-5.5	Low----------	0.43	3-2	1-4
	9-31	18-35	1.50-1.70	0.2-0.6	0.08-0.14	3.6-5.5	Low----------	0.32		
	31-35	---	---	---	---	---	----------	----		
5B, 5C---------- Braddock	0-7	10-25	1.20-1.50	0.6-6.0	0.14-0.19	3.6-5.5	Low----------	0.32	4	1-2
	7-37	35-55	1.20-1.50	0.6-2.0	0.12-0.17	3.6-5.5	Moderate-----	0.24		
	37-65	25-45	1.20-1.50	0.6-6.0	0.06-0.12	3.6-5.5	Low----------	0.24		
6B, 6C, 6D------- Braddock	0-7	10-25	1.00-1.20	0.6-6.0	0.10-0.19	3.6-5.5	Low----------	0.24	4	1-2
	7-37	35-55	1.20-1.50	0.6-2.0	0.14-0.19	3.6-5.5	Moderate-----	0.20		
	37-65	25-45	1.20-1.50	0.6-6.0	0.06-0.12	3.6-5.5	Low----------	0.20		
7A---------- Broadway	0-11	10-27	1.35-1.60	0.6-2.0	0.12-0.22	7.4-8.4	Low----------	0.28	5	1-3
	11-46	18-35	1.40-1.70	0.6-2.0	0.14-0.22	7.4-8.4	Low----------	0.32		
	46-72	5-15	1.55-1.70	0.6-6.0	0.06-0.10	7.4-8.4	Low----------	0.20		
8B, 8C---------- Carbo	0-8	20-40	1.20-1.40	0.6-2.0	0.16-0.19	4.5-7.3	Moderate-----	0.37	2	.5-3
	8-37	60-80	1.30-1.45	0.06-0.2	0.10-0.14	5.6-7.8	High---------	0.24		
	37-41	---	---	---	---	---	----------	----		
9C*:										
Carbo----------	0-8	20-40	1.20-1.40	0.6-2.0	0.16-0.19	4.5-7.3	Moderate-----	0.37	2	.5-3
	8-37	60-80	1.30-1.45	0.06-0.2	0.10-0.14	5.6-7.8	High---------	0.24		
	37-41	---	---	---	---	---	----------	----		
Endcav----------	0-8	30-40	1.20-1.40	0.6-2.0	0.15-0.20	5.1-7.3	Moderate-----	0.37	2	.5-2
	8-58	35-80	1.30-1.50	0.06-0.2	0.10-0.14	5.1-7.8	High---------	0.20		
	58-62	---	---	---	---	---	----------	----		
9D*:										
Carbo----------	0-8	20-40	1.20-1.40	0.6-2.0	0.16-0.19	4.5-7.3	Moderate-----	0.37	2	.5-3
	8-37	60-80	1.30-1.45	0.06-0.2	0.10-0.14	5.6-7.8	High---------	0.24		
	37-41	---	---	---	---	---	----------	----		
Endcav----------	0-8	30-40	1.20-1.40	0.6-2.0	0.15-0.20	5.1-7.3	Moderate-----	0.37	2	.5-2
	8-58	35-80	1.30-1.50	0.06-0.2	0.10-0.14	5.1-7.8	High---------	0.20		
	58-67	---	---	---	---	---	----------	----		

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
10A---------- Caverns	0-10	7-18	1.45-1.65	2.0-6.0	0.11-0.18	5.6-7.3	Low----------	0.20	5	1-3
	10-39	7-18	1.45-1.70	2.0-6.0	0.11-0.20	5.6-7.3	Low----------	0.24		
	39-72	7-18	1.45-1.70	2.0-6.0	0.08-0.18	5.6-7.3	Low----------	0.24		
11B, 11C, 11D, 11E, 12C, 12D, 13C, 13D, 13E--- Chilhowie	0-6	30-40	1.20-1.40	0.6-2.0	0.15-0.20	6.1-8.4	Moderate-----	0.37	2	.5-3
	6-18	60-80	1.30-1.45	0.06-0.2	0.10-0.15	6.1-8.4	High---------	0.24		
	18-35	55-80	1.20-1.50	0.06-0.2	0.02-0.05	6.6-8.4	High---------	0.24		
	35-39	---	---	---	---	---	----------	----		
14B---------- Coursey	0-12	18-27	1.35-1.60	0.6-2.0	0.14-0.23	3.6-5.5	Low----------	0.32	5	1-3
	12-58	18-35	1.45-1.70	0.6-2.0	0.07-0.15	3.6-5.5	Low----------	0.28		
	58-60	18-35	1.50-1.70	0.6-2.0	0.07-0.15	3.6-5.5	Low----------	0.28		
14C---------- Coursey	0-12	18-27	1.35-1.60	0.6-2.0	0.14-0.23	3.6-5.5	Low----------	0.32	5	1-3
	12-58	18-35	1.45-1.70	0.6-2.0	0.07-0.15	3.6-5.5	Low----------	0.28		
	58-63	18-35	1.50-1.70	0.6-2.0	0.07-0.15	3.6-5.5	Low----------	0.28		
15A---------- Derroc	0-3	5-15	1.40-1.65	2.0-20	0.10-0.15	5.6-7.3	Low----------	0.17	3	1-3
	3-37	5-15	1.55-1.70	2.0-20	0.06-0.09	5.6-7.3	Low----------	0.17		
	37-65	5-10	1.55-1.70	>6.0	0.04-0.07	5.6-7.3	Low----------	0.17		
16B, 16C--------- Edom	0-7	15-35	1.20-1.50	0.6-2.0	0.14-0.20	5.1-7.8	Low----------	0.28	3	.5-4
	7-34	35-60	1.30-1.60	0.2-2.0	0.10-0.14	5.1-7.8	Moderate-----	0.28		
	34-65	27-60	1.30-1.60	0.2-2.0	0.04-0.08	5.6-7.8	Moderate-----	0.17		
17B, 17C, 17D, 18B, 18C-------- Endcav	0-8	10-25	1.20-1.40	0.6-2.0	0.17-0.22	5.1-7.3	Low----------	0.37	3	.5-2
	8-58	35-80	1.30-1.50	0.06-0.2	0.10-0.14	5.1-7.8	High---------	0.20		
	58-62	---	---	---	---	---	----------	----		
19D---------- Frederick	0-7	13-27	1.25-1.50	2.0-6.0	0.12-0.20	4.5-6.0	Low----------	0.28	4	1-2
	7-16	35-75	1.20-1.50	0.6-2.0	0.10-0.18	4.5-6.0	Moderate-----	0.24		
	16-47	40-80	1.20-1.50	0.6-2.0	0.10-0.18	4.5-6.0	High---------	0.24		
	47-65	40-70	1.20-1.50	0.6-2.0	0.09-0.20	4.5-6.0	High---------	0.24		
20B*, 20C*, 20D*: Frederick-------	0-7	13-27	1.25-1.50	2.0-6.0	0.16-0.24	4.5-6.0	Low----------	0.32	4	1-2
	7-16	35-75	1.20-1.50	0.6-2.0	0.12-0.18	4.5-6.0	Moderate-----	0.24		
	16-47	40-80	1.20-1.50	0.6-2.0	0.10-0.18	4.5-6.0	High---------	0.24		
	47-65	40-80	1.20-1.40	0.6-2.0	0.10-0.20	4.5-6.0	High---------	0.24		
Poplimento------	0-12	17-27	1.20-1.35	0.6-2.0	0.15-0.22	4.5-6.5	Low----------	0.32	4	.5-2
	12-23	35-60	1.30-1.60	0.2-0.6	0.10-0.14	4.5-6.5	High---------	0.24		
	23-54	30-55	1.30-1.55	0.2-0.6	0.07-0.14	4.5-6.5	High---------	0.24		
	54-62	27-50	1.25-1.50	0.2-0.6	0.05-0.12	4.5-6.5	Moderate-----	0.24		
21B*, 21C*, 21D*, 21E*: Frederick------	0-7	13-27	1.25-1.50	2.0-6.0	0.12-0.20	4.5-6.0	Low----------	0.28	4	1-2
	7-16	35-75	1.20-1.50	0.6-2.0	0.10-0.18	4.5-6.0	Moderate-----	0.24		
	16-47	40-80	1.20-1.50	0.6-2.0	0.10-0.18	4.5-6.0	High---------	0.24		
	47-65	40-70	1.20-1.50	0.6-2.0	0.09-0.20	4.5-6.0	High---------	0.24		
Poplimento-----	0-12	10-27	1.20-1.35	0.6-2.0	0.08-0.14	4.5-6.5	Low----------	0.24	4	.5-2
	12-23	35-60	1.30-1.60	0.2-0.6	0.10-0.14	4.5-6.5	High---------	0.24		
	23-54	30-55	1.30-1.55	0.2-0.6	0.07-0.14	4.5-6.5	High---------	0.24		
	54-62	27-50	1.25-1.50	0.2-0.6	0.05-0.12	4.5-6.5	Moderate-----	0.24		

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
22B*, 22C*, 22D*, 23C*, 23D*:										
Frederick------	0-7	13-27	1.25-1.50	2.0-6.0	0.16-0.24	4.5-6.0	Low----------	0.32	4	1-2
	7-16	35-75	1.20-1.50	0.6-2.0	0.12-0.18	4.5-6.0	Moderate-----	0.24		
	16-47	40-80	1.20-1.50	0.6-2.0	0.10-0.18	4.5-6.0	High---------	0.24		
	47-65	40-80	1.20-1.40	0.6-2.0	0.10-0.20	4.5-6.0	High---------	0.24		
Poplimento-----	0-12	17-27	1.20-1.35	0.6-2.0	0.15-0.22	4.5-6.5	Low----------	0.32	4	.5-2
	12-23	35-60	1.30-1.60	0.2-0.6	0.10-0.14	4.5-6.5	High---------	0.24		
	23-54	30-55	1.30-1.55	0.2-0.6	0.07-0.14	4.5-6.5	High---------	0.24		
	54-62	27-50	1.25-1.50	0.2-0.6	0.05-0.12	4.5-6.5	Moderate-----	0.24		
24B*, 24C*, 24D*, 24E*:										
Gainesboro-----	0-7	10-27	1.20-1.50	2.0-6.0	0.16-0.22	4.5-6.0	Low----------	0.32	3	1-2
	7-24	18-35	1.30-1.55	0.6-6.0	0.06-0.11	4.5-6.0	Low----------	0.24		
	24-30	18-35	1.20-1.50	0.6-6.0	0.05-0.10	4.5-6.0	Low----------	0.24		
	30-34	---	---	---	---	---	----------	----		
Berks----------	0-7	5-23	1.20-1.50	0.6-6.0	0.08-0.12	3.6-6.5	Low----------	0.17	3	.5-3
	7-33	5-32	1.20-1.60	0.6-6.0	0.04-0.10	3.6-6.5	Low----------	0.17		
	33-37	5-20	1.20-1.60	2.0-6.0	0.04-0.10	3.6-6.5	Low----------	0.17		
	37-41	---	---	---	---	---	----------	----		
25B, 25C, 25D---- Gilpin	0-3	15-27	1.20-1.40	0.6-2.0	0.12-0.18	3.6-5.5	Low----------	0.32	3	.5-4
	3-10	18-35	1.20-1.50	0.6-2.0	0.12-0.16	3.6-5.5	Low----------	0.24		
	10-26	15-35	1.20-1.50	0.6-2.0	0.08-0.12	3.6-5.5	Low----------	0.24		
	26-30	---	---	---	---	---	----------	----		
26C, 26D--------- Gilpin	0-3	15-27	1.20-1.40	0.6-2.0	0.12-0.16	3.6-5.5	Low----------	0.24	3	.5-4
	3-10	18-35	1.20-1.50	0.6-2.0	0.12-0.16	3.6-5.5	Low----------	0.24		
	10-26	15-35	1.20-1.50	0.6-2.0	0.08-0.12	3.6-5.5	Low----------	0.24		
	26-30	---	---	---	---	---	----------	----		
27C, 27D, 27E---- Gilpin	0-3	15-27	1.20-1.40	0.6-2.0	0.08-0.14	3.6-5.5	Low----------	0.24	3	.5-2
	3-10	18-35	1.20-1.50	0.6-2.0	0.12-0.16	3.6-5.5	Low----------	0.24		
	10-26	15-35	1.20-1.50	0.6-2.0	0.08-0.12	3.6-5.5	Low----------	0.24		
	26-30	---	---	---	---	---	----------	----		
28C, 28D, 28E---- Gilpin	0-3	15-27	1.20-1.40	0.6-2.0	0.08-0.14	3.6-5.5	Low----------	0.24	3	.5-2
	3-10	18-35	1.20-1.50	0.6-2.0	0.12-0.16	3.6-5.5	Low----------	0.24		
	10-26	15-35	1.20-1.50	0.6-2.0	0.08-0.12	3.6-5.5	Low----------	0.24		
	26-30	---	---	---	---	---	----------	----		
29A---------- Gladehill	0-5	5-10	1.45-1.65	2.0-6.0	0.08-0.14	6.1-8.4	Low----------	0.20	5	1-3
	5-42	5-18	1.45-1.70	2.0-6.0	0.10-0.20	6.1-8.4	Low----------	0.28		
	42-72	5-10	1.50-1.70	2.0-6.0	0.08-0.16	6.1-8.4	Low----------	0.28		
30A---------- Guyan	0-7	12-25	1.20-1.40	0.6-2.0	0.18-0.22	5.1-7.0	Low----------	0.32	4	1-3
	7-62	20-35	1.25-1.55	0.6-2.0	0.14-0.20	4.5-5.5	Low----------	0.37		
31B, 31C, 32C, 32D---------- Jefferson	0-5	10-20	1.30-1.50	2.0-6.0	0.10-0.18	4.5-5.5	Low----------	0.24	4	.5-5
	5-48	18-34	1.30-1.65	2.0-6.0	0.10-0.16	4.5-5.5	Low----------	0.28		
	48-72	15-30	1.30-1.65	2.0-6.0	0.08-0.14	4.5-5.5	Low----------	0.17		
33C---------- Jefferson	0-5	10-25	1.30-1.50	2.0-6.0	0.10-0.16	4.5-5.5	Low----------	0.10	4	.5-5
	5-48	18-34	1.30-1.65	2.0-6.0	0.10-0.16	4.5-5.5	Low----------	0.28		
	48-60	15-30	1.30-1.65	2.0-6.0	0.08-0.14	4.5-5.5	Low----------	0.17		

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
33D, 33E--------- Jefferson	0-5	10-25	1.30-1.50	2.0-6.0	0.10-0.16	4.5-5.5	Low----------	0.10	4	.5-5
	5-48	18-34	1.30-1.65	2.0-6.0	0.10-0.16	4.5-5.5	Low----------	0.28		
	48-72	15-30	1.30-1.65	2.0-6.0	0.08-0.14	4.5-5.5	Low----------	0.17		
34B, 34C, 35C, 35D, 36B, 36C--- Laidig	0-7	10-27	1.20-1.40	0.6-2.0	0.12-0.18	3.6-5.5	Low----------	0.28	4	1-4
	7-30	18-35	1.30-1.50	0.6-6.0	0.08-0.12	3.6-5.5	Low----------	0.24		
	30-65	18-35	1.30-1.60	0.06-0.6	0.06-0.10	3.6-5.5	Low----------	0.17		
37C, 37D, 37E---- Laidig	0-7	7-27	1.20-1.40	0.6-6.0	0.08-0.12	3.6-5.5	Low----------	0.28	4	1-4
	7-30	18-35	1.30-1.50	0.6-6.0	0.08-0.10	3.6-5.5	Low----------	0.28		
	30-65	18-35	1.30-1.60	0.06-0.6	0.06-0.10	3.6-5.5	Low----------	0.17		
38B*, 38C*, 38D*, 38E*:										
Lehew----------	0-4	4-16	1.20-1.40	2.0-20	0.08-0.12	4.5-5.5	Low----------	0.17	3	1-4
	4-20	5-18	1.20-1.40	2.0-20	0.06-0.10	4.5-5.5	Low----------	0.17		
	20-24	5-18	1.20-1.40	2.0-20	0.06-0.10	4.5-5.5	Low----------	0.17		
	24-28	---	---	---	---	---	----------	----		
Gainesboro-----	0-7	10-27	1.20-1.50	2.0-6.0	0.16-0.22	4.5-6.0	Low----------	0.32	3	1-2
	7-24	18-35	1.30-1.55	0.6-6.0	0.06-0.11	4.5-6.0	Low----------	0.24		
	24-30	18-35	1.20-1.50	0.6-6.0	0.05-0.10	4.5-6.0	Low----------	0.24		
	30-34	---	---	---	---	---	----------	----		
39A---------- Massanetta	0-11	20-26	1.20-1.55	0.6-2.0	0.14-0.20	7.4-8.4	Low----------	0.37	5	4-8
	11-22	20-32	1.35-1.65	0.6-2.0	0.14-0.20	7.4-8.4	Low----------	0.37		
	22-40	22-32	1.30-1.60	0.6-2.0	0.12-0.20	7.4-8.4	Low----------	0.28		
	40-62	---	---	---	---	---	----------	----		
40D, 40E--------- Massanutten	0-2	5-10	1.20-1.40	2.0-6.0	0.12-0.17	3.6-5.5	Low----------	0.24	2	.5-2
	2-4	8-12	1.25-1.45	2.0-6.0	0.12-0.17	3.6-5.5	Low----------	0.24		
	4-21	12-18	1.25-1.45	2.0-6.0	0.10-0.20	3.6-5.5	Low----------	0.17		
	21-24	5-10	1.25-1.45	2.0-6.0	0.05-0.10	3.6-5.5	Low----------	0.17		
	24-28	---	---	---	---	---	----------	----		
41D, 41E--------- Massanutten	0-2	5-10	1.20-1.40	2.0-6.0	0.08-0.12	3.6-5.5	Low----------	0.24	2	.5-2
	2-4	8-12	1.25-1.45	2.0-6.0	0.08-0.12	3.6-5.5	Low----------	0.24		
	4-21	12-18	1.25-1.45	2.0-6.0	0.10-0.14	3.6-5.5	Low----------	0.17		
	21-24	5-10	1.25-1.45	2.0-6.0	0.05-0.10	3.6-5.5	Low----------	0.17		
	24-28	---	---	---	---	---	----------	----		
42A---------- Maurertown	0-6	27-40	1.30-1.40	0.2-0.6	0.12-0.18	5.6-7.3	Moderate-----	0.37	3	2-4
	6-65	35-60	1.30-1.50	<0.06	0.12-0.16	5.6-7.3	High---------	0.32		
43B, 43C--------- Moomaw	0-8	10-20	1.45-1.65	0.6-2.0	0.14-0.22	4.5-5.5	Low----------	0.17	3	.5-3
	8-18	18-35	1.45-1.65	0.6-2.0	0.10-0.21	4.5-5.5	Low----------	0.32		
	18-65	18-35	1.45-1.70	0.06-0.6	0.08-0.20	4.5-5.5	Low----------	0.32		
44B, 44C--------- Moomaw	0-8	10-27	1.35-1.65	0.6-2.0	0.13-0.22	4.5-5.5	Low----------	0.24	3	.5-3
	8-18	18-35	1.45-1.65	0.6-2.0	0.10-0.18	4.5-5.5	Low----------	0.32		
	18-65	18-35	1.45-1.70	0.06-0.6	0.08-0.20	4.5-5.5	Low----------	0.32		
45A---------- Newmarc	0-14	7-27	1.35-1.60	0.6-2.0	0.15-0.24	5.6-7.8	Low----------	0.32	5	1-4
	14-36	18-35	1.40-1.60	0.6-2.0	0.14-0.23	5.6-7.8	Low----------	0.43		
	36-62	12-40	1.40-1.70	0.6-2.0	0.13-0.21	5.6-7.8	Low----------	0.43		
46A---------- Nomberville	0-13	10-25	1.40-1.70	0.6-2.0	0.14-0.18	5.6-8.4	Low----------	0.28	5	1-3
	13-50	18-35	1.55-1.70	0.6-2.0	0.18-0.23	5.6-8.4	Low----------	0.32		
	50-62	10-30	1.55-1.70	0.6-6.0	0.10-0.23	5.6-8.4	Low----------	0.32		

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
47C, 48C, 48D---- Opequon	0-3	27-45	1.20-1.50	0.2-2.0	0.16-0.21	5.1-7.8	High---------	0.37	1	1-4
	3-20	35-75	1.40-1.70	0.2-2.0	0.12-0.16	5.1-7.8	High---------	0.32		
	20-24	---	---	---	---	---	----------	----		
49*. Pits										
50A---------- Purdy	0-6	18-35	1.30-1.50	0.2-0.6	0.18-0.24	3.6-5.5	Moderate-----	0.43	3	2-4
	6-51	35-50	1.30-1.60	<0.2	0.12-0.18	3.6-5.5	Moderate-----	0.32		
	51-65	35-50	1.30-1.60	<0.2	0.10-0.16	3.6-5.5	Moderate-----	0.32		
51D*:										
Rock outcrop----	0-60	---	---	---	---	---	----------	----	---	---
Carbo----------	0-8	20-40	1.20-1.40	0.6-2.0	0.16-0.19	4.5-7.3	Moderate-----	0.37	2	.5-3
	8-37	60-80	1.30-1.45	0.06-0.2	0.10-0.14	5.6-7.8	High---------	0.24		
	37-41	---	---	---	---	---	----------	----		
52F*:										
Rock outcrop----	0-60	---	---	---	---	---	----------	----	---	---
Drall----------	0-4	5-18	1.25-1.40	6.0-20.0	0.04-0.08	4.5-5.5	Low----------	0.17	3	.5-2
	4-22	5-15	1.25-1.40	6.0-20.0	0.04-0.08	4.5-5.5	Low----------	0.17		
	22-42	15-45	1.30-1.60	0.6-20.0	0.08-0.12	4.5-5.5	Low----------	0.17		
	42-46	---	---	---	---	---	----------	----		
Wallen----------	0-7	8-20	1.40-1.55	2.0-6.0	0.08-0.12	4.5-6.0	Low----------	0.17	2	0-2
	7-35	8-20	1.40-1.55	2.0-6.0	0.05-0.10	4.5-6.0	Low----------	0.17		
	35-39	---	---	---	---	---	----------	----		
53C---------- Sequoia	0-5	15-27	1.30-1.50	0.6-2.0	0.17-0.20	4.5-5.5	Low----------	0.37	3	.5-2
	5-38	35-60	1.35-1.55	0.2-0.6	0.08-0.16	4.5-5.5	Moderate-----	0.24		
	38-60	---	---	---	---	---	----------	----		
53D, 53E--------- Sequoia	0-5	15-27	1.30-1.50	0.6-2.0	0.17-0.20	4.5-5.5	Low----------	0.37	3	.5-2
	5-38	35-60	1.35-1.55	0.2-0.6	0.08-0.16	4.5-5.5	Moderate-----	0.24		
	38-42	---	---	---	---	---	----------	----		
54B---------- Timberville	0-8	6-25	1.30-1.50	2.0-6.0	0.11-0.18	3.6-6.5	Low----------	----	5	1-3
	8-22	13-25	1.30-1.50	0.6-2.0	0.11-0.19	3.6-6.5	Low----------	0.24		
	22-65	35-60	1.40-1.55	0.6-2.0	0.14-0.18	3.6-6.5	Moderate-----	0.24		
55A---------- Toms	0-10	12-20	1.20-1.35	0.6-2.0	0.18-0.22	5.6-7.8	Low----------	0.43	3	2-4
	10-21	12-27	1.20-1.35	0.6-2.0	0.18-0.22	5.6-7.8	Low----------	0.43		
	21-32	35-60	1.25-1.40	0.06-0.2	0.12-0.16	5.6-7.8	Moderate-----	0.32		
	32-44	35-60	1.25-1.40	0.06-0.2	0.12-0.16	5.6-7.8	Moderate-----	0.32		
	44-62	35-50	1.25-1.40	0.06-0.2	0.12-0.16	5.6-7.8	Moderate-----	0.32		
	62-66	---	---	---	---	---	----------	----		
56B, 56C--------- Trappist	0-8	7-27	1.20-1.40	0.6-2.0	0.15-0.23	3.6-5.5	Low----------	0.37	3	1-3
	8-37	30-60	1.40-1.65	0.2-0.6	0.08-0.18	3.6-5.5	Moderate-----	0.28		
	37-40	35-60	1.40-1.60	0.06-0.2	0.05-0.12	3.6-5.5	Moderate-----	0.24		
	40-44	---	---	---	---	---	----------	----		
57*. Udorthents										
58*: Udorthents.										
Urban land.										

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
59B, 59C--------- Unison	0-8	10-25	1.35-1.65	0.6-6.0	0.14-0.20	4.5-6.0	Low----------	0.32	4	1-3
	8-52	30-70	1.30-1.60	0.6-2.0	0.12-0.18	4.5-6.0	Moderate-----	0.24		
	52-62	30-50	1.30-1.60	0.6-6.0	0.08-0.16	4.5-6.0	Moderate-----	0.28		
60B, 60C--------- Unison	0-8	10-25	1.35-1.65	0.6-6.0	0.11-0.17	4.5-6.0	Low----------	0.24	4	1-3
	8-52	30-70	1.30-1.60	0.6-2.0	0.12-0.18	4.5-6.0	Moderate-----	0.24		
	52-62	30-50	1.30-1.60	0.6-6.0	0.08-0.16	4.5-6.0	Moderate-----	0.24		
61B, 61C--------- Unison	0-8	10-25	1.35-1.65	0.6-6.0	0.11-0.17	4.5-6.0	Low----------	0.24	4	1-3
	8-52	30-70	1.30-1.60	0.6-2.0	0.12-0.18	4.5-6.0	Moderate-----	0.24		
	52-62	30-50	1.30-1.60	0.6-6.0	0.08-0.16	4.5-6.0	Moderate-----	0.24		
62C, 62D--------- Wallen	0-7	8-20	1.40-1.55	2.0-6.0	0.07-0.11	4.5-6.0	Low----------	0.17	2	.5-2
	7-35	8-20	1.40-1.55	2.0-6.0	0.05-0.09	4.5-6.0	Low----------	0.17		
	35-39	---	---	---	---	---	----------	----		
63C, 63D, 63E---- Wallen	0-7	8-20	1.40-1.55	2.0-6.0	0.08-0.12	4.5-6.0	Low----------	0.17	2	.5-2
	7-35	8-20	1.40-1.55	2.0-6.0	0.05-0.10	4.5-6.0	Low----------	0.17		
	35-39	---	---	---	---	---	----------	----		
64D, 64E, 64F---- Wallen	0-7	8-20	1.40-1.55	2.0-6.0	0.08-0.12	4.5-6.0	Low----------	0.17	2	.5-2
	7-35	8-20	1.40-1.55	2.0-6.0	0.05-0.10	4.5-6.0	Low----------	0.17		
	35-39	---	---	---	---	---	----------	----		
65C*, 65D*, 65E*:										
Wallen----------	0-7	8-20	1.40-1.55	2.0-6.0	0.08-0.12	4.5-6.0	Low----------	0.17	2	.5-2
	7-35	8-20	1.40-1.55	2.0-6.0	0.05-0.10	4.5-6.0	Low----------	0.17		
	35-39	---	---	---	---	---	----------	----		
Lehew----------	0-4	4-16	1.20-1.40	2.0-20	0.08-0.12	4.5-5.5	Low----------	0.17	3	.5-2
	4-20	5-18	1.20-1.40	2.0-20	0.06-0.10	4.5-5.5	Low----------	0.17		
	20-24	5-18	1.20-1.40	2.0-20	0.06-0.10	4.5-5.5	Low----------	0.17		
	24-28	---	---	---	---	---	----------	----		
66E*, 66F*:										
Wallen----------	0-7	8-20	1.40-1.55	2.0-6.0	0.08-0.12	4.5-6.0	Low----------	0.17	2	.5-2
	7-35	8-20	1.40-1.55	2.0-6.0	0.05-0.10	4.5-6.0	Low----------	0.17		
	35-39	---	---	---	---	---	----------	----		
Lehew----------	0-4	4-16	1.20-1.40	2.0-20	0.08-0.12	4.5-5.5	Low----------	0.17	3	.5-2
	4-20	5-18	1.20-1.40	2.0-20	0.06-0.10	4.5-5.5	Low----------	0.17		
	20-24	5-18	1.20-1.40	2.0-20	0.06-0.10	4.5-5.5	Low----------	0.17		
	24-28	---	---	---	---	---	----------	----		
67F---------- Weikert	0-3	15-27	1.20-1.40	2.0-6.0	0.08-0.14	4.5-6.0	Low----------	0.28	2	1-3
	3-16	15-27	1.20-1.40	2.0-6.0	0.04-0.08	4.5-6.0	Low----------	0.28		
	16-20	---	---	---	---	---	----------	----		
68D*, 68E*:										
Weikert---------	0-3	15-27	1.20-1.40	2.0-6.0	0.08-0.14	4.5-6.0	Low----------	0.28	2	1-3
	3-16	15-27	1.20-1.40	2.0-6.0	0.04-0.08	4.5-6.0	Low----------	0.28		
	16-20	---	---	---	---	---	----------	----		
Berks----------	0-7	5-23	1.20-1.50	0.6-6.0	0.08-0.12	3.6-6.5	Low----------	0.17	3	.5-3
	7-33	5-32	1.20-1.60	0.6-6.0	0.04-0.10	3.6-6.5	Low----------	0.17		
	33-37	5-20	1.20-1.60	2.0-6.0	0.04-0.10	3.6-6.5	Low----------	0.17		
	37-41	---	---	---	---	---	----------	----		

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
69D*, 69F*:										
Weikert---------	0-3	15-27	1.20-1.40	2.0-6.0	0.08-0.14	4.5-5.5	Low----------	0.20	2	1-3
	3-16	15-27	1.20-1.40	2.0-6.0	0.04-0.08	3.6-5.5	Low----------	0.28		
	16-20	---	---	---	---	---	----------	----		
Berks----------	0-7	5-23	1.20-1.50	0.6-6.0	0.08-0.12	3.6-6.5	Low----------	0.17	3	.5-3
	7-33	5-32	1.20-1.60	0.6-6.0	0.04-0.10	3.6-6.5	Low----------	0.17		
	33-37	5-20	1.20-1.60	2.0-6.0	0.04-0.10	3.6-6.5	Low----------	0.17		
	37-41	---	---	---	---	---	----------	----		
70B---------- Wolfgap	0-11	12-20	1.35-1.60	0.6-2.0	0.12-0.18	6.1-8.4	Low----------	0.32	5	1-3
	11-58	18-30	1.45-1.70	0.6-2.0	0.08-0.16	6.1-8.4	Low----------	0.32		
	58-72	8-15	1.50-1.70	6.0-20	0.04-0.08	6.1-8.4	Low----------	0.20		
71D, 71E--------- Zepp	0-4	7-20	1.20-1.40	2.0-6.0	0.08-0.12	3.6-5.5	Low----------	0.17	5	.5-2
	4-10	5-15	1.25-1.45	2.0-6.0	0.08-0.12	3.6-5.5	Low----------	0.24		
	10-48	10-18	1.25-1.45	2.0-6.0	0.10-0.14	3.6-5.5	Low----------	0.17		
	48-57	20-40	1.25-1.45	2.0-6.0	0.12-0.16	3.6-5.5	Low----------	0.17		
	57-65	20-40	1.25-1.45	2.0-6.0	0.12-0.16	3.6-5.5	Low----------	0.17		
72E---------- Zepp	0-4	7-20	1.20-1.40	2.0-6.0	0.08-0.12	3.6-5.5	Low----------	0.15	5	.5-2
	4-10	5-15	1.25-1.45	2.0-6.0	0.08-0.12	3.6-5.5	Low----------	0.24		
	10-48	10-18	1.25-1.45	2.0-6.0	0.10-0.14	3.6-5.5	Low----------	0.17		
	48-57	20-40	1.25-1.45	2.0-6.0	0.12-0.16	3.6-5.5	Low----------	0.17		
	57-65	20-40	1.25-1.45	2.0-6.0	0.12-0.16	3.6-5.5	Low----------	0.17		

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--WATER FEATURES

("Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth	Kind	Months
					Ft		
1B---------- Alonzville	B	Rare----------	---	---	>6.0	---	---
1C---------- Alonzville	B	None----------	---	---	>6.0	---	---
2B---------- Berks	C	None----------	---	---	>6.0	---	---
3C*:							
Berks----------	C	None----------	---	---	>6.0	---	---
Weikert----------	C/D	None----------	---	---	>6.0	---	---
4B, 4C---------- Blairton	C	None----------	---	---	0.5-3.0	Perched	Nov-Mar
5B, 5C, 6B, 6C, 6D------ Braddock	B	None----------	---	---	>6.0	---	---
7A---------- Broadway	B	Occasional------	Very brief to brief.	Dec-Mar	>6.0	---	---
8B, 8C---------- Carbo	C	None----------	---	---	>6.0	---	---
9C*, 9D*:							
Carbo----------	C	None----------	---	---	>6.0	---	---
Endcav----------	C	None----------	---	---	>6.0	---	---
10A---------- Caverns	B	Rare----------	---	---	>6.0	---	---
11B, 11C, 11D, 11E, 12C, 12D, 13C, 13D, 13E----- Chilhowie	C	None----------	---	---	>6.0	---	---
14B, 14C---------- Coursey	C	None----------	---	---	2.0-3.0	Apparent	Nov-May
15A---------- Derroc	B	Frequent--------	Very brief to brief.	Dec-Mar	>6.0	---	---
16B, 16C---------- Edom	C	None----------	---	---	>6.0	---	---
17B, 17C, 17D, 18B, 18C- Endcav	C	None----------	---	---	>6.0	---	---
19D---------- Frederick	B	None----------	---	---	>6.0	---	---

See footnote at end of table.

TABLE 16.--WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth	Kind	Months
					Ft		
20B*, 20C*, 20D*, 21B*, 21C*, 21D*, 21E*, 22B*, 22C*, 22D*, 23C*, 23D*:							
Frederick	B	None	---	---	>6.0	---	---
Poplimento	C	None	---	---	>6.0	---	---
24B*, 24C*, 24D*, 24E*:							
Gainesboro	C	None	---	---	>6.0	---	---
Berks	C	None	---	---	>6.0	---	---
25B, 25C, 25D, 26C, 26D, 27C, 27D, 27E, 28C, 28D, 28E Gilpin	C	None	---	---	>6.0	---	---
29A Gladehill	B	Occasional	Very brief to brief.	Dec-Mar	>6.0	---	---
30A Guyan	C	Rare	---	---	0.5-1.5	Apparent	Nov-May
31B, 31C, 32C, 32D, 33C, 33D, 33E Jefferson	B	None	---	---	>6.0	---	---
34B, 34C, 35C, 35D, 36B, 36C, 37C, 37D, 37E Laidig	C	None	---	---	2.5-4.0	Perched	Jan-Mar
38B*, 38C*, 38D*, 38E*:							
Lehew	C	None	---	---	>6.0	---	---
Gainesboro	C	None	---	---	>6.0	---	---
39A Massanetta	B	Occasional	Very brief	May-Sep	2.0-3.5	Apparent	Jan-Apr
40D, 40E, 41D, 41E Massanutten	B	None	---	---	>6.0	---	---
42A Maurertown	D	None	---	---	0-0.5	Apparent	Nov-Jun
43B, 43C, 44B, 44C Moomaw	C	None	---	---	1.5-3.0	Perched	Dec-Apr
45A Newmarc	C	Occasional	Very brief to long.	Dec-Mar	0.5-1.5	Apparent	Dec-May
46A Nomberville	B	Rare	---	---	>6.0	---	---
47C, 48C, 48D Opequon	C	None	---	---	>6.0	---	---
50A Purdy	D	None	---	---	+1-1.0	Apparent	Nov-Jun

See footnote at end of table.

TABLE 16.--WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth	Kind	Months
					Ft		
51D*:							
Rock outcrop	D	None	---	---	>6.0	---	---
Carbo	C	None	---	---	>6.0	---	---
52F*:							
Rock outcrop	D	None	---	---	>6.0	---	---
Drall	B	None	---	---	>6.0	---	---
Wallen	B	None	---	---	>6.0	---	---
53C, 53D, 53E Sequoia	C	None	---	---	>6.0	---	---
54B Timberville	B	Frequent	Very brief	Apr-Oct	>6.0	---	---
55A Toms	C	None	---	---	0.5-1.5	Perched	Nov-Apr
56B, 56C Trappist	C	None	---	---	>6.0	---	---
59B, 59C, 60B, 60C, 61B, 61C Unison	B	None	---	---	>6.0	---	---
62C, 62D, 63C, 63D, 63E, 64D, 64E, 64F Wallen	B	None	---	---	>6.0	---	---
65C*, 65D*, 65E*, 66E*, 66F*:							
Wallen	B	None	---	---	>6.0	---	---
Lehew	C	None	---	---	>6.0	---	---
67F Weikert	C/D	None	---	---	>6.0	---	---
68D*, 68E*, 69D*, 69F*:							
Weikert	C/D	None	---	---	>6.0	---	---
Berks	C	None	---	---	>6.0	---	---
70B Wolfgap	B	Rare	---	---	>6.0	---	---
71D, 71E, 72E Zepp	B	None	---	---	>6.0	---	---

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--SOIL FEATURES

(The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Bedrock		Potential frost action	Risk of corrosion	
	Depth	Hardness		Uncoated steel	Concrete
	In				
1B---------- Alonzville	>60	---	Moderate----------	Low----------	High.
1C---------- Alonzville	>60	---	Moderate----------	Low----------	High.
2B---------- Berks	20-40	Soft	Low----------	Low----------	High.
3C*:					
Berks----------	20-40	Soft	Low----------	Low----------	High.
Weikert----------	10-20	Soft	Moderate----------	Moderate----------	Moderate.
4B, 4C---------- Blairton	20-40	Soft	High----------	High----------	High.
5B, 5C, 6B, 6C, 6D------ Braddock	>60	---	Moderate----------	High----------	Moderate.
7A---------- Broadway	>60	---	Moderate----------	Low----------	Low.
8B, 8C---------- Carbo	20-40	Hard	Moderate----------	High----------	Low.
9C*, 9D*:					
Carbo----------	20-40	Hard	Moderate----------	High----------	Low.
Endcav----------	40-60	Hard	Moderate----------	High----------	Low.
10A---------- Caverns	>60	---	Moderate----------	Low----------	Moderate.
11B, 11C, 11D, 11E, 12C, 12D, 13C, 13D, 13E----- Chilhowie	20-40	Hard	Moderate----------	High----------	Low.
14B, 14C---------- Coursey	>60	---	High----------	Moderate----------	High.
15A---------- Derroc	>60	---	Moderate----------	Low----------	Moderate.
16B, 16C---------- Edom	40-60	Soft	Moderate----------	High----------	Low.
17B, 17C, 17D, 18B, 18C- Endcav	40-60	Hard	Moderate----------	High----------	Low.
19D---------- Frederick	>60	---	Moderate----------	Moderate----------	High.
20B*, 20C*, 20D*, 21B*, 21C*, 21D*, 21E*, 22B*, 22C*, 22D*, 23C*, 23D*:					
Frederick----------	>60	---	Moderate----------	Moderate----------	High.

See footnote at end of table.

TABLE 17.--SOIL FEATURES--Continued

Soil name and map symbol	Bedrock		Potential frost action	Risk of corrosion	
	Depth	Hardness		Uncoated steel	Concrete
	In				
20B*, 20C*, 20D*, 21B*, 21C*, 21D*, 21E*, 22B*, 22C*, 22D*, 23C*, 23D*:					
Poplimento	>60	Hard	Moderate	High	Moderate.
24B*, 24C*, 24D*, 24E*:					
Gainesboro	20-40	Hard	Moderate	Moderate	Moderate.
Berks	20-40	Soft	Low	Low	High.
25B, 25C, 25D, 26C, 26D, 27C, 27D, 27E, 28C, 28D, 28E Gilpin	20-40	Soft	Moderate	Low	High.
29A Gladehill	>60	---	Moderate	Low	Low.
30A Guyan	>60	---	High	High	Moderate.
31B, 31C, 32C, 32D Jefferson	>60	---	Moderate	Moderate	High.
33C, 33D, 33E Jefferson	>60	---	Moderate	Moderate	High.
34B, 34C, 35C, 35D, 36B, 36C, 37C, 37D, 37E Laidig	>60	---	Moderate	Moderate	High.
38B*, 38C*, 38D*, 38E*:					
Lehew	20-40	Hard	Low	Low	High.
Gainesboro	20-40	Hard	Moderate	Moderate	Moderate.
39A Massanetta	>60	---	Moderate	Low	Low.
40D, 40E, 41D, 41E Massanutten	20-40	Hard	Moderate	High	High.
42A Maurertown	>60	---	High	High	High.
43B, 43C, 44B, 44C Moomaw	>60	---	Moderate	High	High.
45A Newmarc	>60	---	High	High	Low.
46A Nomberville	>60	---	High	Low	Moderate.
47C, 48C, 48D Opequon	12-20	Hard	Moderate	Moderate	Low.
49*. Pits					

See footnote at end of table.

TABLE 17.--SOIL FEATURES--Continued

Soil name and map symbol	Bedrock		Potential frost action	Risk of corrosion	
	Depth	Hardness		Uncoated steel	Concrete
	In				
50A Purdy	>60	---	High	High	High.
51D*:					
Rock outcrop	0	Hard	---	---	---
Carbo	20-40	Hard	Moderate	High	Low.
52F*:					
Rock outcrop	0	Hard	---	---	---
Drall	40-60	Hard	Low	Low	High.
Wallen	20-40	Hard	Low	Low	High.
53C, 53D, 53E Sequoia	20-40	Soft	Low	High	Moderate.
54B Timberville	>60	---	Moderate	Low	High.
55A Toms	>60	---	High	High	High.
56B, 56C Trappist	20-40	Hard	Moderate	High	High.
57*. Udorthents					
58*:					
Udorthents.					
Urban land.					
59B, 59C, 60B, 60C, 61B, 61C Unison	>60	---	Moderate	High	Moderate.
62C, 62D Wallen	20-40	Hard	Low	Low	High.
63C, 63D, 63E, 64D, 64E, 64F Wallen	20-40	Hard	Low	Low	High.
65C*, 65D*, 65E*, 66E*, 66F*:					
Wallen	20-40	Hard	Low	Low	High.
Lehew	20-40	Hard	Low	Low	High.
67F Weikert	10-20	Soft	Moderate	Moderate	Moderate.
68D*, 68E*, 69D*, 69F*:					
Weikert	10-20	Soft	Moderate	Moderate	Moderate.
Berks	20-40	Soft	Low	Low	High.

See footnote at end of table.

TABLE 17.--SOIL FEATURES--Continued

Soil name and map symbol	Bedrock		Potential frost action	Risk of corrosion	
	Depth	Hardness		Uncoated steel	Concrete
	In				
70B---------- Wolfgap	>60	---	Moderate----------	Low----------	Moderate.
71D, 71E, 72E---------- Zepp	>60	---	Moderate----------	High----------	High.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 18.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Alonzville	Fine-loamy, siliceous, mesic Typic Hapludults
Berks	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Blairton	Fine-loamy, mixed, mesic Aquic Hapludults
Braddock	Clayey, mixed, mesic Typic Hapludults
Broadway	Fine-silty, siliceous, mesic Fluventic Hapludolls
Carbo	Very fine, mixed, mesic Typic Hapludalfs
Caverns	Coarse-loamy, siliceous, mesic Ultic Hapludalfs
Chilhowie	Very fine, mixed, mesic Typic Hapludalfs
Coursey	Fine-loamy, siliceous, mesic Aquic Hapludults
Derroc	Loamy-skeletal, siliceous, mesic Dystric Fluventic Eutrochrepts
Drall	Sandy-skeletal, siliceous, mesic Typic Udorthents
Edom	Fine, illitic, mesic Typic Hapludalfs
Endcav	Very fine, mixed, mesic Typic Hapludalfs
Frederick	Clayey, mixed, mesic Typic Paleudults
Gainesboro	Loamy-skeletal, mixed, mesic Typic Hapludults
Gilpin	Fine-loamy, mixed, mesic Typic Hapludults
Gladehill	Coarse-loamy, siliceous, mesic Fluventic Hapludolls
Guyan	Fine-loamy, mixed, mesic Aeric Ochraquults
Jefferson	Fine-loamy, siliceous, mesic Typic Hapludults
Laidig	Fine-loamy, siliceous, mesic Typic Fragiudults
Lehew	Loamy-skeletal, siliceous, mesic Typic Dystrochrepts
Massanetta	Fine-loamy, carbonatic, mesic Fluvaquentic Hapludolls
Massanutten	Coarse-loamy, siliceous, mesic Typic Hapludults
Maurertown	Fine, mixed, mesic Typic Ochraqualfs
Moomaw	Fine-loamy, siliceous, mesic Typic Fragiudults
Newmarc	Fine-silty, siliceous, mesic Fluvaquentic Hapludolls
Nomberville	Fine-silty, siliceous, mesic Fluventic Hapludolls
Opequon	Clayey, mixed, mesic Lithic Hapludalfs
Poplimento	Fine, mixed, mesic Ultic Hapludalfs
Purdy	Clayey, mixed, mesic Typic Ochraquults
Sequoia	Clayey, mixed, mesic Typic Hapludults
Timberville	Clayey, mixed, mesic Typic Hapludults
Toms	Fine, mixed, mesic Aeric Ochraqualfs
Trappist	Clayey, mixed, mesic Typic Hapludults
Udorthents	Udorthents
Unison	Clayey, mixed, mesic Typic Hapludults
Wallen	Loamy-skeletal, siliceous, mesic Typic Dystrochrepts
Weikert	Loamy-skeletal, mixed, mesic Lithic Dystrochrepts
Wolfgap	Fine-loamy, siliceous, mesic Fluventic Hapludolls
Zepp	Coarse-loamy, siliceous, mesic Typic Hapludults

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