

Soils of Montgomery County



LEGEND:

-  APPALACHIAN MOUNTAINS
-  APPALACHIAN VALLEYS
-  BLUE RIDGE MOUNTAINS

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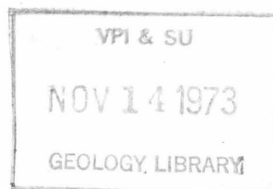
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The Soils of Montgomery County, Virginia

Montgomery County is principally an agricultural area with corn and wheat the most important crops, although acreages of these crops have been drastically cut during the past decade. Livestock has steadily increased in importance over the years--both dairy and beef cattle doubled in number since the 1910 census. Hay crops have also steadily increased for many years both in acreage and production. Other important crops being produced today are vegetables and fruit. During the past 10 years, the population of the county has greatly increased. Building and development, particularly in the vicinity of small towns, are on the move. The student body of the land grant college at Blacksburg, 2 new industries, and a continuation of full-time work at Hercules Powder Plant near Radford, have created a need for better roads, larger schools, and other facilities. Soil Survey information, properly interpreted, can be invaluable in making proper adjustments in non-agricultural uses of the land in this county, as well as for agricultural uses.

There are many kinds of soil in Montgomery County. On some kinds you can raise almost any crop; on others you will get good yields of some crops and poorer yields of others. Part of the county is not suited for row crops of any kind; part of it is excellent for pasture; much of it will grow trees better than anything else.

Before you can plan the best use of your land you need to know what kinds of soil you have. The detailed soil survey of Montgomery



County was made to furnish that information. In making the soil survey, trained soil scientists covered the terrain in great detail.

Weighed acreage measurements of the units mapped show that, of the 399 square miles in the county, about 125 are suited to row crops, 118 to pasture, and 156 are so stony and/or steep that their best use is for growing trees and for recreational areas. Those soils that are suited to cultivated crops are also well-suited for pasture or forest, and all pasture land will produce some type of forest.

This report is an inventory of the research findings, in maps and in writing, of soil and soil conditions in Montgomery County. It contains important information which will assist the county agents, soil conservation service, land owners, and others in the wise use of the land, whether it is for agriculture, urban development, highways, building sites, gardens, lawns, airports, or recreational and other non-agricultural uses.

Who made this survey?

The soil survey was made jointly by the Virginia Agricultural Experiment Station, the Soil Survey Division of the Soil Conservation Service, U.S.D.A. The report was prepared by H. C. Porter, Associate Agronomist in charge, Dr. S. S. Obenshain, Mr. R. E. Devereux, and Mr. G. R. Epperson of the V.P.I. Agronomy Department.

How was the soil survey made?

In making this survey, trained soil scientists examined the county thoroughly. They walked over the land, farm by farm acre by acre, and field by field. This took a lot of walking 8 to 10 miles per square mile of mapping. They looked at deep cuts to determine the effective depth of the soil. They studied the structure, consistency, density texture, and color of each different layer and the kind of parent rock material underneath. These are some of the observable characteristics which the soil scientist uses to identify and map the different kinds of soil.

They found that the many kinds of soil in the county occur on many kinds of slopes. Some of them are leached, and some are rocky or stony; and some are shaly and gravelly. All of these things they marked down on aerial photographs which they used as base maps.

What does the Soil Map Show?

It shows physical land features such as rock outcrop, stony areas, streams (permanent and intermittent), springs, ponds, lakes, sink holes, mines, quarries, earth and rock escarpments, roads, highways, houses, churches, cemeteries, schools, towns, railroads, power lines, major telephone lines, light beacons, radio and T.V. stations, and large industries. Vegetative cover when the photo was taken, including woodland, idle land, brush land, crop land and pasture land, is depicted on the aerial photo. These constitute the base maps. Upon them, soil, slope, and erosion boundaries are delineated.

Fig. 1 Section showing soil map made on aerial photo.

When surveyors had put down all the facts, they discovered that there were 50 different soil series in Montgomery County. They also found that these soils lie on 6 different kinds of complex slopes and that erosion; because of misuse of the land, did several different kinds of damage. The

soil map shows each one of these soils, the slope on which it lies, and the amount and kind of damage by water erosion. The total mapping units in the county included some 440 separatives. This report briefly explains the soil information contained in the map. To use it to best advantage, you should understand about the soil: Just what is a soil? How and where do soils occur on the lands surface? What is the best way to find and look at a soil? How are soils formed or what do they come from? How do they get their name?

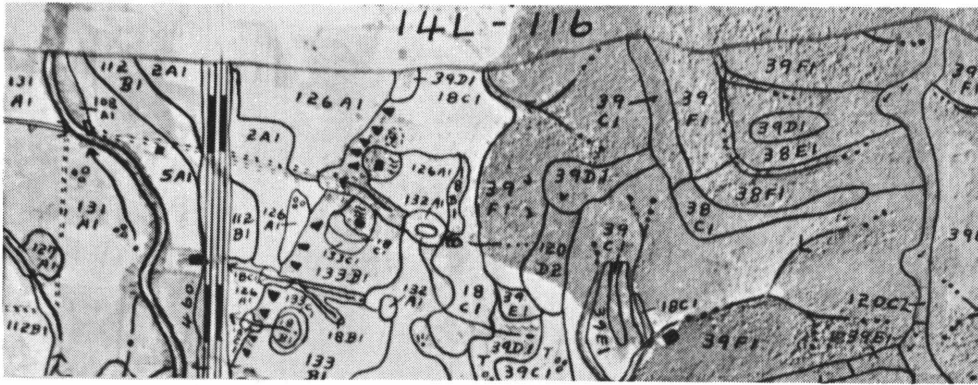


Fig. 1. Section showing soil map made on aerial photo.

Meaning of symbols and lines on the map

<u>Soils</u>	<u>Erosion</u>
112 - Elk loam	1 - Slight
126 - Taft silt loam	2 - Moderate or eroded
132 - Robertsville silt loam	<u>Other Symbols</u>
133 - Etowah silt loam	==== Highways
2 - Captina silt loam	===== Roads to houses
5 - Huntington silt loam	~~~~~ Soil boundaries
131 - Huntington loam	~~~~~ River
108 - Huntington loam (calcareous)	---> Intermittent drains
127 - Mixed Alluvial land	o-> Springs
18 - Landisburg and Greendale silt loams	■ Houses
39 - Litz-Teas silt loams	▼▼▼ Earth excarpments
38 - Litz silt loam	o ∅ Shallow sinks
120 - Litz-Teas silt loams, eroded	⌈⌋ Cemetery
≈ Made land	°° Loose gravel and stones
<u>Slopes</u>	
A - Level to nearly level	D - Moderately steep
B - Gently sloping	E - Steep
C - Sloping	F - Very Steep

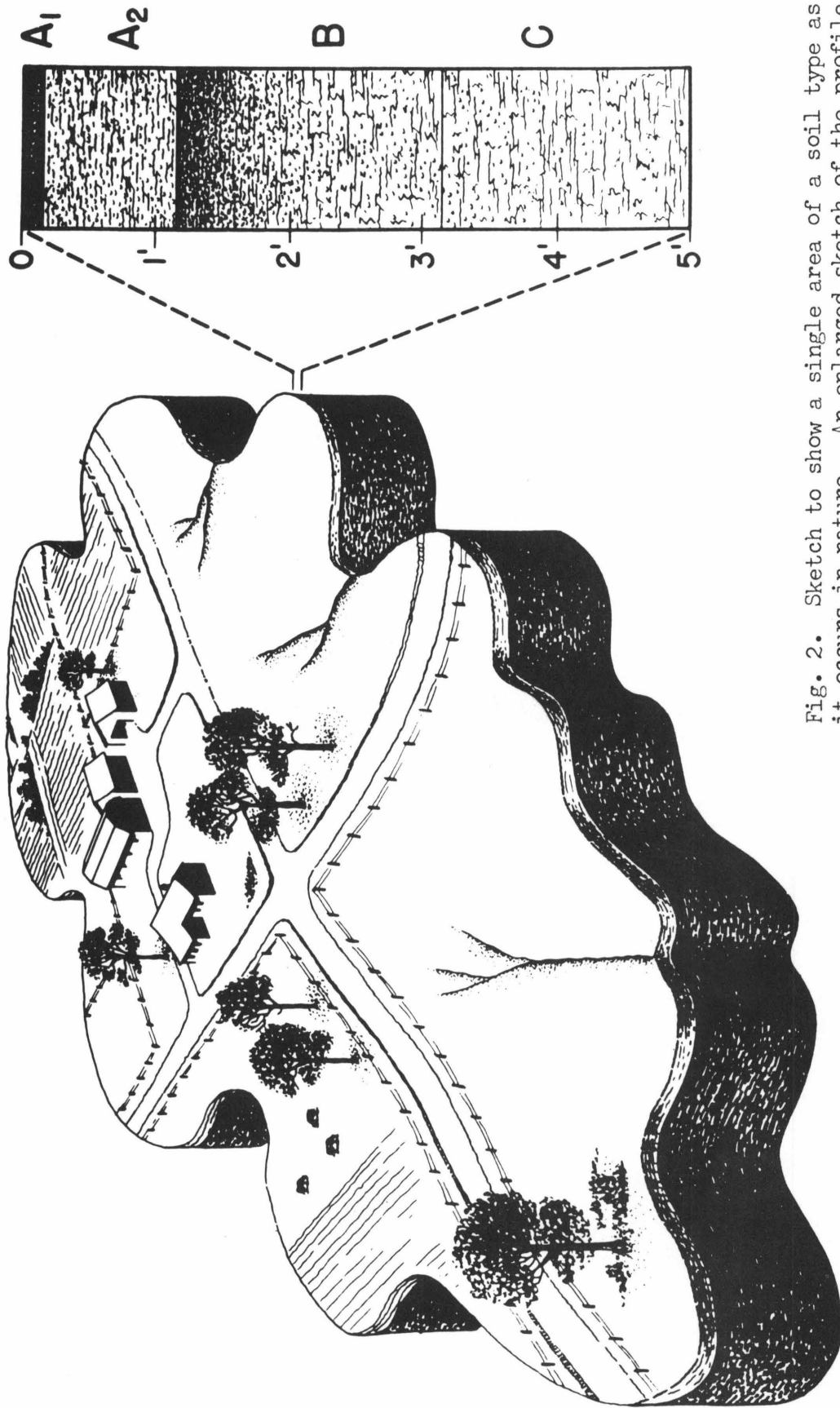


Fig. 2. Sketch to show a single area of a soil type as it occurs in nature. An enlarged sketch of the profile with major horizons appears at the right.

What is a soil?

A soil is a natural body made up of weathered rock fragments, with decaying remains of plants and animals. It covers the earth in thin layers. When these layers contain proper proportions of air, water, and essential elements needed for plant growth they furnish mechanical support and nutrients for growing plants. In short, the soil may be considered as the factory or medium for plant growth.

A soil consists of 5 essential parts: mineral matter, water, air, organic matter, and animal life. Each soil occurs in the land surface somewhat like a part of a jigsaw puzzle. It has depth, width, and length and is underlaid by certain kinds of rock or soil materials. The shape of the soil, as well as its physical and chemical makeup, and the position it occupies on the land surface, has a great deal to do with the way it handles water, air and plant nutrients, and consequently with the way it behaves when cultivated or is planted to various crops.

Fig. 1. Sketch showing the main positions of soils on the land surface in the southern part of Montgomery County over granitic rock materials.

Most of the soils in Montgomery County occur on the upland over residual rock materials. There are about 349 square miles on the uplands, and 38.5 square miles on the colluvial land, about 19 square miles on the terrace lands, and 13.8 square miles on the bottom lands. (Picture along Paris Mt.)

Most extensive soils on the residual uplands in this area are the Chester and Brandywine soils; on the colluvial land positions, the Meadowville soils; on the terrace positions, the Hiwassee soils; and on the bottom lands, the Chewacla soils.

To study a soil you must first find what position it occupies on the land surface. To see it as a landscape that joins other soils you need to look out across it to see what the underlying parent rocks are, and along the boundaries to see where and how it joins with other soils.

Fig. 2. Following is a hypothetical sketch showing a landscape and how bodies of soil types fit together in a small landscape, much as pieces in a jigsaw puzzle. Boundaries between adjacent bodies are gradations rather than sharp lines.

How are soils formed?

The main factors involved in soil information are climate, vegetation, parent material, relief, and time. The climate, vegetation, and relief influence the parent rocks over periods of time and make our soils the way they are.

Because of the climate, most of the older, well-developed soils in this area are highly leached of their plant nutrients. Even soils from high calcic limestone are acid because of this leaching. The forest vegetation under which our soils largely developed has made them less fertile than soils developed under grass, with low rainfall. But many soils of this county have good physical structure. Many of them are fairly open and porous, hence well aeriated. Consequently, they are productive where plant nutrients are applied in right amounts. The relief or lay of the land makes great differences in the kinds of soils that develop. On nearly level or flat relief you usually find gray, poorly-drained soils. On extremely hilly to very steep slopes you have shallow soils with little or no horizonation over residual rock. This is caused by geologic erosion removing fine, weathered soil materials

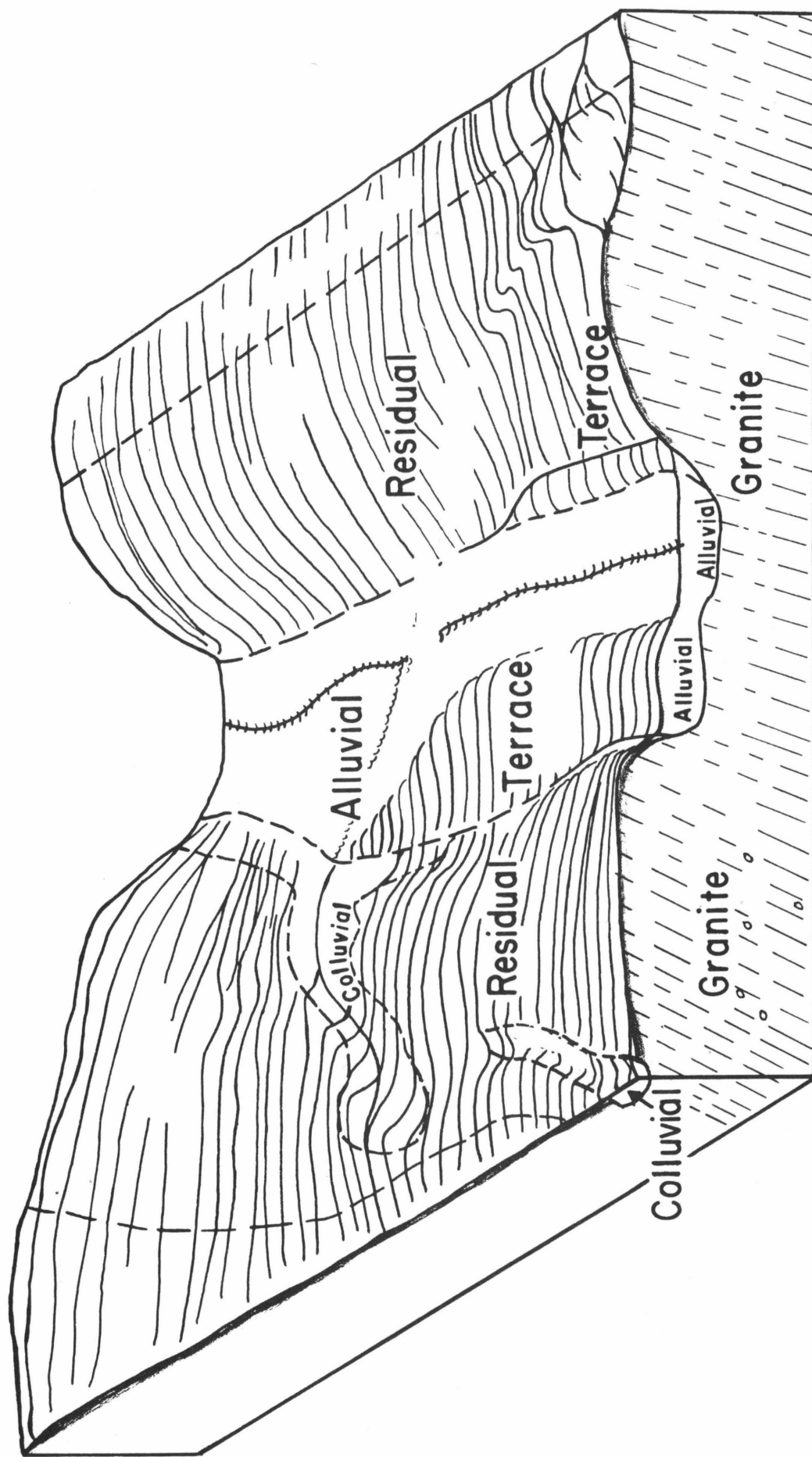
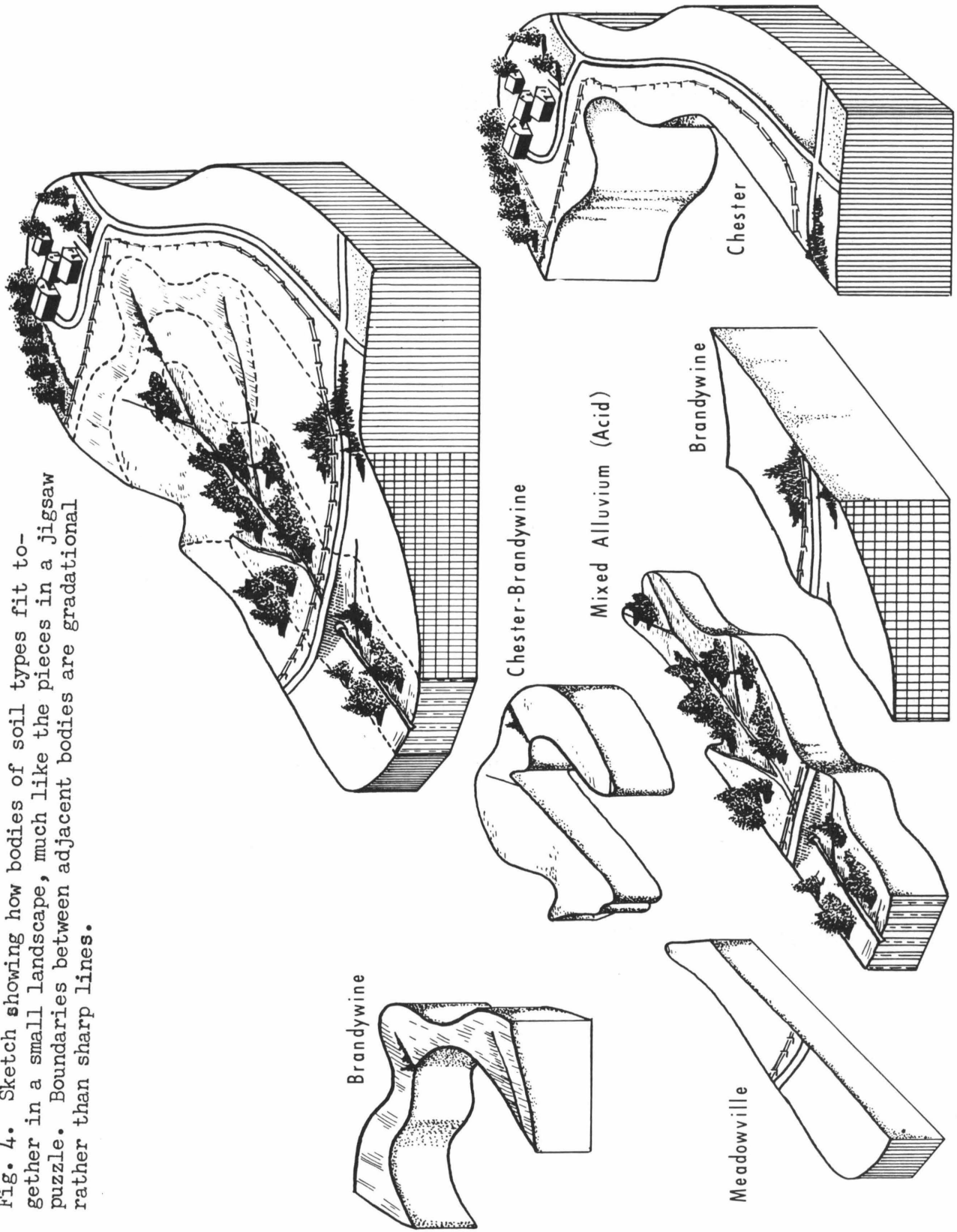


Fig. 3. Sketch showing the main positions of soils on the land surface in southern Montgomery County, over granitic rock materials.

Fig. 4. Sketch showing how bodies of soil types fit together in a small landscape, much like the pieces in a jigsaw puzzle. Boundaries between adjacent bodies are gradational rather than sharp lines.



faster than they can develop into a soil. On undulating or gently sloping relief, fine soil materials accumulate from weathering of rocks and leaching and remain in place. Thus, there is time enough for soil forming processes to develop a soil with well defined horizons - one with developed and distinct layers. The kind of parent rock from which the soil material weathers is variable in this area. They range from very resistant acid shale and sandstone to easily weathered calcic limestone and many kinds of acid crystalline and quartzite rock materials. These different rocks, upon weathering, give different kinds of soils. The time the material has been in place and the amount of weathering over different periods of time has a lot to do with the maturity or development of the soil. For instance, fine soil materials recently deposited on bottom lands show little soil development. Such a soil looks and feels about the same from the surface down; there is no definite line of demarcation between soil layers. Such soils are known as young soils. The same materials, however, that now lie on an old, high terrace have developed into mature or well developed soils. The stream over a period of many years has cut deeper and left the alluvial material high above overflow. The same is true of soils formed from the weathered materials of old colluvial beds of rock formations, and better developed soils occur on the smoother slopes.

A change in any of the soil forming factors of climate, vegetation, relief, parent material, or time changes the soil to varying degrees.

How are soils named?

Soils are named after places where they were first found or mapped. Soil names consist of 3 parts: the soil series name, the class name, and the phase name. A combination of the series and class gives the type names. The series, class, and phase together give the complete name.

Example Groseclose = series
 siltloam = class
 gently sloping = phase (2-7% slopes)

Full name - Groseclose silt loam, gently sloping (2-7% slopes). This is the mapping unit or area that is delineated on the maps.

Symbols on field sheets:

A composite symbol is used to show the kind of soil, degree of slope, and amount of erosion, such as 25B1. The first number in the legend indicates the soil type, the first letter represents the slope, and the second number gives the degree of erosion. In the following pages are explanations and descriptions of the slope, erosion and soils as mapped in Montgomery County.

Slope:

Slope refers to surface relief or lay of the land. It is expressed by percent and measured in terms of the difference in deviation per 100' measured horizontally. If land rises or falls 1' per 100', you have a 1% slope. If you have a 5' rise or fall per 100' horizontally, you have a 5% slope.

Slope Classes:

Dominant slopes are mapped by slope classes as indicated in the symbol by capital letters. Since slope is significant in the use of the soil, it is used to separate the soil into phases such as gently sloping, steep, etc. Below are brief descriptions of the slope classes used in the soil survey of Montgomery County.

A = 0-2% Level to nearly level. On this slope, runoff of rain water is slow and there is no difficulty in the use of agricultural machinery. Erosion is not a problem, but many soils have poor drainage because of flat surface relief.

- B = 2-7% Gently sloping (undulating). Rain water runoff is of medium rate. All types of agricultural machinery may be used for most soils. Danger from erosion is slight to moderate.
- C = 7-14% Sloping (rolling). Runoff is moderate to rapid. While all types of farm machinery may be used successfully, there may be some problem with using large machinery. When cultivating slopes in this class, careful soil management practices must be observed to prevent serious loss from erosion.
- D = 14-25% Strongly sloping (hilly). Runoff is rapid to very rapid. Farm machinery can be used, but with difficulty, especially on complex slopes. Land should be kept under cover, preferably deeply rooted perennials. When necessary to cultivate, great care must be taken to prevent erosion.
- E = 25-45% Steep. Runoff is rapid. Only light machinery can be used. Land should be kept under a permanent cover of grass or trees.
- F = 45+ Very steep. Runoff is very rapid. Land should be kept in grass at all times.

Erosion:

There are 2 natural forces which are contributory to man-made erosion--wind and rain water. While Virginia suffers some from wind erosion, there is very little damage in Montgomery County. The primary cause of soil erosion here is falling and running rain water. Erosion begins when forces released by falling rain drops break loose soil particles from the mass. Next, water moves the soil down the slope. Not only is soil eroded away in this process, but water and plant food are lost.

As stated previously, the third part of the composite symbol represents the amount of erosion. Below is a description and explanation of the different erosion classes mapped in Montgomery County.

- 1 = None to slight--at least 75% of original surface soil remains throughout the mapped area. In cultivated areas, a few rills, shallow gullies, or places with thin A horizons that give evidence of accelerated erosion may exist, but most farming operations are essentially in A material.
- 2 = Moderate--25 to 75% of original surface soil removed. It may, and often does, contain some shallow gullies or occasional deep gullies. Areas mapped 2 erosion may have (1) a complex of textures caused by mixing of A and B soil material in plowing, (2) patches in which the plow layer consists wholly of the original A, and others in which it consists wholly of underlying horizons.
- 3 = Severe--75% of original surface and up to 25% of subsoil removed. Areas mapped 3 erosion may contain several deep gullies. The plow layer consists essentially of material from the B or other underlying horizons.
- S = Symbol used to show small spots of severe erosion--too small to delineate. These symbols may occur within slightly--or moderately--eroded areas.
- G = Symbol used to show small areas of severely-gullied land too small to delineate. These symbols may occur within slightly--or moderately--eroded areas.

It is important that we know our soils and soil differences because (1) they are our most important natural resource; (2) they are so different in their characteristics, suitability for various plants, and in productivity; and (3) we must be able to wisely use, conserve, and improve them and to educate others how to do the same.

This report and map show that there are about 78,080 acres (30%) of deep well-drained soils in the county. This is enough good soil to produce 4 1/2 million bushels of corn, or about 234,840 tons of alfalfa hay each year if all the soil could be used for these crops under proper management.

Drainage of soils for crop production is not a big problem in the county because only about 6 square miles (3,840 acres) of soil is poorly drained enough to need drainage. Many of these areas cannot be drained by tiling because of their fine textured subsoils and substrata. About 7 square miles are moderately well-drained and do not need drainage for most crops, except **alfalfa**.

Relief and presence of root cutcrps, loose cobbles, bare stones, and gravel often determine the use made of the soils. About 5% of the county is level to nearly level (0-2% slopes); 10% is gently sloping (2-7% slopes); 21% is sloping (7-15% slopes); 15% is moderately steep (15-25% slopes); 29% is steep (25-45% slopes); and 20% is very steep (45% slopes or more). Most soils on steep and very steep slopes are shallow and have developed little subsoil. About 26% of the county is too stony, rocky, or cobbly for cultivation. Most shallow soils are droughty. The surface soils of Montgomery County range in thickness from 4" to 22" and the subsoils from a few inches to over 5'. The substrata may range from a few inches to 60' or more. There is probably more porous substrata underneath the limestone valleys in this county than in any other county in this region.

The surface soils, where not eroded, are mainly silt loams and loams in the limestone valley areas and loams, stony loams, and fine sandy loams in the mountains. Colors of the surface soils are mostly brown, but range from pale to dark brown. The subsoils of well-developed soils are mostly yellowish red, red, and strong brown. Many are **clays** in texture. About 102 acres of the county has been severely eroded and about 18,804 acres have been moderately eroded.

Table 1 - Approximate acreage of soils developed from each kind of parent rock material in Montgomery County.

*Table 2 - Simple legend showing soil numbers and slopes, soil names, and acreage of mapping units in Montgomery County.

*Soils are listed in numerical order so they can be found easily on the soil survey field-sheets.

Table 1

Approximate acreage of soils developed from each kind of parent rock material in Montgomery County, Virginia.

<u>Residual Soils from:</u>	<u>Acres</u>	<u>Square Miles</u>
High calcic limestone	1,787	2.79
Argillaceous (or muddy) limestone	1,742	2.72
Dolomitic and cherty dolomitic limestone	17,645	27.57
Mixed dolomitic limestone, cherty dolomitic limestone, and sandstone	16,242	25.38
Limestone, dolomitic limestone, and calcareous shale breccia	41,242	64.44
Interbedded limestone and calcareous shale	3,047	4.76
Calcareous shale with a little limestone and sandstone	47,598	74.37
Acid shale	37,815	59.09
Acid sandstone (some shale)	10,197	15.93
Quartzite and acid sandstone (some shale)	6,817	10.65
Phyllite and schist	1,139	1.78
Granite Gneiss and granodiorite	7,880	12.31
Rock outcrop (mostly sandstone and quartzite)	203	0.32
Rockland (limestone)	5,623	8.79
Rockland (sandstone)	8,056	12.58
Rockland (crystalline)	<u>930</u>	<u>1.45</u>
	207,963	324.94

<u>Colluvial Soils from:</u>	<u>Acres</u>	<u>Square Miles</u>
Mostly limestone and calcareous shale	12,037	18.81
Mostly sandstone, quartzite, and acid shale	12,205	19.07
Mostly crystalline rock materials	<u>386</u>	<u>.60</u>
	<u>24,628</u>	<u>38.5</u>
	232,581	363.4

Table 2

<u>Soil Underlain by Older Alluvium on Stream Terraces</u>	<u>Square Miles</u>
Mostly from limestone and calcareous shales	6.6
Mostly crystalline rocks with some shale, quartzites, sandstones, and limestone	<u>12.0</u>
	18.6
 <u>Soil of the Flood Plains or Bottom Lands</u>	
Mostly from limestone and calcareous shales	9.0
Mostly from sandstones, quartzites, and shales	5.5
Mostly crystalline rocks with some sandstone, quartzite and shales, and limestone	<u>2.5</u>
	17.0
	<u>363.4</u>
Total	399.

TABLE 2 - SIMPLE LEGEND SHOWING SOIL NUMBERS, SLOPE, SOIL NAMES, AND ACREAGE OF MAPPING UNITS IN MONTGOMERY COUNTY, VIRGINIA

Soil Number and Name*	Acres	Soil Number and Name	Acres
2A1 Captina and Capshaw	401	18D1 Landisburg & Greendale sils.	5
2B1 Captina and Capshaw	457	19B1 Leadvale sil.	308
3B1 Holston loam	132	19C1 Leadvale sil.	772
3C1 Holston loam	19	20B1, 2** Dunmore sil.	4
5A1 Huntington sil.	355	20C1, 2 Dunmore sil.	15
6A1 Lindside and Newark sils.	1872	20D1, 2 Dunmore sil.	3
6B1 Lindside and Newark sils	6	22B1, 2 Hagerstown sil.	110
7A1 Melvin sil.	1166	22C1, 2 Hagerstown sil.	154
8A1 Pope fsl.	17	22D1, 2 Hagerstown sil.	178
9CDE Gullied Land	88	22E1, 2 Hagerstown sil.	25
10A1 Philo fsl.	148	24B1, 2 Groseclose sil., porous substrata	2786
11B Hayter loam	30	24C1, 2 Groseclose sil., porous substrata	3943
11C1 Hayter loam	87	24D1, 2 Groseclose sil., porous substrata	1963
11D1 Hayter loam	40	24E1, 2 Groseclose sil., porous substrata	59
12A1 Hayter cobbly loam	2	25B1, 2 Frederick sil., porous substrata	742
12B1 Hayter cobbly loam	13	25C1, 2 Frederick sil., porous substrata	1451
12C1 Hayter cobbly loam	115	25D1, 2 Frederick sil., porous substrata	806
12D1 Hayter cobbly loam	129	25E1, 2 Frederick sil., porous substrata	58
12E1 Hayter cobbly loam	2	26A1 Frederick cherty sil.	6
14B1 Allen cobbly fsl.	3	26B1, 2 Frederick cherty sil.	1377
14C1 Allen cobbly fsl.	30	26C1, 2 Frederick cherty sil.	3429
14D1 Allen cobbly fsl.	179	26D1, 2 Frederick cherty sil.	3497
15B1 Jefferson fsl.	364	26E1, 2 Frederick cherty sil.	2304
15C1 Jefferson fsl.	1278	27B1 Bodine very cherty sil., shallow	14
15D1 Jefferson fsl.	904	27C1 Bodine very cherty sil., shallow	64
16B1 Jefferson cobbly loam	350		
16C1 Jefferson cobbly loam	939		
16D1 Jefferson cobbly loam	896		
17A1 Emory sil.	2		
17B1 Emory sil.	161		
17C1 Emory sil.	587		
18A1 Landisburg & Greendale sils.	8		
18B1 Landisburg & Greendale sils.	6531		
18C1 Landisburg & Greendale sils.	4486		

*Soil class names are abbreviated as follows:

sil. - silt loam	sicl. - silty clay loam
sils. - silt loams	sicls. - silty clay loams
fsl. - fine sandy loam	vfsl. - very fine sandy loam

**1 and 2 erosion - have been combined to shorten legend

1 = none to slight erosion	2 = moderate erosion
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Soil Number and Name	Acres	Soil Number and Name	Acres
27D1 Bodine very cherty sil., shallow	273	39B1, 2 Litz-Teas sils.	489
27E1, 2 Bodine very cherty sil., shallow	297	39C1, 2 Litz-Teas sils.	2687
28B1 Frederick-Lodi very rocky sils.	54	39D1, 2 Litz-Teas sils.	1982
28C1, 2 Frederick-Lodi very rocky sils.	1240	39E1, 2 Litz-Teas sils.	3911
28D1, 2 Frederick-Lodi very rocky sils.	1459	39F1, 2 Litz-Teas sils.	6165
28E1, 2 Frederick-Lodi very rocky sils.	2887	40B1 Rockland (limestone)	17
28F1, 2 Frederick-Lodi very rocky sils.	169	40C1 Rockland (limestone)	359
29A1 Carbo sicl.	2	40D1 Rockland (limestone)	358
29B1 Carbo sicl.	28	40E1, 2 Rockland (limestone)	2175
29C1, 2 Carbo sicl.	318	40F1 Rockland (limestone)	2674
29D1, 2 Carbo sicl.	249	41A1 Holston sil.	5
29E1, 2 Carbo sicl.	74	41B1 Holston sil.	98
29F1 Carbo sicl.	5	41C1 Holston sil.	3
30C1 Carbo sicl.	4	42B1 Montevallo sil.	68
31B1, 2 Lodi loam, porous substrata	2478	42C1, 2 Montevallo sil.	1329
31C1, 2 Lodi loam, porous substrata	4016	42D1, 2 Montevallo sil.	689
31D1, 2, 3, Lodi loam, porous substrata	2622	42E1, 2 Montevallo sil.	7575
31E1, 2 Lodi loam	1164	42F1, 2 Montevallo sil.	1062
31F1, 2 Lodi loam	41	43B2 Montevallo shaly sil.	1
32B1 Lodi cherty loam	218	43C1, 2 Montevallo shaly sil.	301
32C1, 2 Lodi cherty loam	1059	43D1, 2 Montevallo shaly sil.	469
32D1, 2 Lodi cherty loam	1074	43E1, 2 Montevallo shaly sil.	3922
32E1, 2 Lodi cherty loam	604	43F1, 2 Montevallo shaly sil.	991
33B1 Westmoreland sil.	9	44B1 Muskingum fsl.	28
33C1, 2 Westmoreland sil.	95	44C1 Muskingum fsl.	124
33D1, 2 Westmoreland sil.	164	44D1 Muskingum fsl.	104
33E1, 2 Westmoreland sil.	632	44E1 Muskingum fsl.	842
33F1, 2 Westmoreland sil.	2047	44F1 Muskingum fsl.	142
35B1 Dandridge sil.	61	46C1, 2 Pedlar very rocky sil.	98
35C1, 2 Dandridge sil.	244	46D1, 2 Pedlar very rocky sil.	94
35D1, 2 Dandridge sil.	140	46E1 Pedlar very rocky sil	1047
35E1, 2 Dandridge sil.	215	46F1 Pedlar very rocky sil.	404
35F1 Dandridge sil.	35	47C1, 2 Teas sil.	23
36C2 Dandridge sil. eroded	9	47D1, 2 Teas sil.	15
36D1, 2 Dandridge sil. eroded	89	47E2 Teas sil.	24
36E2 Dandridge sil. eroded	111	48C1 Muskingum stony loam	242
38B1, 2 Litz sil.	520	48D1 Muskingum stony loam	830
38C1, 2 Litz sil.	2770	48E1, 2 Muskingum stony loam	3875
38D1, 2 Litz sil.	2628	48F1 Muskingum stony loam	2721
38E1, 2 Litz sil.	6161	49B1 Lodi very stony loam	5
38F1, 2 Litz sil.	6979	49C1 Lodi very stony loam	62
		49C1, 2 Lodi very stony loam	105
		49E1 Lodi very stony loam	320
		49F1 Lodi very stony loam	134
		50C2 Rockland, (limestone)	2
		50D1 Rockland, (limestone)	3
		50E1 Rockland, (limestone)	4
		50F1 Rockland, (limestone)	2
		52C1 Rockland (sandstone quartzite)	182
		52D1 Rockland (sandstone quartzite)	530

Soil Number and Name	Acres	Soil Number and Name	Acres
52E1 Rockland (sandstone quartzite)	4075	98B1 Monongahela sil.	31
52F1 Rockland (sandstone quartzite)	3269	98C1 Monongahela sil.	82
54B1 Sequatchie fsl.	69	100B1 Muskingum vfsl.	17
55B1 Stony Colluvium	48	100C1 Muskingum vfsl.	910
55C1 Stony Colluvium	428	100D1, 2 Muskingum vfsl.	1164
55D1 Stony Colluvium	582	100E1, 2 Muskingum vfsl.	7369
55E1 Stony Colluvium	14	100F1, 2 Muskingum vfsl.	7237
58B1 Leadvale gravelly sil.	40	101B1 Hayesville fsl.	23
58C1 Leadvale gravelly sil.	69	103C1, 2 Hayesville fsl.	96
58D1 Leadvale gravelly sil.	4	103D1, 2 Hayesville fsl.	35
59A1 Sequatchie cobbly loam	1	104B1 Edneyville fsl.	23
59B1 Sequatchie cobbly loam	40	104C1, 2 Edneyville fsl.	146
60A1 Mixed alluvium (sandstone)	19	104D1 Edneyville fsl.	47
61A1 Mixed alluvium (sandstone)	3	104E1 Edneyville fsl.	21
64A1 Mixed alluvium (acid)	2263	105B1 Chester loam	271
67D3 Groseclose sicl. eroded	1	105C1, 2 Chester loam	1856
68A1 Dunning sicl.	103	105D1, 2, 3, Chester loam	1007
69B1 Hiwassee loam	2	105E1 Chester loam	25
69C1 Hiwassee loam	20	107A1 Pope gravelly fsl.	4
69D1 Hiwassee loam	11	108A1 Huntington loam, calcareous	661
70A1 Buncombe lfs.	90	109A1 Weaver sil.	537
70B1 Buncombe lfs.	19	110B1 Burgin sicl.	95
70C1 Buncombe lfs.	2	110C1 Burgin sicl.	22
74B1 Hiwassee fsl.	311	111B1 Ramsey loam	16
74C1, 2 Hiwassee fsl.	633	111C1 Ramsey loam	242
74D1, 2 Hiwassee fsl.	326	111D1 Ramsey loam	243
76A1 Congaree sil.	9	111E1, 2 Ramsey loam	543
77A1 Congaree fsl.	295	111F1 Ramsey loam	106
78B1, 2 Lodi fsl.	100	112A1 Elk sil.	76
78C1, 2 Lodi fsl.	140	112B1 Elk sil.	471
78D1 Lodi fsl.	100	112C1 Elk sil.	2
78E1 Lodi fsl.	8	113B1 Masada fsl.	1752
84B1 Wickham loam	739	113C1, 2 Masada fsl.	585
85A1 Chewacla sil.	260	113D1, 2 Masada fsl.	175
86A1 Wehadkee sil.	151	113E1, Masada fsl.	10
87B1, 2 Litz shaly sil.	39	114A1 Altavista loam	72
87C1, 2 Litz shaly sil.	288	114B1 Altavista loam	666
87D1, 2 Litz shaly sil.	309	114C1 Altavista loam	16
87E1, 2 Litz shaly sil.	870	114D1 Altavista loam	22
87F1, 2 Litz shaly sil.	1126	115B1 Jefferson stony fsl.	20
89B1 Ramsey sil., mod. deep	69	115C1 Jefferson stony fsl.	1318
89C1, 2 Ramsey sil., mod. deep	663	115D1 Jefferson stony fsl.	3231
89D1, 2 Ramsey sil., mod. deep	404	116A1 Augusta fsl.	293
89E1, 2 Ramsey sil., mod. deep	2322	116B1 Augusta fsl.	35
89F1, 2 Ramsey sil., mod. deep	1835	116C1 Augusta fsl.	3
91A1 Atkins sil.	118	117B1 Hagerstown-Pisgah very rocky sils.	3
92C1 Tusquittee loam	6	117C1 Hagerstown-Pisgah very rocky sils.	148
92D1 Tusquittee loam	8	117D1 Hagerstown-Pisgah very rocky sils.	163
93C2 Tusquittee stony loam	8		

Soil Number and Name	Acres	Soil Number and Name	Acres
117E1 Hagerstown-Pisgah very rocky sils.	74	130C1, 2 Carbo-Chilhowie very rocky sicl.	112
118B1 Wellston loam	102	13CD1, 2 Carbo-Chilhowie very rocky sicl.	189
118C1 Wellston loam	1874	130E1, 2 Carbo-Chilhowie very rocky sicl.	378
118D1 Wellston loam	33	130F1, 2 Carbo-Chilhowie very rocky sicl.	248
118E1 Wellston loam	5	131A1 Huntington loam	738
119B1 Bolton loam	15	131B1 Huntington loam	3
119C1, 2 Bolton loam	139	132A1 Robertsville sil.	146
119L1, 2 Bolton loam	353	133B1 Etowah sil.	361
119E1, 2 Bolton loam	658	133C1 Etowah sil.	187
119F1 Bolton loam	20	133D1, 2 Etowah sil.	111
120B1, 2 Litz-Teas sils.	95	134B1 Swaim sicl.	28
120C1, 2 Litz-Teas sils.	673	134C1 Swaim sicl.	85
120D1, 2 Litz-Teas sils.	1378	138B1 Blacksburg sil.	43
120E1, 2 Litz-Teas sils.	1748	138C1, 2 Blacksburg sil.	271
120F1, 2 Litz-Teas sils	835	138D1, 2 Blacksburg sil.	233
121B1 Masada cobbly fsl.	337	138E1, 2 Blacksburg sil.	853
121C1 Masada cobbly fsl.	914	138F1, 2 Blacksburg sil.	66
121D1, 2 Masada cobbly fsl.	601	139B1, 2 Calvin sil.	105
121E1 Masada cobbly fsl.	7	139C1, 2 Calvin sil.	1159
123C1 Ramsey stony loam	95	139D1, 2 Calvin sil.	509
123D1 Ramsey stony loam	160	139E1, 2 Calvin sil.	1279
123E1 Ramsey stony loam	1417	139F1, 2 Calvin sil.	478
123F1 Ramsey stony loam	3995	140B1 Brandywine loam	2
124B1, 2 Groseclose-Blacksburg soils	470	140C1, 2 Brandywine loam	311
124C1, 2 Groseclose-Blacksburg soils	1340	140D1, 2 Brandywine loam	790
124D1, 2 Groseclose-Blacksburg soils	1461	140E1, 2 Brandywine loam	3227
124E1, 2 Groseclose-Blacksburg soils	1780	140F1, 2 Brandywine loam	381
124F1 Groseclose-Blacksburg soils	16	143B1 Ramsey shaly sil.	6
126A1 Taft sil.	413	143C1, 2 Ramsey shaly sil.	37
126B1 Taft sil.	106	143D1, 2 Ramsey shaly sil.	101
127A1 Mixed alluvium (slightly acid to alkaline)	1572	143E1, 2 Ramsey shaly sil.	657
127B1, C1 Mixed alluvium (slightly acid to alkaline)	14	143F2 Ramsey shaly sil.	133
129B1 Pedlar-Carbo very rocky sils.	26	152C1 Rockland (crystalline)	9
129C1, 2 Pedlar-Carbo very rocky sils.	718	152D1 Rockland (crystalline)	15
129D1, 2 Pedlar-Carbo very rocky sils.	785	152E1 Rockland (crystalline)	171
129E1, 2 Pedlar-Carbo very rocky sils.	7466	152F1 Rockland (crystalline)	799
129F1, 2 Pedlar-Carbo very rocky sils.	6768	164A1 Mixed alluvium (acid)	768
130B1 Carbo-Chilhowie very rocky sicl.	14	164B1 Mixed alluvium (acid)	6
		192B1 Meadowville sil.	143
		192C1 Meadowville sil.	221
		203B1 Whiteford sil.	26
		203C1 Whiteford sil.	125
		203D1 Whiteford sil.	70
		204C1 Louisburg fsl.	8
		204D1 Louisburg fsl.	30
		203E1 Louisburg fsl.	41
		205B1 Chester-Brandywine loams	15

Soil Number and Name	Acres	Soil Number and Name	Acres
205C1, 2 Chester-Brandywine loams	361	24OB1 Ramsey sil.***	3
205D1, 2 Chester-Brandywine loams	398	24OC1 Ramsey sil.	61
205E1 Chester-Brandywine loams	4	24OD1 Ramsey sil.	153
214A1 Roanoke sil.	104	24OE1 Ramsey sil.	577
214B1 Roanoke sil.	27	24OF1 Ramsey sil.	91
229B1 Carbo sil.	7		
229C1 Carbo sil.	49		
229D1, 2 Carbo sil.	60		
229E1 Carbo sil.	7	Made land	1874
239B1 Ungers sil.	244	Rock outcrop	203
239C1 Ungers sil.	15	Water	1276

***Was tentative correlated as HAZEL in Carroll County, Virginia

Soil Descriptions

In the following pages a general description of each soil in Montgomery County is given, showing the outstanding soil characteristics and suitability for agricultural and non-agricultural uses.

2A1 CAPTINA AND CAPSHAW SILT LOAMS, (0-2% slopes) (2B1)*

These are light colored moderately well drained soils that have formed in alluvium washed principally from areas underlain by limestone and calcareous shales with some influence from sandstone, quartzite, and crystalline rock materials. They occur in an intricately mixed pattern on low to moderately low stream terrace lands mainly along Roanoke River. The Captina soil differs from the Capshaw mainly by having a fragipan in the soil.

Captina silt loam has a light yellowish-brown to brown very friable silt loam surface, 8" to 12" thick. The subsoil, ranging from 10" to 20" thick above the compacted layer, is a yellowish-brown mottled with grayish-brown, gray, firm to very firm silt loam to silty clay loam 12" to 30" thick. The substratum is usually a mottled gray brownish-yellow friable loamy soil material mixed with many black mineral films and concretions with pockets of clay.

Capshaw silt loam in the mixed unit has a yellowish-brown to brown surface soil and silty clay loam to clay subsoil with mottles of gray and yellowish brown occurring at 18" to 30". Depth to underlying hard rock materials is usually below 8" but may range to 20". These soils are medium to strongly acid in reaction, medium in natural fertility and medium to low in organic matter. Permeability is rapid in the surface and slow to very slow in subsoils. Water supplying capacity for plants is high. These soils remain wet for relatively long wet periods. Erosion hazards are low and productivity is medium for most crops grown.

*2B1 differs from 2A1 mainly by having 2-7% slopes and somewhat better surface drainage.

Suitability for agricultural uses: Well suited to short rotations, particularly corn and mixed hay. Alfalfa is not adapted and small grains lodge badly mainly because of slow drainage.

Suitability for non-agricultural uses: Mainly because of the slow internal drainage and moderately high water table these soils are poorly suited for the non-agricultural uses mentioned in this report.

3B1 HOLSTON LOAM (2-7% slopes) (3lCl*) is a deep well to moderately well drained soil that has formed in alluvium washed mainly from acid shales and sandstones. It is similar to 4lB1 Holston silt loam (2-7% slopes) differing from it principally by having coarser textures throughout the entire profile. It has light yellowish-brown to yellowish-brown loam surfaces and mostly yellowish-brown clay loam subsoils. It is strongly acid, easy to work, and fairly productive under good management.

Suitability for agricultural uses: This soil is well suited for most crops except alfalfa and is especially good for many vegetables.

Suitability for non-agricultural uses: Mainly because of slow internal drainage in the lower subsoil and substratum this soil is unfavorable for septic tank disposal systems, fair to poor for road subgrades, pipe lines, and basements. Large building footings should be placed through the alluvium onto the underlying residual formations. It is poor for trench silos, bomb shelters, underground cables. Areas are small and widely scattered and therefore not suitable for airports or large developments. The surface soil is good for topsoiling materials and the subsoil is poor.

5A1 HUNTINGTON SILT LOAM, 0-2% slopes

This is a deep, well drained, brown, fertile soil that has formed in young alluvium on first bottom lands. The alluvium **is washed from upland soils underlaid** by limestones and calcareous shale. It is found with the Newark, Lindside, and Melvin soils and is subject to flooding. The soil has little or no profile development. It consists mostly of recent layers or strata laid down by different flooding periods. The surface soil is a dark-brown porous friable, silt loam, 10ⁱⁿ to 16ⁱⁿ thick. The subsoil is a very dark grayish-brown to dark brown, friable, slightly sticky, light silty clay loam 20ⁱⁿ to 40ⁱⁿ thick. Depth to variable kinds of bed rock is usually less than 6^{ft}, but may range from 4^{ft} to 10^{ft} or more.

Huntington silt loam is usually neutral in reaction but may range from medium acid to mildly alkaline. The water holding capacity is good, workability is fair, conservability is good, permeability is moderate to rapid, and productivity for suitable crops is high.

Suitability for agricultural uses: This soil is well suited to short rotations.

It is better suited to row crops such as corn and mixed hay than for small grain. Alfalfa is grown but stands do not last long. Small grain lodges badly in wetter seasons. Many vegetable crops are suited to this soil but, since it remains cool and moist in the early spring months, planting time of most crops is delayed. The major soil problems are its low topographic position and hazard of flooding.

Suitability for non-agricultural uses: Use is limited for home sites and big building sites because of the flooding hazards. It is unfavorable for septic tank drainage systems; poor for road subgrades; poor for bridge footings, cemeteries, school sites, shopping centers, radar stations, golf courses, race tracks, sanitary land fills, bomb shelters, underground storage space, pond sites, lagoons, and trench silos. It is excellent for growing sod or for topsoiling materials.

6A1 LINDSIDE AND NEWARK SILT LOAMS, 0-2% slopes (6B1)

This is a complex of Lindsides and Newark soils which are mapped as one unit. They have formed in young alluvium on the low-lying first bottom land which has washed from areas underlain chiefly by limestone and calcareous shale. They occur with the well-drained Huntington and the poorly-drained Melvin soils, and usually occupy intermediate positions in relief and drainage between them. The Lindsides is a moderately deep, somewhat poorly-drained soil, and the Newark is a moderately deep, moderately well-drained soil. Both are subject to flooding. The water table is within 6" to 16" of the surface in wet seasons on the Lindsides and within 20" to 30" of the surface in the Newark soil. The surface is a dark grayish-brown, very friable silt loam, 6" to 16" thick. The subsurface is mottled gray, black, brown, and yellowish-red. It is mostly a friable, silt loam to light silty clay loam, 10" to 36" thick. The substratum is usually a mixture of loams and sand containing gravel and shale fragments. Depth to bed rock is usually greater than 5' but may range from 4' to 10'.

These soils are neutral to medium acid in reaction. Workability is fair, fertility and organic matter content is relatively high, conservability of soil and plant nutrients is good to excellent, and productivity for some crops is high under good management. There is a narrow range of moisture conditions under which these soils can be cultivated.

Suitability for agricultural uses: This unit is well suited to short rotations. It is better suited to corn, other row crops, and mixed hay than to small grain. Corn can be grown continuously. They are poorly suited to alfalfa because of their high water table. Fescue, timothy, bluegrass, and white clover grow well, but small grain lodge badly and usually have weak straw and poor grain. Vegetables and truck crops that tolerate abundant moisture are well adapted. Good soil tilth and structure can become a **major** problem if winter cover crops are not grown. The major problems are slow runoff, slow internal drainage, high water table conditions, and danger of flooding.



Plate 7. Alfalfa on Huntington soil and weeds on Lindside soil.



Plate 8. Scene near Pilot, in the Blue Ridge region of the county, showing Chester and Brandywine soils on the uplands and mixed alluvium on the bottom lands.

Suitability for non-agricultural uses: This unit is unfavorable for most non-agricultural uses, mainly because of the high water table and flooding hazards.

*About 6 acres of 6B1 Lindside and Newark silt loam 2-5% slopes were mapped in Montgomery County separately from 6A1 because they have a little more rolling relief.

7A1 MELVIN SILT LOAM, 0-2% slopes

This is a gray, poorly drained, fine textured soil that has formed in recent alluvium on the first bottom land. The alluvium has washed out of areas that are underlaid chiefly by limestone and calcareous shale formations. It occurs with the Huntington, Lindside, and Newark soils and usually occupies the lowest relief among them. The surface soil is a grayish-brown faintly mottled with gray, friable, slightly sticky, silt loam, 6" to 13" thick. The subsoil is distinctly mottled light gray, strong brown, yellowish-red, and dark gray slightly plastic silty clay, 18" to 32" thick. The substratum is predominantly light gray, mottled with shades of brown and yellow, friable, silt loam to sandy clay loam soil mixed with many shale and quartz gravel. Depth to bedrock of variable rock materials is usually less than 6' but may range from 3' to 12'.

The Melvin soil is neutral to medium acid in reaction. The organic matter content is high and natural fertility is medium to high. Permeability of the **surface** is rapid and in the subsoil is moderate to slow. Workability is poor, conservability is excellent, and productivity is low for most crops. The water table extends to the surface; runoff is very slow and water stands on the surface in places over long periods.

Suitability for agricultural uses: This soil is best suited to permanent pasture plants that tolerate high moisture conditions such as white dutch clover, ladino clover, fescue, and bluegrass. Forest cover consists of sycamore, willow, birch, alders, and other water-loving trees and shrubs. Soil can be improved for most crops by drainage, but most areas are difficult to drain with tile or ditches because of the unusually heavy textured subsoils and lack of outlets.

Suitability for non-agricultural uses: Because of the wet conditions and flood hazard, this soil is poorly suited to most non-agricultural uses. It is fair for pond sites but poor for dam building materials.

SAL POPE FINE SANDY LOAM, 0-2% slopes

This is a brown, very friable, fine sandy loam soil that has formed on the first bottom land in alluvium which has washed from acid sandstones and shale areas. It is subject to flooding and occurs with the somewhat poorly drained Philo and poorly drained Atkins soils.

Permeability is rapid throughout, workability is good, conservability of plant nutrients is poor, fertility is low to medium, and productivity is fair to good under intensive levels of management. The reaction is strongly acid. The water table is in the parent material strata usually less than 4' beneath the surface. Depth to shale and sandstone bed rock is usually less than 5' but may range from 2 1/2' to 8'.

Suitability for agricultural uses: This soil is well suited to short rotations and corn can be grown intensively. Because of flooding hazard, it is best suited to corn or mixed hay. Alfalfa can be grown, but at high cost, and stands soon die out. Small grains are grown but some lodging is to be expected.

Suitability for non-agricultural uses: Frequent flooding is the limiting factor of this soil for many non-agricultural uses. It is good for topsoiling material, but poor for most other uses. It is a fair soil on which to grow sod for sale, and for recreational areas.

9 CDE GULLIED LAND, 7-50% slopes

This is a land type consisting of a close network of deep gullies. This eroded condition exists on several different soil types, but the larger areas are in the Brandywine and Hayesville soils in the southern part of the county. Individual areas are small and widely scattered. Runoff is very rapid and erosion hazards are great. Most areas are strongly acid.

Suitability for agricultural uses: This unit is best suited to Virginia pine. A few areas may be returned to permanent pasture by completely landscaping or filling in the gullies by bulldozing.

Suitability for non-agricultural uses: This land type is poorly-suited for most non-agricultural uses because of rough, badly eroded conditions and rolling to steep slopes. A few areas that were formerly deep soils may be reclaimed at a high cost.

LOAL PHILO FINE SANDY LOAM, C-2% slopes

This is a somewhat poorly-drained, light colored, infertile soil that has formed in young alluvium on the first bottoms. The alluvium has washed principally from areas underlaid by acid sandstone and shale. The surface is grayish brown, very friable, fine sandy loam, 8" to 12" thick. The subsoil is mottled gray, yellowish-brown, and reddish-yellow, friable, fine sandy loam ranging to silty clay loam, 10" to 40" thick. The substratum is mixed shale, sandstones, quartz fragments, and cobbles mixed with sandy soil materials.

Reactions are strongly acid to very strongly acid. Permeability is good, but the soil water table is within 10" to 18" of the surface in wet seasons. Conservability is excellent, workability is fair to poor, and productivity is fair under good management.

Suitability for agricultural uses: It is best suited to corn and mixed hay crops. Short rotations can be used. Flooding and wetness greatly limit its use. Some areas could be drained by tiling or by ditching.

Suitability for non-agricultural uses: Because of flooding hazard and somewhat poor drainage, this soil is very limited in its suitability for non-agricultural uses. A few areas are suitable for pond sites where deep ponds are not needed.

11B1 HAYTER LOAM, 2-7% slopes (11C1 and 11D1)*

This is a deep, well-drained soil that exists with the Jefferson soils on the older colluvial lands. It has formed from colluvium consisting of mixed limestone, shale, and sandstone materials. Most areas occur along the foot slopes of Paris Mountain in the North Fork Roanoke River Valley. The surface soil is a brown, to reddish brown very friable loam, 8" to 14" thick. The subsoil is strong brown to reddish brown, friable clay loam 20" to 40" thick. The substratum consists of colluvial beds of silt loam, loam, and sandy loam mixed with many small sandstone and shale fragments, and angular cobbles and stones. These beds range from 3' to 25' or more in thickness.

This soil is medium to strongly acid in reaction and medium in natural fertility and organic matter content. Permeability is moderate to rapid, productivity is high, workability and conservability are good. The water holding and supplying capacity is good.

Suitability for agricultural uses: Hayter loam 2-7% slopes is well suited for most crops grown in the county and for short rotations. The size of individual areas is **small** and there are some areas that have steeper slopes. Such areas are best suited for pasture.

Suitability for non-agricultural uses: This soil is suited for many non-agricultural uses. However, it is subject to slippage, **especially** where seepage water occurs in the colluvial beds. It is good for small building sites, but entire layers of the colluvial deposit should be penetrated for large buildings. Then slippage of the materials may occur. It is favorable for absorption systems for sewage disposal, but care should be taken to avoid placement of intensive systems over areas where sinks occur or where the colluvium overlies high calcic limestone formations. 11B1 is questionable for pond sites or lagoons and most areas are too small for airports. Most areas can be used for bomb shelters, pipe **lines**, water lines, and underground storage. Excavated areas are subject to

slipping and care should be taken when digging ditches or making other excavations. In the lower lying areas some trouble may be caused by seepage, since this soil occupies low-lying positions within the landscape in most places.

The position in the landscape, ungraded materials in the substratum or colluvial beds and consequent susceptibility to slipping, plus the small size of the individual area, are major problems in its uses.

*11C1 Hayter Loam, 7-15% slopes and 11C1 Hayter Loam, 15-25% slopes differ from 11B1 because they have steeper slopes, are shallower over hard rock, and occupy somewhat different positions on the land surface. These units are less well-suited for agricultural and non-agricultural uses than 11B1. 11D1 is best suited for permanent pasture or crops in long rotations which include close growing plants. Slips are more likely to occur on the stronger slopes where the soil is excavated.

12B1 HAYTER COBBLY LOAM, 2-7% slopes (12C1 & 12D1, 12E1)*

This soil is similar to 11B1 Hayter loam, 2-7% slopes, except it contains enough cobbles and stone on the surface and throughout the profile to make cultivation difficult. It is therefore poorly-suited for crop production and best suited for permanent pasture. It is also less suited to most non-agricultural uses.

*(12C1, 12D1, 12E1) differ from 12B1 mainly by having steeper slopes, thinner profiles and thinner colluvium over the underlying land surfaces. The steeper areas are higher in the mountain foot slopes and are less well-suited to most agricultural and non-agricultural uses.

14D1 ALLEN COBBLY FINE SANDY LOAM, 15-25% slopes (14C1)*

This is a deep, well-drained, infertile soil that has formed in old colluvial beds of sandstones with some shale and cherty rock materials. It occurs principally in small areas north and northwest of Ironto along the southern foot slopes of Paris Mountain. It has a thick 10" to 24", light yellowish brown to brown, very friable fine sandy loam surface; and red friable to firm, slightly sticky, slightly plastic, clay loam to light clay subsoils 24" to 52" thick. The substratum or colluvial beds range in thickness from a few inches to 25' or more. They consist of many subangular sandstone, shale and chert cobbles, and stone and gravel fragments mixed with mingled red, yellowish-red, yellow, brownish yellow, and gray loamy soil material. Most of this soil and the colluvial beds overlie the Montevallo and Bodine soil formations and is associated with them and the Jefferson soils.

Depth of soil over hard rock, including the colluvial beds, land surfaces of shale, and/or cherty formations, is usually more than 6' but may range from 2' to as much as 25'.

This soil is strongly acid, and low in natural fertility and organic matter content. Permeability of the surface is rapid, and that of the subsoil is moderate to moderately slow in the lower part and in the substratum. Productivity is fair to good under good management, but cobbles make cultivation difficult.

Suitability for agricultural uses: Mainly because of the many cobbles and hilly slopes, this soil is better suited for pasture or forest production than for crops. A few areas, from which cobbles have been removed, are used for orchard but most are in forest or pasture. Forests produce good, long-bodied timber, usually of good species, including many kinds of oaks, poplar, ash, locust, and red maple.

Major problems in agricultural use: Moderately steep slopes and cobbliness prevent the use of farm machinery and limit suitability. Their fine, sandy loam surface textures are more leachable, somewhat droughty, and less productive for tree and pasture growth.

Suitability for non-agricultural uses: This soil is favorable for home sites and for septic tank drainage disposal systems, except where the colluvium is thin over cherty or slowly-permeable shales. The surface and subsoil are good for road subgrade materials. However, the colluvial beds are subject to slipping or sliding when deep road cuts penetrate into or through the colluvium. It is questionable for pond sites, but areas that overlie impermeable shales or chert should hold water well and make good pond sites. This soil is good for cemeteries, pipe lines, underground cables, but questionable for large buildings unless the colluvium can be penetrated and footings placed on fixed bed residual materials. Because of the many loose cobbles and stones and wide variations in depth, few areas are suitable for sanitary fills. It is fairly poor for road fill materials mainly because of cobbles and stones.

*14C1 differs from 14D1 principally in having smoother (7-15%) slopes. It is better suited for agricultural and non-agricultural uses than the moderately steep place.

15B1 JEFFERSON FINE SANDY LOAM, 2-7% slopes (15C1, 2, 15D1, 2)*

This soil is deep, light colored, and well drained. It has developed in old colluvial materials of mixed acid sandstone and shale. It is formed near the foot of slopes, along the smoother, lower-lying ridge tops and in drainage ways, principally around the foot slopes of Brush, Sinking Creek, Gap, and Prices mountains. The surface is a yellowish-brown, very friable, fine sandy loam, 8" to 12" thick. The subsoil is a brownish-yellow, friable, fine sandy clay loam to clay loam, 20" to 60" thick. The substratum is mixed fine sandy loam, and loamy sand soil material containing many sandstone, shale, and quartzite fragments ranging in size from 1/4" to 10" or more in diameter. Some of the materials are purplish, and in places purplish and reddish-brown colors are present throughout the profile. Depth to colluvial materials is usually less than 5' but depth to bed rock underneath the colluvial deposit may range from 3' to 20'. In places, small spots of soil from residual materials are present in the areas as mapped. In other places the colluvium substratum is absent or very thin and the soil lies directly on acid shale.

Jefferson fine sandy loam is strongly to very strongly acid. Permeability of the surface is very rapid, but that of the subsoil is moderate and in the substratum or colluvial beds it may be slow. Workability is good, fertility is low, conservability is fair to good, and productivity is good only where lime and liberal amounts of fertilizers are used in a good management program. The moisture supplying capacity is moderate to moderately low. However, seepage water in the colluvial bed is not uncommon.

Suitability for agricultural uses: This soil is suitable for moderately short rotations. It is best suited to small grain and mixed hay; but corn, other row crops, alfalfa, red clover, and many vegetables grow well under careful management. Trees grow much better on this soil than on the associated Muskingum and Montevallo soils, principally because of slope, position, thicker soil, and higher

moisture content. The major problems are low organic matter, low pH, low natural fertility, and moderate to low water holding capacity. This unit is found in small areas associated with the steep unproductive Muskingum and Montevallo soils.

Suitability for non-agricultural uses: Jefferson is questionable for absorption systems for sewage disposal, fair to poor for road subgrades, good for home sites or smaller buildings, but questionable for large buildings unless the entire colluvium is penetrated. It is good for cemeteries, radar stations, pipe lines, underground cables, and pond dam building materials. Some areas are good for pond and lagoons but most sites need to be examined. The surface is good for topsoiling materials, but the subsoil is only fair to poor. Areas are usually too small for large air ports but the soil would be fair to good for that purpose.

The **major** problems with the use of this soil for non-agricultural uses, are the composition and ungraded material in the colluvial beds, and presence of seepage water table in the colluvial beds which may cause slippage of the soil and soil materials when excavated.

*15C1 and 15D1 differ from 15B1 principally by having steeper slopes and by being thinner of colluvium over residual materials. They are more poorly-suited for agricultural and non-agricultural uses than 15B1.

16B1 JEFFERSON COBBLY LOAM, 2-7% slopes (16C1 and 16D1)*

This is a deep, well drained, light colored soil, and it differs from 15B1 in **having** slightly finer textures throughout the profile. It is formed principally from colluvial beds of materials which have washed out of areas underlaid mainly by quartzite, sandstone, and acid shale. Most areas are along the foot slopes of the Blue Ridge Mountains in the southern part of the county.

This soil is similar to 115B1 in suitability for agricultural and **non**-agricultural uses. However, its slightly finer textures make it somewhat less permeable and slightly more difficult to work. In general this soil is somewhat shallower in the colluvial beds over residual rock materials.

*16C1 Jefferson cobbly loam, 7-15% slopes, is very similar to 16B1 except for steepness, **pc**sition on the land's surface, and thickness over residual rock materials.

*16D1 has 15-25% slopes and is found on **strongly-breaking** ridge tops and hill-sides, generally on the high-lying portions of the colluvial lands. Because of slope and **sh**allowness, this soil is less well-suited to agricultural and non-agricultural uses than the smoother types. It is best suited to forest, permanent pastures, and wildlife areas.

17B1 EMORY SILT LOAM, 2-7% slopes (17A1, 17C1)*

This is a deep, well-drained fertile soil that is developed in fine colluvial and local alluvial creep and clough chiefly from the Hagerstown, Pisgah, and Pedlar soils. It occupies toe slopes, upper drainageways, depressions, and sink hole positions, usually in small, widely-scattered areas. The surface soil is a brown, to dark-brown very friable silt loam 10" to 20" thick. The subsoil is a reddish-brown and yellowish-red, friable, slightly sticky, slightly plastic, silty clay loam, but may range to silty clay in the lower part. It ranges in thickness from 20" to 60".

Emory silt loam is medium acid in reaction in most places, but may range from neutral to strongly acid. Permeability of the surface is rapid and that of the subsoil is rapid to moderate. The organic matter content and natural fertility are relatively high, the soil is easy to work and conserve, and is highly productive of most crops of the area.

Suitability for agricultural uses: Emory silt loam is suitable for short or continuous rotations, including corn, other row crops, most hay and pasture crops, small grain, and many vegetables and truck crops. Corn and mixed hay are better suited than small grains and alfalfa.

The major problems are that it is found in small, widely scattered areas, usually in association with soils that are not suited for crop production. In most places it receives seepage water from surrounding slopes, and higher organic matter and moisture content causes lodging in small grain. The soil remains moist and cool longer than upland soils in the early spring. Moisture conditions are slightly high for long stands of alfalfa.

Suitability for non-agricultural uses: It is questionable for absorption fields for sewage disposal, because it may retain fairly large amounts of moisture in the lower layers during the wet part of the year. It is fair to poor for home sites and large buildings and for house basements. It is poor to fair for road



Plate 11. Clods from the subsoil of Lodi loam. The subsoil contains clays with shrink-swell properties which make compaction for road material difficult.

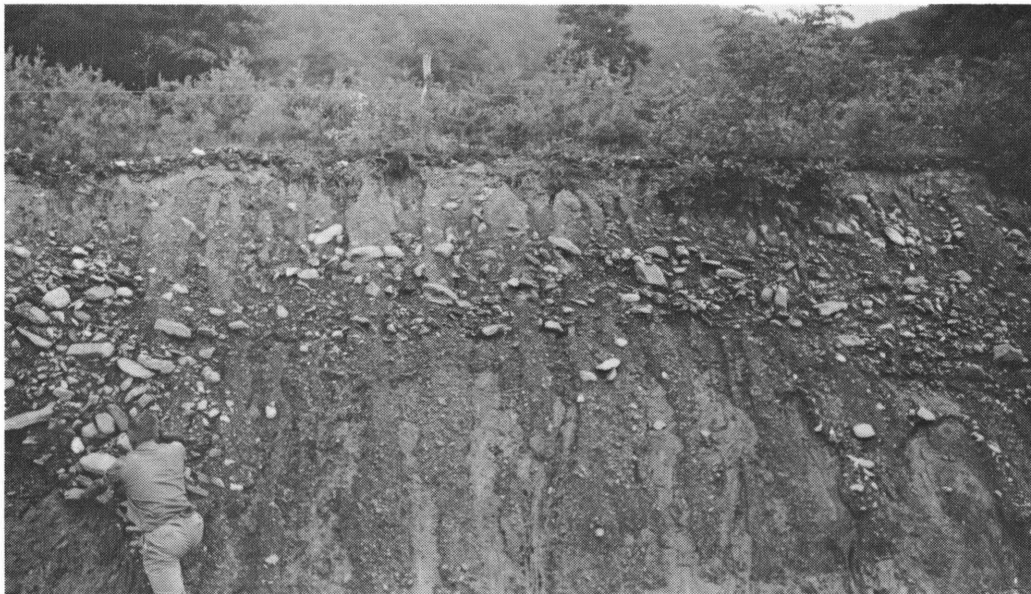


Plate 12. Profile of Jefferson cobbly loam, overlying residual shale formation.

subgrades; fair for pipe lines and underground cables; and poor for pond sites. It is good for pond dam and fill materials. Areas are too small for airports and soil is only fair for such uses. It is fair for cemeteries, and poor for trench silos, underground storage, and poor for sanitary land fills.

*17A1 has 0-2% slopes and 17C1 has 7-15% slopes. 17A1 is usually deeper than 17B1 and 17C1 is slightly shallower and more strongly developed than 17B1.

18B1 LANDISBURG AND GREENDALE SILT LOAMS, 2-7% slopes (18C1, 18D1)*

This is a mapping unit which includes the Landisburg silt loam and Greendale silt loam soils. Since they are so intricately mixed that they cannot be separated on the map at the scale used. They have formed on the colluvial lands and are found in depressions near the heads of drainageways on foot slopes, in sinks, and on divides between the heads of intermittent drainageways. Most areas are moderately well drained but include small, somewhat poorly-drained areas. The colluvium or local alluvium from which they are derived washed or sloughed mainly from the Groseclose, Frederick, Blacksburg, Litz, and Lodi soils. The Landisburg silt loam differs from Greendale silt loam principally in having a fragipan in the subsoil. It has a dark yellowish-brown to brown loam surface from 8" to 15" thick. The subsoil above the fragipan is principally a dark yellowish-brown, friable, silty clay and ranges in thickness above the fragipan horizons from 10" to 20". The lower part of this horizon is faintly mottled with gray. The fragipan varies in thickness from a few inches to as much as 2' or 3'. It is dominantly yellowish-brown, containing medium and fine mottles of gray, brown, and red compact, light silty clay loam with weak, platy structure. This fragipan has formed in the old A horizon of the underlying land surface and is usually underlaid by the subsoil of Groseclose, Lodi, Frederick, or Blacksburg. Manganese concretions are plentiful in many profiles and concretionary pans are common in local areas. Depth to hard rock is from 6' to over 25'.

Greendale silt loam in this complex is a well-drained to moderately-well drained soil formed in recent fine colluvium that washed or sloughed from the Groseclose, Lodi, Frederick, Blacksburg, Litz, and Westmoreland soils. It occurs in areas with the Landisburg soils on toe slopes, in depressions, near the heads, and along upper drainageways, and in sinks. It is a dark yellowish-brown, very friable loam to silt loam surface soil, 8" to 20" thick. The 16" to 40" subsoil

is a yellowish-brown, faintly mottled in the lower part, with light gray and brownish-yellow. The subsoil usually rests on or gradually grades into underlying land surface. Depth to hard bed rock is variable, depending largely on what residual soil is underneath the colluvium from which this soil has formed. It is usually more than 8' but ranges from 4' to 25'. The ground water table comes up into the lower part of the subsoil, usually between 30" or 60" during wet periods. It is in a position to receive abundant seepage water from surrounding slopes. Greendale silt loam is permeable in the upper layers and moderate to slow in the lower. The organic matter content and natural fertility is medium, workability is fair, conservability is excellent, and productivity is high for many crops of the area.

Suitability for agricultural uses: This soil is suitable for short and continuous rotations including corn, other row crops, small grain, and mixed hay. Yields of small grain are reduced by lodging in wet seasons. Alfalfa can be produced but stands die out in 2 to 3 years. Corn could be grown continuously without damage to soil tilth but most areas are small and widely-scattered among larger areas of upland soils. Therefore it is not feasible to grow continuous row crops on many areas. The major problems are: its position on the land surface, individual small size and widely scattered pattern of distribution, and seepage and relatively high temporary water table in wet seasons.

Suitability for non-agricultural uses: This unit is questionable for absorption systems for sewage disposal, poor for house basements, large building footings, underground shelter, and storage space for large equipment. It is poor for road subgrades, but makes good fill and dam building materials. The surface soil is good for topdressing material, but the subsoil is poor. It is poor for pond or lagoon sites, airports, and trench silos; but fair for underground cables, pipe lines, and water lines. It is good for lawns, golf fairways, and many shrubs, but only fair for golf greens. In places where hard surface is desirable the surfaced areas may break up under heavy traffic.

*18C1 Landisburg and Greendale silt loams (2-7% slopes), differs from 18C1 mainly in having steeper slopes and thinner profiles. 18D1 is not extensive and is not as well suited for agricultural uses as the smoother 18E1 and 18C1.

19B1 LEADVALE SILT LOAM, 2-7% slopes (19C1)*

This is a moderately deep to deep, moderately well-drained, light colored soil that has developed in fine, recent colluvium or **local** alluvium. The colluvium has washed and sloughed principally from areas of Montevallo silt loam and Ramsey silt loam. Leadvale occupies toe slopes and depressions near the heads of drainage-ways and thus receives seepage as well as runoff water from these areas. The surface is a light yellowish-brown to yellowish-brown, very friable, silt loam, 6" to 12" thick. The subsoil in the upper part is yellowish-brown, firm, hard silty clay or clay 24" thick. This grades into dominantly yellowish-brown mottled with yellow, white, pale yellow, gray and reddish yellow firm, very hard, silty clay to clay at 20" to 30". The total thickness of the subsoil ranges from 20" to 50". The substratum is mostly silt loam and clay materials mixed with multi-colored and gray shale particles. In places the lower B horizon contains a distinct fragipan. It is found in small, widely-scattered areas. Depth to fairly hard bed rock of shale and shaly sandstone is usually less than 5', but may range from 2' to 8'.

Leadvale silt loam is **strongly** to very strongly acid. Permeability of the surface is moderate to rapid and in the subsoil is slow to very slow. It is fairly easy to work and easily conserved, but low in natural plant nutrients and **organic** matter. It has a high water holding capacity, responds well to good management, and is fairly productive for most crops grown locally.

Suitability for agricultural uses: 19B1 is suited for short rotations in which corn, small grain, and mixed hay can be grown. Corn can be grown continuously under good management. Because of the slow internal drainage, it is poor for alfalfa. The heavy texture also makes it less suitable for many crops than the more sandy soils that have higher temperatures in early spring. Slow internal drainage, fine surface and subsoil textures, and its low-lying depressional position are the **major** problems in its use for agriculture.

Suitability for non-agricultural uses: It is unfavorable for absorption systems for sewage disposal, for road subgrade, fill material, house basements, airports, sanitary land fills, bomb shelters, underground storage, cemeteries, and topsoiling materials. It is fair for underground pipe lines and cables, and good for pond sites; but fair to poor for dam building materials. It is suitable for large buildings only if footings are put below the subsoil or pan layers and seepage waters are removed. Paved areas do not stand up as well as they do on the better-drained, associated upland soils.

*19C1 Leadvale silt loam, 7-15% slopes differs from 19B1 mainly in having steeper slopes. It is not as productive of most crops, but is somewhat better for a few non-agricultural uses than the smoother type, mainly because of more rapid runoff and shallowness.

20E1 DUNMORE SILT LOAM, 2-7% slopes (20C1, 20D2, 20E1)*

A very small acreage of this soil was mapped. It is similar to (25B1) Frederick silt loam, porous substratum, and is formed over breccia rock materials.

Suitability: is the same as Frederick silt loam.

*(20C1, 20D1, and 20E1) differ from 20B1 mainly by having steeper slopes and because of these are **less** well-suited for agricultural and non-agricultural uses.

22B1 HAGERSTOWN SILT LOAM, 2-7% slopes (22C1, 22D1, 22E1)*

This is a deep reddish-brown, well-drained, productive soil of the uplands. It has formed from the weathered products of high calcic limestone and limestone breccia. Most areas are found in the valley south and north of Childress and in the Pedlar Hill section. The surface soil is dark reddish-brown to brown, very friable, silt loam 6" to 10" thick. The subsoil is a reddish-brown, firm, slightly plastic, slightly sticky clay 20" to 50" thick. The substratum is usually thin, ranging from a few inches to several feet over relatively hard limestone rock. Many areas contain limestone outcrops. Sink holes are common. Areas are not extensive and are found principally with the Pedlar, Emory, and Frederick soils.

This soil is medium to strongly acid, medium in organic matter, easy to conserve, and highly productive of many crops under good management. Permeability of the surface is rapid and of the subsoil is moderate to moderately slow.

Suitability for agricultural uses: This unit is well suited for all crops grown in the area and can be used in short rotations. It is better suited to alfalfa, corn, small grain, and most general purpose crops than to vegetables. However, most garden vegetables are grown successfully. Pastures are highly productive.

Major problems in agricultural uses: Hagerstown has a narrow range of moisture **conditions** under which it can be cultivated. Early and timely plowing is essential for good soil tilth and high productivity. It is subject to severe erosion on the steeper slopes.

Suitability for non-agricultural uses: Because of the fine texture of the subsoil it is questionable for absorption systems for sewage disposal. It is fair for road subgrade and fill materials. The surface is good for topsoiling materials but the subsoil is poor. Because of subterranean drainage through underlying rock materials in most places, it is poor for pond sites. It is only fair for dam building material because of the fine clay texture. Usually it is too thin for good sanitary land fills

but is good for house basements, large building sites, airports, radar stations, most shrubs, lawns, and underground cable and pipe lines. Firm, plastic, sticky clay textures of the subsoil and subterranean drainage in the underlying rock materials; sinks through which a large part of the drainage water moves; and thickness to hard massive limestone, cause most problems.

*22C1 differs from 22B1 mainly by having steeper slopes. It is slightly shallower, over bed rock, less productive and more difficult to work and conserve.

*22D1 differs from 22B1, 22C1 by being steeper, having shallower layers, being less productive, and more difficult to conserve.

*22E1 differs from 22D1 mainly by having steeper slopes and thinner profile layers. Runoff is rapid. It is best suited for pasture.

24B1 GROSECLOSE SILT LOAM, POROUS SUBSTRATUM (24C1 & 2, 24D1 & 2, 24E1 & 2)*

This is a deep, well-drained soil that has formed in residuum of dolomitic limestone and shale breccia. It is extensive on the large drainage divide between New River and Roanoke River, and is found with the Frederick, Lodi, Blacksburg, Landisburg-Greendale soils which have developed from similar materials. Most areas are on ridge tops. The surface soil is usually yellowish-brown, very friable, silt loam, 6" to 10" thick. The 18" to 46" subsoil is yellowish-brown to strong brown, firm, plastic, sticky clay, usually coarser in texture and lighter in color in the upper part. The substratum is yellow, brownish-yellow, yellowish-brown, white, yellowish-red, and strong brown, porous, deeply-weathered breccia rock material mixed with small amounts of silt loam and loam soil material. Depth to bed rock of breccia is usually more than 15' and may range from 10' to 25' or more. Several areas have been excavated and drilled to hundreds of feet without encountering unweathered bed rock.

Groseclose silt loam is medium to strongly acid in reaction. Permeability is rapid in the surface soil, but moderate in the subsoil. It is fairly easy to work, easy to conserve, and highly productive under good management. Natural fertility is medium and fertility levels can be built up rapidly. The water and nutrient holding and supply capacity is good.

*24B2 differs from 24B1 mainly by being moderately eroded.

24C1 Groseclose silt loam, 7-15% slopes differs from 24B1 by having stronger slopes and being somewhat thinner of profile and depth over bed rock. It is not as well-suited for crops, needs longer rotations and more care to prevent soil losses when cultivated.

*24D1 & 2 differs from 24C1,2 by having steeper (15-25%) slopes and thinner profiles. It is, therefore, less suitable for agricultural or other uses. However, because of the porous, thick substratum it can be excavated easily and still used for many things, such as home sites.

Suitability for agricultural uses: It is well suited for short rotations and for most crops grown in the county. The major problems are medium to strongly acid reaction, medium natural fertility, and fine surface and subsoil textures which influence tillage operations.

Suitability for non-agricultural uses: It is good for septic tank disposal systems, but because of the porous substratum, contamination of ground water may be a problem. Although it is clayey soil, it does not remain wet for long periods **after rains** and can soon be worked. It is fair for road subgrades and large building sites, but poor for pond or lagoon sites and for fill or earth dam building materials. The surface is good for topsoiling. **It is good** for underground storage, bomb shelter, pipe lines, land fills, cemeteries, home sites, home basements, airports, shopping centers, playgrounds, parks, golf courses, and hospital sites. It has a medium shrink-swell potential in the subsoil that may pose a problem with streets, roads, and the foundations for certain buildings.

*24E1,2 is steep, 25-45% slopes, and is best suited for permanent pasture or forest. It is limited in its suitability for non-agricultural uses.

25B1 FREDERICK SILT LOAM, POROUS SUBSTRATUM, 2-7% slopes (25C1,2 & 25D1,2 & 25E1,2)*

This is a deep, well-drained soil that is developed from the weathered products of dolomitic limestone and dolomitic limestone and shale breccia. It is formed on the wider ridge tops and divides in the vicinity of Blacksburg, Prices Fork, and north of Christiansburg. It occurs with and has developed from the same parent rocks as the Lodi, Groseclose, Landisburg-Greendale soils. The surface soil is a brown, very friable silt loam, 4" to 10" thick. The subsoil is a yellowish-red clay that ranges in thickness from 20" to 60". The substratum is yellowish-brown, strong brown and yellow, friable, weathered breccia rock materials which extends to great depths.

Depth to hard rock is usually more than 15' but may vary from 6' to as much as 80' or 100'.

This unit is medium to strongly acid in reaction and medium to low in natural fertility and organic matter content. It is easy to work and conserve and is highly productive of many crops. The water holding capacity is high and permeability is rapid in the surface and subsurface, and moderate in the subsoil.

*25C1 differs from 25B1 principally in having slightly steeper (7-15%) slopes, by being slightly thinner of profile, and being over hard rock materials. 25B2 is moderately eroded.

*25C2 is similar to 25C1 except it has been moderately eroded and has lost about half or a little more of its surface soil. It is therefore less well-suited to most crops.

*25D1 has stronger (15-20%) slopes than 25C1 and is not as well suited for all uses as the smoother phase. 25D2 is moderately eroded but otherwise is like 25D1.

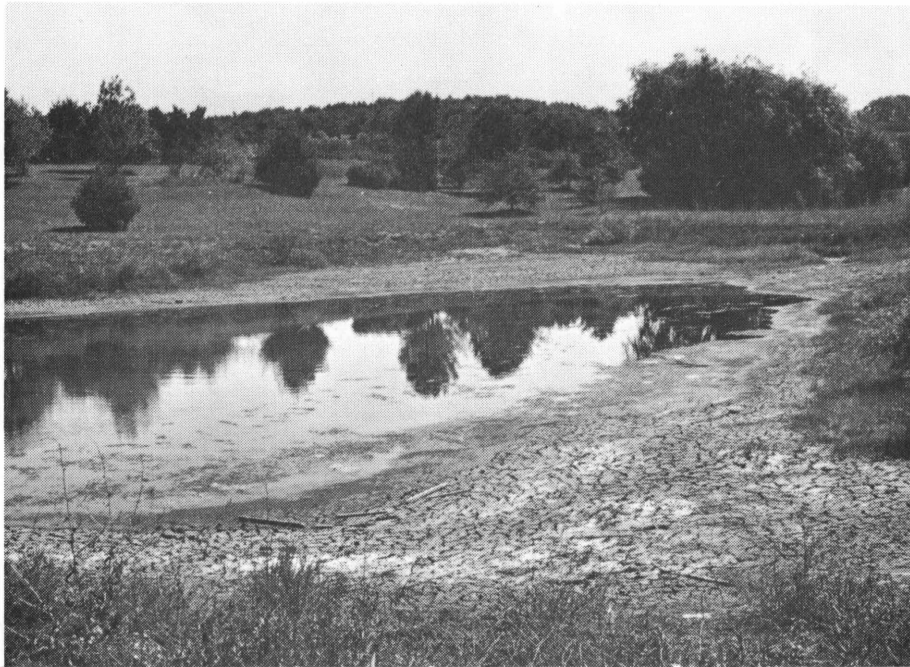


Plate 5. A leaking pond in limestone valley area. It is difficult to get ponds in the county's limestone valley areas to hold water, because of the underground drainage and crevices in underlying rock materials. However, ponds usually hold water well in soils underlaid by shales, sandstones, and granitic rock materials.



Plate 6. A scene in the Pedlar Hills area of the county showing the narrow bottoms of Weavers and Huntington (calcareous) soils and the very steep relief of Pedlar soils.

Suitability for agricultural uses: This unit is well suited to most of the common crops grown in the county and to shrot rotations that include row crops. Most is used for crops or pasture and yield is relatively high. The major problems are its natural low fertility, low pH, and silt loam surface and plastic sticky clay subsoil which requires early plowing to maintain good structure.

Suitability for non-agricultural uses: It is widely suited for non-agricultural uses except for pond sites and is only fair for road subgrade materials. The subsoil has critical shrink-swell ratio potential. The surface is good for top dressing materials, but the subsoil is poor. Workability during prolonged wet periods is fair. It is good for airports, sanitary land fills, absorption systems for sewage disposal, pipe lines, power poles, and large buildings. Because of the porous substratum spread, footings may be needed under large buildings. The soil and underlying substratum is fairly difficult to compact when used for fill materials. Contamination of grownd water may occur where absorption systems for sewage are used extensively. However, the breccia rock materials are not stratified, hence, water may not move literally for long distances. The major problems in non-agricultural uses are the porous substratum, heavy clay subsoil as they relate to footings for heavy buildings, septic effluent contamination in thickly populated areas with septic tanks, and clay content of the subsoils as it relates to road subgrades.

26B1 FREDERICK CHERTY SILT LOAM, 2-7% slopes (26A1, 26C1, 26C2, 23D1, 26D2, 26E1,

26E2)*

This deep, gently-sloping, well-drained, cherty soil is formed from the weathered residue of cherty dolomitic limestone. It usually is found on smooth ridge tops in association with the Lodi and Bolton soils. Larger areas are mapped on the high ridge north of the Roanoke River Valley between Luster's Gate and McDonald's Mill in the northeastern part of the county. The surface is a dark, yellowish-brown, to brown very friable, cherty silt loam 7" to 10" thick. The subsoil is a brownish-yellow, light, silty clay loam in the upper part and yellowish-red, plastic clay in the lower part. The lower subsoil below 22" to 24" is mottled or splotched with red, yellow, and strong brown. The substratum is usually only 1" or 2" of soft, weathered, shaly materials just over hard limestone. Most chert fragments are in the surface, but there are many stringers and strata of chert throughout the subsoil and in the substratum in most places. Depth to hard, stratified limestone bed rock is usually more than 10' but may range from 2' to 20' or more.

Frederick cherty silt loam is medium to strongly acid throughout, except in the C layer that lies close to the weathered residual rock. This layer is neutral in many places. Permeability of the surface soil is rapid and that of the subsoil is slow. It is fairly easy to work and easily conserved under good management. The organic matter content is low to medium and the water holding capacity is high. The water supplying capacity is moderately good.

Suitability for agricultural uses: This unit is suitable for short rotations and can be used intensively for row crops if legumes and close growing crops are grown every 2 or 3 years. Most areas are used for crops but because of this small acreage within steeper ridge areas, permanent pasture and forest still remain on some areas.

It is well suited to all crops grown in the county, but is better for corn, small grain, and hay crops than for vegetables or truck crops. The cherty nature of the surface makes it somewhat more droughty than other types. Consequently it is a very good soil for small grains. Chertiness interferes with seed-bed preparations and reduces stands.

Suitability for non-agricultural uses: This soil is questionable for septic tank drainage systems, fair for road subgrade, and poor for pond sites. Most areas tested did not pass percolation standards set by the Health Department. It is good for home sites but its shrink-swell potential is within the critical range and footing and basement walls may be moved considerably by the expanding clays. It is fairly difficult to work during prolonged wet periods; is too fine-textured and shallow for good sanitary land fills; but is fairly good for pipe lines, water lines, trunk sewage lines, power line towers, and, in most places, for bomb shelters. It is poor for top dressing material, and fair for compact fill materials. Most shrubs and lawns grow well, and cemetery graves can be dug to desirable depths without hitting rock in most places. Chertiness and heavy plastic critical swelling clay subsoil that extends to hard, massive rock are major problems in non-agricultural uses of this soil.

*26A1 differs from 26B1 principally in having smoother (0-2%) slopes.

*26C1 differs from 26B1 principally in having stronger slopes and slightly thinner profile layers over hard rock.

*26C2 is moderately eroded and the plow layer extends into the subsoil in many places over the areas.

*26D1, 26D2, 26E1, and 26E2 differs from 26C1 & 2 in having steeper slopes and shallower profile layers over hard rock material. 26D1 has 15-25% slopes. 26E1 and 26E2 have 25-45% slopes and is best suited to pasture or forest. These steeper slopes are less well-suited to agricultural and non-agricultural uses than the gently sloping to slopey areas.

27C1 BODINE VERY CHERTY SILT LOAM, SHALLOW, 7-15% slopes (27B1, 27D1, 27E1,2)*

This is a very cherty, shallow, excessively-drained, infertile soil that has formed from the weathered products of very cherty limestone. There is little limestone present in the formations, and what is there is mostly white and grayish stratified cherty rock and rock materials. Most of this soil exists along the southern exposed slopes of Paris mountain north of Ironto. Other small areas occupy high ridges northwest of McDonald's Mill and near the top of Ingles mountain southeast of Radford. Those areas mapped on the ridge northwest of McDonald's Mill have formed from more deeply-weathered cherty dolomitic limestone, have thicker profiles, and are deeper over bedrock. The surface is almost white when dry but dark grayish-brown to pale brown when wet. The surface texture is friable, very cherty silt loam, 6" to 10" thick. The subsoil is pale brown to brownish-yellow and is usually mottled in the lower part with specks of strong brown, yellowish-red, and white. The substratum is a compact, firm, silt loam and silty clay loam mixed with many (25-50%) chert fragments from 1/8" to 6" in size. The hard chert is usually at depths less than 20", but may range from 1' to 5'. The steeper slopes usually have thinner profiles, but on long steep slopes slough **from** above has accumulated on the lower portions, giving the soil more depth. Several areas mapped on the large ridge northwest of McDonald's Mill are merely slough or creek deposits of very cherty materials that have moved from the Frederick cherty silt loam soil areas. In places these colluvial deposits have buried

*27B1 comprises only 14 acres and differs from 27C1 mainly by having smoother slopes, mostly on the tops of narrow ridges. It is slightly thicker over hard rock in places.

*27D1 has 15-25% slopes, but is similar to 27C1 and 27B1 in other characteristics.

*27E1,2 has 25-45% slopes and occurs on slopes adjacent to larger drains and streams in the area. It is similar to 27D1 except for having steep slopes. These steep soils are less suitable for all uses.

high-grade limestone formations. Fragipan horizons occur in the subsoil and many of these areas have been mapped with the Landisburg-Greendale soils. This soil (27C1) is very strongly acid throughout. Natural fertility and organic matter are low. Permeability is very rapid in the surface and moderate to slow in the subsoil and substratum. The water-supplying and water-holding capacity is low. Workability and conservability are poor and productivity for nearly all crops is low to very low.

Suitability for agricultural uses: This soil is poorly-suited for most crops, pasture, and forest. Its best use, however, is for forest or permanent pasture, mainly because of chertiness, shallowness, low fertility and occurrence with less favorable soils.

Suitability for non-agricultural uses: It is fair for road subgrades, makes good footings for large or small buildings, but is poor for lawns, and shrubs. It is also poor for installation of basements or any underground pipe lines, bomb shelters, and sanitary land fills. It makes poor fill material or earth dam materials, and is questionable for pond or lagoon sites mainly because the chert bedrock is shattered in places. It is poor for cemeteries, air ports, golf courses, and playgrounds, and only fair for recreational areas. The major problems are shallowness, chertiness, and occurrence in widely-scattered, mountainous areas.

28C1, 2 FREDERICK-LODI VERY ROCKY SILT LOAMS, 7-15% slopes (28B1, 28D1 & 2, 28E1&2, 28F1)*

This is a complex of 2 well-drained soils that occur in such an intricately mixed pattern that they could not be separated on the scale used. Rock outcrops of dolomite occupy from 15 to 40% of the surface and depth to rock varies greatly between the rock ledges. Profiles of the Lodi, Frederick, and Groseclose soils are found between the rock ledges. These vary from soils with brown silt loam and silty clay loam surface, having thin heavy plastic clays near the rock ledges, to deep, well-drained Frederick, Lodi, and Groseclose soils in wider spaces between the ledges. (See description of these soils on page ____ of this report.) These soils are less permeable, less acid, more difficult to work, and lower in productivity than the non-rocky types and phases.

Suitability for agricultural uses: Mainly because of the many rock ledges, these soils are not suited for crop production. Their best use is for permanent pastures or forest. Only small spots between the rock ledges are suitable for crops or small garden spots.

Suitability for non-agricultural uses: Rock ledges make these soils much less suitable for non-agricultural uses than the non-rocky types.

*28B1 Frederick-Lodi very rocky silt loams 2-7% slopes differs from 28C1 mainly by having smoother slopes, somewhat thicker profiles and less runoff with less subsequent erosion.

*28C2 differs from 28C1 in being moderately eroded.

*28D1,2 differs from 28C1 in having steeper (15-25%) slopes.

*28E1,2 differs from 28C1,2 by having steeper (25-45%) slopes, usually thinner profiles, and being somewhat more worn and thinner over hard rock materials. These hilly, steep, shallow soils are less suitable for all uses.

29C1 CARBO SILTY CLAY LOAM, 7-15% slopes (29B1,2, 30C1, 29D1,2, 29E1,2, 29F1)*

This is a moderately-deep, well-drained, slowly permeable soil developed from the weathered products of highly calcareous, muddy, or argillaceous limestone, containing in places small strata of calcareous shale. The 6" surface soil is yellowish-brown, to brown, friable, granular silty clay loam. The subsoil is reddish-yellow to yellowish-red, mottled with red, very firm plastic to very plastic sticky clay, 8" to 20" thick. The substratum or parent material horizon is thin, usually less than 3", over hard limestone. This soil occurs mostly with the Dandridge and Rockland (limestone) in the North Fork Roanoke River valley area, and with the Pedlar soils in the Pedlar Hills area. Depth to hard bedrock is usually less than 3', but may range from 1 1/2' to 6'.

Carbo silty clay loam is medium acid to neutral in the solum and will effervesce in places with dilute HCl in the substratum. Natural fertility is medium.

Permeability is moderate in the surface but slow in the subsoil. Conservability is fair, workability is poor to fair, and productivity is fairly good for general crops.

Suitability for agricultural uses: Carbo silty clay loam is better suited for alfalfa, mixed hay, small grain, and pasture than for row crops, although corn and other row crops can be grown successfully. Forest includes cedar, locust, and many species of oak. Except for cedar, trees make fairly slow growth. This soil is best suited for moderately-long rotations that include mostly grasses and legumes.

The major problem is its silty clay loam surface, very plastic and sticky clay subsoil, shallowness over hard rock, and consequent poor workability and high erosion hazard.

Suitability for non-agricultural uses: This unit is unsuitable for sewage disposal systems. It is poor for subgrade materials, pond sites, dam building materials,

underground cables, pipe lines, airports, earth silos, centeries, house cemeteries, and top soiling materials. It is questionable for large building sites because of underground caverns or sinks. Many shrubs that require coarse textured acid soils are not adapted to this soil. Cedars, walnuts, and black locust grow well.

The major problems are swelling clayey subsoil, and shallowness over hard rock.

*29B1 Carbo silty clay loam, 2-7% slopes, differs from 29C1 mainly by having smoother slopes. It is inextensive and is better suited for most agricultural uses than the sloping (7-15% slopes) phase.

*29D1,2 has hilly (15-25%) slopes, 29E1 has steep (25-45%) slopes, and 29F1 has very steep (45-60%) slopes. They are slightly more eroded and are thinner of profile than 29C1 and best suited for pasture or forest. They are more poorly suited for most engineering uses.

30C1 CARBO SILT LOAM. 7-15% slopes

This soil is similar to 29C1 except it has silt loam surfaces and is underlain by brecciated rock materials. It is somewhat coarser in texture and less plastic in the subsoil than 29C1.

Use suitability is similar to 29C1.

31B1 LODI LOAM, POROUS SUBSTRATUM, 2-7% slopes (31B2, 31C1, 2, 31D1, 2 loam & 78B1 C1)*

This is a deep, well drained soil that is on the wide ridge divide of the Roanoke and New River watersheds. There are extensive areas in the vicinity of Blacksburg, Prices Fork and between Blacksburg and Christiansburg. It has formed from the weathered products of limestone, sandstone, and shale breccia. The surface soil is a yellowish-brown, very friable loam, 6" to 12" thick. The subsoil is a brown to yellowish-red, firm clay 20" to 60" thick. Some areas have sandy clay or clay loam textures in the subsoil. The substratum is a silty clay loam mottled red, brown, yellow, white, and gray. It is mixed with many shale, sandstone and limestone fragments of weathered breccia. Depth to relatively hard bed rock ranges from 5' to over 20', but is usually more than 15'. Wells have been dug to hundreds of feet without hitting hard rock.

It is strongly acid, moderately low in natural fertility and organic matter content, easy to work, and good soil tilth is easily maintained with proper management. Conservability of added plant nutrients is good, and productivity is high under good management. The water holding capacity is high and the moisture supplying capacity is good.

Suitability for agricultural uses: This soil is well suited to fairly short rotations in which many row crops can be grown. It is suited for most crops in the county including corn, small grain, alfalfa, other legumes, and grasses. Many vegetables, such as Irish potatoes and cabbage, grow somewhat better on this soil than on those having silt loam textures. Early plowing is necessary to maintain good soil structure and tilth. It is slightly more erodible than the Groseclose and Frederick soils.

Suitability for non-agricultural uses: It is fair for road subgrades and compacted fill materials. The surface soil is good for topsoiling materials, pond or lagoon sites. It is good for sewage disposal systems, provided lines are put in below 36" deep. It is good for basements, footings for small buildings, underground

storage, pipe lines, cables, power poles, bomb shelters, airports, radar stations, parks, playgrounds, shopping centers, golf courses, and cemeteries.

*31B2 soil differs from 31B1 mainly by being moderately eroded. Plow layers usually penetrate the subsoil and mix it with the surface.

*31C1,2 differs from 31B1 mainly in having steeper (7-15%) slopes. It is usually thinner of profile, runoff is more rapid, less water is available for plants, and the soil needs more care to prevent erosion and runoff. Longer rotation that includes fewer row crops are needed.

*31D1,2 differs from 31B1,2 and 31C1,2 in being steeper and slightly shallower over hard rock. Runoff is rapid and erosion hazards are high. Long rotations including close growing crops or pasture are needed for good conservation of soil and water. These soils are less well suited for agricultural and non-agricultural uses than the smoother and less eroded phases.

31D1 LODI LOAM, 15-25% slopes (31D2, 31E1,2, 31F1,2)*

This soil is very similar to 31D1,2 (Lodi loam, porous substratum, 15-25% slopes) except it is underlain with massive, stratified, dolomitic limestone and sandstone or siliceous dolomitic limestone. It has finer textures in the lower subsoil and substratum. It is a deep, well-drained soil that occurs on the wider ridge tops and upper hillsides along the high ridges east and northeast of Blacksburg, north of McDonald's Mill and in the vicinity of Christiansburg along Route 460. It has a yellowish-brown, very friable loam surface, 6" to 12" thick. The subsoil is a strong brown to yellowish-red, firm plastic clay that grades into mottled yellow, red, and brown firm clay mixed with yellow shale, brownish sandstone, and chert fragments in the lower part. The substratum is usually very thin and grades into massive rock, usually at about 10'. However, the soil may range from 5' to 15' over bed rock.

This soil is strongly acid, permeability of the surface is rapid, and that of the subsoil is slow. Natural fertility is low, and workability and conservability are fairly difficult because of moderately steep slopes. Runoff is moderately rapid and productivity is moderate. Note: This soil No. 31D1 was also used for 31D1,2 (Lodi loam porous substratum 15-25% slopes) because there was over-lapping in the separations. Consequently some 31D1,2 will have porous substratum and some will not.

*31D2 differs from 31D1 mainly by being moderately eroded. A portion of the subsoil is usually exposed by plowing and mixed with the surface soil.

*31E1,2 differs from 31D1,2 mainly in having steeper (25-45% and 45-60%) slopes. They are thinner of profile, more variable in depth over bed rock, and less suitable for all uses than 31D1,2. Most areas are suited to pasture or forest and limited in suitability for non-agricultural uses. Mainly because of the steeper slopes, they are fair for small home sites but probably best suited to parks or recreational areas.

Suitability for agricultural uses: Mainly because of the strong (15-25%) slopes and clay subsoils, 31D1 is best suited for rotations that include mostly close growing crops such as small grain, hay crops, and permanent pastures.

Suitability for non-agricultural uses: Mainly because of the heavy clay subsoil which extends almost to massive, unweathered bed rock, this soil is unfavorable for septic tank drainage systems in most places, only fair for road subgrades, and poor for road fill or earth dam materials. It is questionable for pond sites and sewage lagoons mainly because of danger of subterranean drainage in the underlying rocks.

Many areas may be satisfactory if sites are properly selected, but on-site investigations are needed to select areas. The surface soil is good for **topsoiling** material, but the subsoil is poor. Workability during prolonged wet periods is poor. It is fair for house basements and footings for large buildings. However, the subsoil has critical shrink-swell. It is poor for airports and fair to good for underground pipe lines and power poles and towers.

32B1 LODI CHERTY LOAM. 2-7% slopes (32C1,2 32D1,2 & 32E1,2)*

This is a deep, well-drained soil that has formed in residuum from cherty dolomite mixed with sandstone and silicious dolomitic limestone. It resembles 31B1 Lodi loam, except it has enough angular white and grayish chert fragments on and in the soil to interfere with cultivation and reduce soil productivity.

Suitability for agricultural and non-agricultural uses: Suitability is similar to that of Lodi loam, but yields of most crops are slightly less and suitability for non-agricultural uses are less favorable.

*32C1 differs from 32B1 mainly in having steeper slopes (7-15%).

*32C2 differs from 32C1 in being moderately eroded. The subsoil is mixed with the surface. The texture and structure are less desirable for crop production and other uses.

*32D1,2 has 15-25% slopes and 32E1,2 has 25-45% slopes. They are somewhat thinner over bed rock and best suited to pasture or forest. They are more poorly suited for most non-agricultural uses being best for wildlife or recreational uses.

33E1 WESTMORELAND SILT LOAM, 25-45% slopes(33B1, 33C1,2, 33D1,2, 33F2, 33F1,2)*

This is a shallow to moderately deep, excessively-drained soil that has developed in the weathered products of interbedded limestone and shale. Most of it is found on the sides of the back-bone-like ridges that extend from the northern slopes of Paris Mountain in the eastern part of the county, the southern slopes of Ingles Mountain, and on Gibson Ridge, 1 1/2 to 5 miles southwest of Christiansburg. Another area extends across Route 11 about 1 1/2 miles west of Christiansburg. The surface soil is dark yellowish-brown to brown very friable, silt loam 5" to 12" thick. The subsoil is very thin, (2" to 6" thick) usually weakly developed or absent, and consists mainly of yellowish-brown and yellowish red, friable silt loam to silty clay loam soil materials mixed with 25-50% shale fragments. The substratum is mostly yellowish-brown, and yellowish-red silt loam soil materials mixed with 75%-90% shale fragments of similar colors. Depth to hard bed rock is usually less than 2', but may range from 12" to 4'. Thicker areas usually occur near the base of slopes where soil creep materials have accumulated. 33E1 is medium to strongly acid in reaction, and low to medium in organic matter content. Permeability is rapid to moderate, the water holding capacity is low, natural fertility is medium, conservability is difficult, workability is poor, and productivity is low for most crops but good for permanent pasture.

*33B1 and 33C2 differs from 33C1 mainly in being moderately eroded.

*33C1 differs from 33E1 mainly in having smoother slopes (2-15%). Usually on narrow ridge tops, and, is more suitable for all uses than the hilly, steep, and very steep phase.

*33D1,2 has 15 to 25% slopes, but is similar to 33F1 in other characteristics.

*33F1,2 has 45-60% slopes and is best suited to forest and recreational areas.

It is slightly shallower and more erosive than the steep phase and difficult to traverse.

Suitability for agricultural uses: It is best suited for permanent pasture.

Suitability for non-agricultural uses: Shallowness and steep slopes limit the use of this soil for many non-agricultural uses. It is unfavorable for septic tank drainage systems, poor for home sites, basements, large building sites, road beds, topsoiling and fill materials, sanitary land fills, cemeteries, airports, and shopping centers. It is best suited for park and recreational areas. Cove positions within these areas will usually hold water for ponds or lagoons.

34C1 HAYTER STONY LOAM, (7-15% slopes) only one acre was mapped in the county.



Plate 1. Scene in North Fork Roanoke River Valley showing Muskingum and Westmoreland soils on the uplands along Paris Mountain; Carbo and Chilhowie soils on lower-lying ridges; Jefferson and Hayter soils on the colluvial lands in the center of the picture; and Huntington and Melvin soils on the bottom land in the immediate foreground.



Plate 2. Two different crops, fescue in the light-colored area and alfalfa in the darker, mark the approximate boundaries between Landisburg and Greendale soils of the colluvial land and Lodi and Groseclose soils of the uplands.

35C1 DANDRIDGE SILT LOAM, (7-15% slopes) (35D1,2; 35E1; 35F1)*

This is a shallow, excessively drained soil over weathered calcareous shales. It occurs with the Carbo, Chilhowie, and Swaim soils in the North Fork Roanoke River Valley. It occupies narrow ridge tops as small areas. The surface is a dark yellowish-brown and yellowish-brown very friable silt loam, 4" to 8" thick. There is usually no subsoil, and the substratum is yellowish-brown silt loam to light silty clay loam soil material mixed with 50% to 75% dark gray to blackish calcareous shales. Depth to unweathered hard bed rock is usually less than 12", but may range from 6" to 30".

This soil is medium acid to neutral in reaction, low in productivity, and organic matter and low to medium in natural fertility. It has a low waterholding capacity, rapid internal drainage, and rapid runoff. Erosion hazards are severe and the soil is droughty.

Suitability for agricultural uses: This soil, mainly because of shallowness, is best suited for mixed hay, small grains, and permanent pasture.

Suitability for non-agricultural uses: This shallow soil is well-suited for building footings, and road beds, but is poor for sewage disposal systems, top soiling materials, compacted fill, sanitary fills, sewage lagoons, pipe lines, underground cables, bomb shelters and many other non-agricultural uses.

*35D1,2 differs from 35C1 mainly by having steeper (15-25%) slopes and by being shallower of profile and over bed rock. It is best suited for permanent pasture and more poorly suited for non-agricultural uses than 35C1.

*35E1,2 has 25-45% slopes and is best suited for pasture or forest, or wildlife and recreational areas.

*35F1, has 45-60% slopes and is best suited to forestry, wildlife and recreational areas.

36C2 DANDRIDGE SHALY SILT LOAM, ERODED (7-15% slopes), (36D2, 35E2, 35F2)*

This is a shallow, droughty, eroded soil that is similar to 35C1 except it has lost a good portion of its surface by erosion. It has a yellowish-brown shaly silt loam surface soil mixed with 20-30% small shale particles, 2" to 6" thick. Depth to bedrock is somewhat less than on the non-eroded 35C1, and runoff is more rapid. It is less productive of most crops, pastures, and forest and less suited for most non-agricultural uses.

*32D2 differs from 36C2 mainly by having steeper (15-25%) slopes. Its best use is forest or wildlife.

*36E2 has 25-45% slopes and 35F1 has 45-60% slopes. These steeper phases are best suited for forest, wildlife, or recreational areas.

38E1 LITZ SILT LOAM, 25-45% slopes (38B1,2, 38C1,2, 38D1,2, 38F1,2)*

2 TT This is a shallow, light colored, excessively-drained soil that has formed in the weathered products of leached calcareous shale. It is found on high lying ridges in a wide area across the southern part of the county near Rogers, Riner, Childress, and Snowville. The surface soil is light yellowish-brown to brown very friable silt loam, 5" to 10" thick. There is little or no subsoil, and the substratum is a brownish-yellow, yellow, strong brown, and pale brown, friable silt loam and loam material mixed with 50% to 90% weathered shale, and silt stone of similar colors. Depth to relatively hard rock is usually less than 18", but may range from 6" to 36". Thicker areas are usually near the base of long slopes where soil creep has accumulated. There are occasional limestone outcrops, and shale and a few sandstone ledges are present in many areas. This shallow soil is strongly acid in most places. Permeability and infiltration is rapid, water holding and supplying capacity are low, conservability is difficult, natural fertility and organic matter content are low, and productivity is low, except for permanent pasture, which is medium.

Suitability for agricultural uses: Because of steepness and shallowness, this soil is best suited for permanent pasture or forest. The cooler, more moist north and east facing slopes produce the best pasture. The smoother slopes (38B1,2 and 38C1,2) are fairly well suited for small grain and mixed hay, and corn and alfalfa are grown under good management and produce fairly well.

Suitability for non-agricultural uses: Shallowness, steep slopes, and consequent erosion hazards limit the suitability of this soil for non-agricultural uses. Its

*38B1,2, 38C1,2 and 38D1,2 differ from 38E1,2 mainly in having smoother slopes. 38B1,2 has 2-7% slopes; 38C1,2 has 7-15% slopes, and 38D1,2 has 15-25% slopes. These soils are better suited to all uses than the steeper 38E1,2 soils. 38F1,2 has very steep (45-60%) slopes and is therefore limited to grass, trees or wildlife and recreational areas.

best use is for parks, wildlife, and recreational areas. It is unfavorable for septic tank drainage fields, mainly because of shallowness to hard rock, although effluent will enter into the rock crevices in most places. It is also poor for road beds, fill materials, underground pipe lines, cables, sanitary land fills, cemeteries, airports, bomb shelters, play grounds, race tracks, and underground storage space. It is good for large and small building and bridge footings, but slope makes building difficult.

39E1,2 LITZ-TEAS SILT LOAMS, 25-45% slopes (39B1,2, 39D1,2, 39F1,2)*

This is a unit of Litz and Teas soils **that** are so intricately mixed in places that they could not be separated on the map at **t h e** scale used. The Litz soil has a yellowish-brown surface soil 5ⁱⁿ to 10ⁱⁿ thick. There is little or no subsoil and the substratum is a brownish-yellow and grayish-brown, friable loamy soil material, mixed with (50% to 90%) weathered shale and siltstone fragments.

The Teas soil is similar to Litz except in color. It has dark reddish-brown, very friable silt loam surface 5ⁱⁿ to 10ⁱⁿ thick. There is little or no subsoil in most places and the substratum is a reddish-brown (purplish), very friable loamy soil material mixed with partly weathered shale fragments. Depth to bedrock is usually less than 18ⁱⁿ, but may range from 6ⁱⁿ to 36ⁱⁿ. Thicker areas are near the base of slopes and adjacent to colluvial areas.

Both soils are strongly acid in most places. Permeability is rapid, water holding capacity is low to very low, conservability is difficult, natural fertility and organic matter content are low, and productivity is low, **except** for permanent pasture which is medium.

*39B1 Litz-Teas silt loams, 2-7% slopes, differs from 39E1 mainly by having smoother slopes. It is slightly thicker over bedrock and is suitable for small grain, mixed hay, and occasional row crops grown in long rotations.

*39B2 differs from 39B1 in being moderately eroded.

*39C1,2 differs from 39B1,2 in having slightly steeper (7-15%) slopes. It is suitable for mixed hay, small grain, and occasional row crops in long rotations.

*39D1,2 has 15-25% slopes and is best suited for pasture or mixed hay crops.

*39F1,2 has very steep (45-60%) slopes and is best suited to forest. It is poor for agricultural and non-agricultural uses.

Suitability for agricultural uses: Litz-Teas silt loams are best suited for permanent pasture or forest mainly because of shallowness and steep slopes. The cooler, more moist north and east facing slopes produce the best pastures and are more easily conserved. The smoother slopes are fairly well suited for small grain and mixed hay, but corn and alfalfa are grown successfully under good management where rotations consist primarily of close-growing crops.

Suitability for non-agricultural uses: Shallowness, steep slopes, and erosion hazards limit this unit for non-agricultural uses. They are best suited for wildlife and recreational areas.

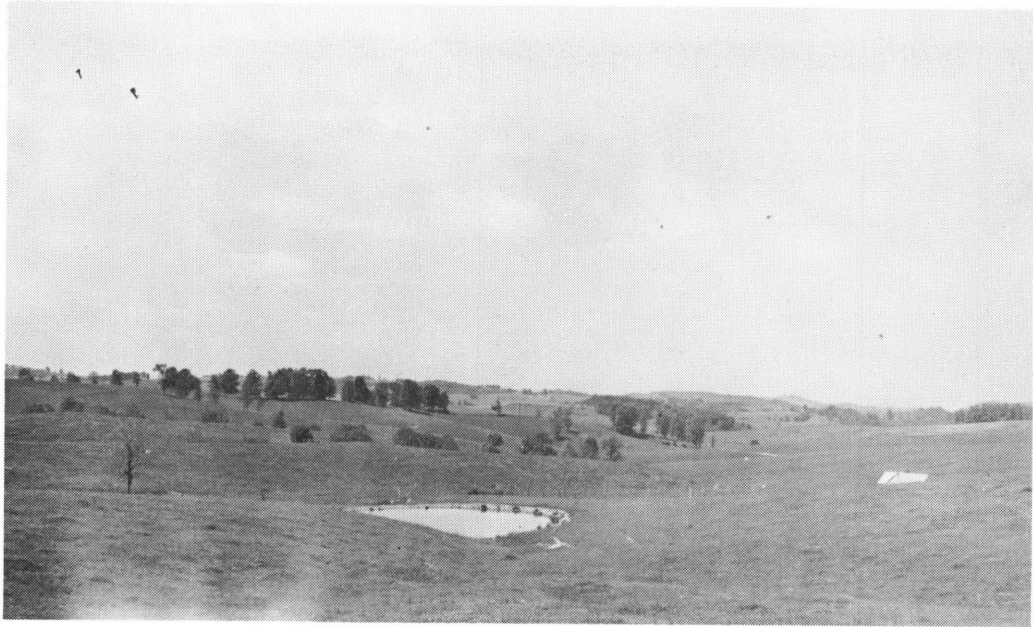


Plate 3. Landscape on ridge divide between Roanoke River and New River watershed, Lodi and Groseclose soils.



Plate 4. Rockland (limestone). Bedrock outcroppings prevent cultivation, but this land makes good-quality pasture. Pisgah and Hagerstown soils are among the rocks in most places.

40B1 ROCKLAND (LIMESTONE). 7-15% slopes (40C1, 40D1,2, 40E1, 40F1)

This is a land type in which 50% to 90% of the surface is covered with outcroppings of various kinds of limestone. The soils among the outcroppings vary from very thin, brown, plastic sticky soils near the rock outcrops to moderately deep soils, similar to the Carbo, Hagerstown, Frederick, Lodi, and Pedlar soils in the larger spaces between the rocks. Smoother areas that contain high calcic limestone are found mostly in the North Fork Roanoke River Valley, in a small area 3 miles south of Radford and in portions of Pedlar Hills. Areas including dolomite limestone are on the large ridge, north and east of Blacksburg and north of McDonald's Mill. Depth of soil ranges from 0 to 4' or 5'. Permeability is slow, reaction is moderately alkaline to strongly acid, but less acid than most areas in the limestone valleys. Natural fertility of the soil between the rock outcrops is usually relatively high, workability is very poor, and productivity is very low.

Suitability for agricultural uses: This land type is unfavorable for all uses except pasture and poor for forest production or wildlife uses.

Suitability for non-agricultural uses: Mainly because of the numerous outcroppings this rock land is poorly suited to nearly all uses, except as crushed rock material for road building. The high calcic limestones make best crushed rock and very little of the dolomitic limestones are used.

*40C1 Rockland (limestone) 7-15% slopes, differs from 40B1 mainly in having stronger slopes. Nearly all of these smoother areas contain high calcic limestone outcroppings and produce better species of trees and pastures.

*40D1,2 has 15-25% slopes. 40E1 has 25-45% slopes. 40F1 has 45-60% slopes. These steeper phases usually have somewhat less rock outcroppings in most places, but some steeper areas contain rock escarpments.

41B1 HOLSTON SILT LOAM. (2-7% slopes). (41A1, 41C1)

This is a light colored moderately well to well drained soil that has developed on the terrace lands. It has formed in alluvium which has washed principally from acid shales and sandstones. It occurs in small areas with the Monongahela soils of the terrace lands and the Pope, Philo, and Atkins soils of the bottom lands. The surface is a light yellowish-brown very friable silt loam 7⁰⁰ to 10⁰⁰ thick. The subsoil is brownish-yellow to yellowish-brown, mottled with light gray and yellowish red in the lower part, 10⁰⁰ to 30⁰⁰ thick. Most areas have thin cobbly substratum and overlie shale formations. Depth to hard bed rock ranges from 4⁰ to 1⁵⁰, but is usually less than 8 feet.

This soil is strongly acid, low in natural fertility, organic matter, and only fairly productive. Workability and conservability is good, runoff is slow and internal drainage is rapid in the upper horizons and slow in the lower horizons. Infiltration is good.

Suitability for agricultural uses: This soil is best suited for corn, mixed hays. Short rotation can be used. Alfalfa can be grown but stands are short lived. Heavy fertilization is needed.

Suitability for non-agricultural uses: Slow internal drainage in the lower subsoil and substratum makes this soil unfavorable for septic tank disposal systems, and fair for home basements, bomb shelters, pipe lines, trench silos, and for road beds. The surface is good for topdressing soil materials, but the subsoil is poor. In places where the substratum is thick and contains many cobbles, slippage may occur where large buildings are placed on the substratum. Therefore, footings for large buildings should be placed on underlying shale formations.

*41A1 differs from 41B1 mainly by having smoother (0-2%) slopes.

*41C1 differs from 41B1 mainly in having steeper(7-15%) slopes. It is also usually thinner of profile and over underlying residual rock materials.

42D1 MONTEVALLO SILT LOAM. 15-25% slopes (42C1, 42E1, 42F1)*

This is a shallow, light colored, droughty soil that has formed from the weathered products of acid shale. Most areas form backbone-like ridges that extend into the Craig and Poverty Creek Valley along the steep northern slopes of Brush and Sinking Creek mountains. Other areas are in the vicinity of Ironto, in the eastern part of the county. The surface soil is a friable, pale brown to almost white when dry, silt loam 4" to 7" thick. There is little or no subsoil and the substratum contains partly weathered multicolored shale fragments (50% to 90%) mixed with brown silt loam and silty clay loam soil material. Fairly hard bed rock of acid shale and fine-grained, shaly sandstone is usually encountered at depths less than 15". Thickness may range from 6" to 20".

This soil is very strongly acid in most places. Organic matter content and natural fertility is low to very low. It has rapid permeability in the surface and in the thin, weathered shale substratum, and runoff is rapid to very rapid. Waterholding and supplying capacity is low. Productivity is low to very low for all crops.

Suitability for agricultural uses: This shallow to very shallow, droughty soil is best suited for forest. Most trees grow very slowly and very few grow to lumber size except in lower cove portions.

Suitability for non-agricultural uses: This soil is best suited for recreational areas or wildlife areas. House basements are difficult to dig because of shallow depth to relatively hard shale. This soil, however, would be good for building footings. Road beds would be hard to prepare because of slope and shallowness. Pond sites, lagoon sites, and holding capacity is good in coves or drainageways, but material is poor for pond dam materials or topdressing materials.

*42C1 Montevallo silt loam, 7-15% slopes, differs from 42D1 in having smoother slopes and in being slightly more-deeply weathered in the substratum. It is somewhat better suited to more uses.

*42E1 Montevallo silt loam, 25-45% slopes and 43F1 Montevallo silt loam, 45-60% slopes are steep and very steep and are less well-suited to forest, recreation, or wildlife than the 42C1 and 42D1.

43D2 MONTEVALLO SHALY SILT LOAM, 15-25% slopes (43B2, 43C2, 43E2, 43F2)*

This soil differs from the silt loam (42D1) mainly in being shallower, and containing 25% to 60% small shale fragments throughout the surface. The surface soil is usually less than 5ⁱⁿ thick and the fairly hard shale is at depths of a few inches to less than 12ⁱⁿ.

*43C2 and 43B2 have 2-7% and 7-15% slopes respectively and occur on narrow ridge tops. 43E2 and 43F2 have 45-60% slopes and occur on deeply dissected areas near larger streams.

All these soils are more poorly suited to agricultural and non-agricultural uses than the (42) non-eroded areas.

44E1 MUSKINGHAM FINE SANDY LOAM, 25-45% slopes (44C1, 44D1, 44F1)*

This is a shallow, sandy, infertile soil that has formed from the weathered products of acid sandstones. Most of it is on mountain sides that are exposed in many directions. Most areas are along Brush and Sinking Creek mountains in the northern part to the county and Prices Mountain in the west central part of the county. Muskingham fine sandy loam occurs with other Muskingham, and Jefferson soils and are bordered on the lower slopes in most places by the Montevallo soils. The surface soil is a yellowish-brown to brown, very friable, fine sandy loam from 4" to 12" thick. There is very little or no subsoil and the substratum consists of brownish and yellowish, very friable, fine sandy loam soil material mixed with 25% to 75% sandstone and shale fragments. Depth to hard rock may range from 4" to as much as 36", but is usually less than 18" thick. Most areas contain a few loose stone and cobbles. Purplish spots and stringers of sandstone and soil that resemble the Lehew soils have been included in this soil. It is not extensive, strongly to very strongly acid in reaction, and low in natural fertility and productivity. Because of shallowness and steep slopes it is difficult to work and to conserve. Permeability is rapid to very rapid and runoff is very rapid. It has a low water holding and water supplying capacity for crops and forest but is slightly better in this respect than the Montevallo soils.

Suitability for agricultural uses: This steep, shallow soil is best suited for forest and wildlife. Most trees grow slowly and very few produce lumber size trees of high value. Permanent pastures can be grown but under present conditions are not economical. The major problems are steep slopes, shallowness, low water holding capacity, low fertility and productivity, and poor conservability, and workability.

*44C1 and 44D1 Muskingham fine sandy loam, 7-15% and 15-25% slopes, differ from 44E1 mainly in having smoother slopes, in occupying ridge top positions and being slightly more suitable for most uses.

*44F1 has 45-60% slopes, and is best suited for growing trees.

Suitability for non-agricultural uses: It is poorly suited for home or building sites, road subgrade, airfields, underground cables, pipe lines, cemeteries, and land fills, and trench silos. Slopes are usually too steep for pond sites and soil is too thin for much dam-building material, although of good quality. It is poor for topdressing materials, for shrubs, lawns, cemeteries, and for septic tank drainage fields, mainly because of slope and shallowness.

46E1 PEDLAR VERY ROCKY SILT LOAM, 25-45% slopes (46C1,2, 46D1,2, 46F1)*

This is a shallow, excessively-drained, brown, alkaline to medium acid soil that has formed from fault breccia materials. It is found mainly in the south-eastern part of the county in the Pedlar Hill section. There are large areas north of Elliston. Some loose limestone fragments and bed rock outcrops make up 15% to 30% of the area occupied by this soil. Most areas are a part of the Pedlar-Carbo complex. The surface soil is a dark brown to reddish-brown, very friable, granular rocky silt loam 7" to 14" thick. In spots where a thin subsoil has developed it is a reddish-brown to dark red, friable to firm, slightly plastic sticky silty clay loam, 2" to 6" thick. The substratum is a very friable, reddish, silt loam and loam soil material mixed with many white, limey particles and many shale, limestone, and some chert fragments weathered from crushed fault breccia.

Depth to unweathered hard rock varies from 0 on the rock ledge to 2' or up to 50' or more where the material has been highly crushed. It is usually hard but somewhat weathered and is found at less than 2'.

*46C1 Pedlar **very** rocky silt loam, 7-15% slopes, differs from 46E1, mainly in having smoother slopes. It occupies narrow ridge tops, is slightly deeper, having more thin subsoil development, and is somewhat redder and thicker over bed rock. It is more suitable for most uses than the steeper 46E1.

*46C2 differs from 46C1 mainly in being moderately eroded. A few shallow gullies are present in places.

*46D1,2 is very similar to 46E1 except it has smoother (15-25%) slopes and is found on narrow, strongly sloping ridge tops and longer, more gradual ridge sides.

*46F1 is very steep (45-60% slopes), thinner of profile and more erosive. It is unfavorable for most uses except forest wildlife or recreational areas. North and east facing slopes produce better timber than the south and west slopes.



Plate 13. Profile of shallow brown, fertile, Pedlar soil that has formed over crushed limestone and shale breccia rock materials.



Plate 14. Improper footings in swelling and shrinking clayey subsoils, such as Carbo, Lodi, Frederick, and Groseclose soils, may cause cracked walls and basements.

46E1 Pedlar very rocky silt loam, is moderately alkaline to medium acid. The reaction usually is neutral in the surface and alkaline in the substratum. Permeability is very rapid, and natural fertility is medium to high. Phosphate is the least available plant nutrient mainly because of the high pH. Workability and conservability are poor, the water holding capacity is low, and productivity is low for crop plants and medium for pasture.

Suitability for agricultural uses: Mostly because of shallowness, rockiness, and steep slopes this soil is better suited to pasture and forest than to cultivated crops. Bluegrass and white clover pastures grow naturally where good fertilization practices are used. The high pH helps lock up some plant nutrients, especially phosphate, and heavy or frequent applications are needed for good results. No lime is needed in most places for pasture production. North and east facing slopes are more productive of permanent pastures and forest than the west and south slopes.

Suitability for non-agricultural uses: Steep slopes, shallowness, and rockiness are the major characteristics that regulate the use of this soil. It is unfavorable or poor for most non-agricultural uses except for recreational or park areas.

47E1 TEAS SILT LOAM, 25-45% slopes (47C1,2, 47D1,2, 47E2)*

This soil is shallow, excessively-drained, dark reddish brown to purplish. It has formed in the weathered products of purplish and reddish brown, deeply leached, calcareous shale with a little shaly sandstone and a few beds and strata of limestone.

It is similar to 38E1 Litz silt loam (25-45% slopes) in most characteristics except color. Litz is mostly yellowish-brown.

Suitability for agricultural and non-agricultural uses: See 38E1 Litz silt loam, for use suitability of this soil.

*47C1,2 similar to 47E1 except it has smoother slopes and occupies ridge tops instead of ridge sides. It is slightly thicker over bed rock and is more suitable for small grains and mixed hays than for corn and other row crops. Rotation should include many close-growing crops. It is moderately eroded and there are many shale fragments in the plow layer.

*47D1,2 has 15-25% slopes and is less suitable for most uses, but is best suited for permanent pasture.

*47E2 Teas silt loam eroded, 25-45% slopes, is similar to 47E1 except it is moderately eroded, contains many shale fragments in the plow layer, and is thinner over bed rock.



Plate 9. Depth of Muskingum soil over bedrock of sandstone is usually very shallow.



Plate 10. Depth to bedrock in the soils over brecciated limestone and shale is usually very deep, and these soils contain few rock outcrops.

48E1,2 MUSKINGHAM STONY LOAM, 25-45% slopes (48C1, 48D1, and 48F1)*

It is a shallow, extensive, **excessively**-drained soil, similar to 44E1,2 and 100E1,2. It differs mainly in having 15% to 30% fixed ledges and loose stones through the profiles and **on** the surfaces.

Suitability for agricultural and non-agricultural uses: Because of steep slopes, shallowness, and stoniness this soil is best suited for forest, and is poor for most non-agricultural uses other than recreational and wildlife areas.

*48C1 Muskingham stony loam, 7-15% slopes, is similar to 48E1,2 except it has smoother slopes, occupies mountain ridge tops, is slightly deeper over bed rock, and has less runoff and erosion hazards. It is better suited for most uses than the steeper phases but is usually poor for crops or production. It is fair for home sites.

*48F1 has very steep (45-65%) slopes and is found on the deeply dissected higher mountain slopes.

49D1 LODI VERY STONY LOAM, 15-25% slopes (49B1, 49C1, 49E1, 49F1)*

This soil differs from 32D1 Lodi cherty loam and 31D1 Lodi loam mainly in having enough loam stone, cobbles, and chert fragments scattered over the surface and embedded in the profile to prevent cultivation. It is thinner of profile over bed rock and includes scattered rock ledges. Stoniness makes cultivation impractical and it is more droughty than the non-stony phases. It is low in productivity of trees and pasture. It is slowly permeable and has a low water supplying capacity for most plants.

Suitability for agricultural uses: 49C1 is best suited to forest or pasture mainly because of the stony texture of the surface.

Suitability for non-agricultural uses: It is best suited to parks and recreational areas and is much less desirable for any uses than the non-stony types.

*49B1 Lodi very stony loam, 2-7% slopes, has smoother slopes than 49C1 and is somewhat better suited for most uses than 49C1.

*49D1 has 15-25% slopes, is a little shallower than 49B1 or 49C1, and has a narrower range of suitability.

*49D2 differs from 49D1 mainly in being moderately eroded.

*49E1 and 49F1 because of steepness (25% to 60% slopes) is best suited to pastures or forest.

50C1 ROCKLAND (LIMESTONE), 7-15% slopes (50D1, 50E1, 50F1)*

This land type is the same as 40C1.

If any of these numbers are found on the map they are the same as 40C1, 40D1, 40E1, and 40F1 Rockland limestone and have similar **uses** and suitability. Only 12 acres were mapped and numbers should have been changed to 40.

52E1 ROCKLAND (SANDSTONE, QUARTZITE), 25-45% slopes (52C1, 52D1, 52F1)*

This is a land type comprising areas of Muskinghum and Ramsey soil materials that contain 50% to 90% rock outcrops, loose stones, and cobbles. It occurs with areas of Muskinghum, Ramsey, and Jefferson soils along Brush Mountain, Sinking Creek, and Gap Mountain in the northern part of the county; Price Mountain in the west center of the county; and on Poor and Pilot mountains in the southeast and southern part of the county. It is very strongly acid and very low in natural fertility and productivity for forest or crops.

Suitability for agricultural uses: It is best suited for forest.

Suitability for non-agricultural uses: It is best suited for wildlife, or recreational uses.

*52C1 occurs mostly on mountain ridge tops and has 7-15% slopes. This soil is fairly well suited for home sites, large buildings, and towers.

*52D1 has 15-25% slopes and may be fairly well suited for small home sites. Soil will make good footings for large buildings but it would be difficult to build large buildings on it.

*52F1 has 45-60% slopes and occupies steep mountain slopes and bluffs near larger streams. It slopes in many directions and is poorly suited for any use except forest, wildlife, or recreation.

54B1 SEQUATCHIE SIME SANDY LOAM, 2-7% slopes

This brown, friable, deep, well-drained soil is found on low terraces mainly in the eastern part of the county. The alluvium has washed out of areas underlain chiefly by sandstone and acid shale. The surface is a brown to dark reddish-brown, very friable fine sandy loam, 8" to 16" thick. The subsoil is mostly reddish-brown to strong brown friable, fine sandy loam to fine sandy clay loam, 12" to 32" thick. The substratum consists of yellowish-brown loamy fine sand, and loamy soil material, mixed with many numerous quartz, sandstone and shale fragments. Depth to variable bed rock types is usually less than 6' but may range from 3' to 10'.

54B1 is strongly acid throughout and low in natural fertility and organic matter content. Permeability is very rapid in the surface and rapid to moderate in the subsoil. Workability is good, and conservability of plant nutrients and water supplying capacity for plants is low. Productivity is medium under good management. Some areas may flood in extremely rainy periods. The water table is usually in the substratum during wet seasons.

Suitability for agricultural uses: It is well suited to short rotations and for most crops grown in the area. It is better suited to small grain, mixed hay, corn, and vegetable crops than to alfalfa. Corn can be grown continuously. The major problems with it is its coarse texture, low pH, **low** natural fertility, and rapid permeability.

Suitability for non-agricultural uses: Where not subject to overflow is good for individual home sites and septic tank disposal systems. This soil is fair for road subgrades, good for fill materials, topsoiling, earth dam materials, playgrounds and parks. It is poor for pond sites, bomb shelters, underground storage space, and sanitary land fills. It is fair to poor for underground cables, pipe lines, and cemeteries, mainly because of the water table in the lower substratum.

55C1 STONY COLLUVIUM, 7-15% slopes (55B1, 55D1, 55E1)*

This land type consists of small, widely-scattered, colluvial accumulations of stones, cobbles, and boulders which have sloughed out of areas of Rockland (sandstone and quartzite) Ramsey and Muskinghum soils. It occurs near the heads and along upper drainageways in Pilot, Sinking Creek, Gap, and Brush Mountains. Stone cobbles, boulders, and gravel make up 90% or more of the land type, with very little soil. Most areas are found with the Jefferson soils of the colluvial lands. The small amount of soil among the stones and boulders is very strongly acid and low in plant nutrients. Moisture conditions are usually poor, but in places much seepage water is available for tree roots.

Suitability for agricultural and non-agricultural uses: This soil is best suited to forest and poorly suited to all other uses except recreation or wildlife.

*55B1 has 2-7% slopes, and usually occurs along lower lying drainageways.

*55D1 has 5-25% slopes, 55E1 has 25-45% slopes and usually are found in upper mountains, coves, or drainageways.

58B1 LEADVALE GRAVELLY SILT LOAM, 2-7% slopes (58C1, 58D1)*

This soil is a moderately deep to deep, moderately well-drained soil that has formed in recent colluvium. It is found along slopes and near the head of drainageways in association with the Montevallo soils.

It differs from 19B1 Leadvale silt loam, 2-7% slopes, principally in having many fine, shale gravel scattered over the surface and throughout the entire profiles.

Suitability for agricultural uses: This soil is poorly suited to most crops but fair for pasture, and small grain.

Suitability for non-agricultural uses: It is very similar to 19 Leadvale silt loam (see no. 19).

*58C1 differs from 58B1, mainly in having steeper (7-15%) slopes. It also is shallower and more gravelly than 58B1.

59B1 SEQUATCHIE COBBLY LOAM, (2-7% slopes)

This soil is a moderately deep, brown, well-drained soil that is similar to 54B1 except it has enough cobbles and gravel strewn over the surface and embedded in the profile to make cultivation difficult. It is low in natural fertility, acid in reaction, and low in productivity for most crops.

Suitability for agricultural uses: This soil is best suited to permanent pasture or forest.

Suitability for non-agricultural uses: This soil is similar to 54 Sequatchie fine sandy loam for most uses. (See 54B1.)

67D3 GROSECLOSE SILTY CLAY LOAM, ERODED, 15-25% slopes

This soil is the same as 24D1 and 2 except it is severely eroded and the subsoil is exposed. Only one acre of this soil remains on the field sheets.

68A1 DUNNING SILTY CLAY LOAM, 0-2% slopes

This is a very poorly-drained, dark colored soil that has formed in recent alluvium washed from limestone materials. It is found in small, widely-scattered relatively low areas along Struble Creek, Meadow Creek, and Roanoke River. It is subject to frequent flooding and water stands on many areas after rainy periods. The surface soil is a dark gray to almost black, friable, silty clay loam which contains a relatively large amount of organic matter, 6" to 15" thick. The subsoil is mostly gray mottled with dark gray, strong brown, yellowish-red, and yellowish-brown, plastic, silty clay or clay, 12" to 40" thick. The underlying substratum consists of fine quartz gravel, chert gravel, some shale, and in places, calcareous limestone fragments mixed with a small amount of loam soil material.

Depth to bed rock is usually less than 5' and ranges from 3' to 10'. Horizontally bedded limestone is underneath this soil in places.

68A1 Dunning silty clay loam is neutral to medium acid in most places, and is mostly acid in the surface soil. The water table remains throughout the entire profile in wet seasons. Permeability is moderate in the surface and slow in the subsoil. Fertility is fairly high, and organic matter content is perhaps higher than any soil in the county. Conservability is excellent, workability is very poor, and productivity is very low. This soil is difficult to drain and produces swamp type vegetation.

Suitability for agricultural uses: This soil is best suited for permanent pasture or forest, but needs drainage for good pasture production.

Suitability for non-agricultural uses: Mainly because of the very poor drainage, clayey textures, flat concave slope position, and flooding hazards, this soil is poorly suited for non-agricultural uses except pond sites and wildlife areas.

69B1 HIWASSEE LOAM, 2-7% slopes (69C1, 69D1)

This soil is similar to 74B1. It differs mainly by having brown to dark reddish-brown loam to silt loam surface soils. It has similar suitability for agricultural and **non-agricultural** uses. Only 41 acres are mapped and they occur mainly on high terraces in the vicinity of Radford.

70A1 BUNCOMBE LOAMY FINE SAND, 0-2% slopes (70B1, 70C1)*

This is a sandy, excessively-drained soil that occurs on first bottoms, usually very close to creek and river banks and on islands in the New River and along Little River. It is subject to flooding. The surface is brown to yellowish-brown, loose, loamy fine sand 6" to 16" thick. The subsoil is yellowish-brown and brownish-yellow, very friable to loose, loamy fine sand and fine sand 10" to 25" thick. The underlying material is mostly quartz, sandstone, gravel, and shale fragments mixed with sand.

Most of this is strongly acid throughout, although some may be medium acid or neutral where it lies adjacent to uplands that contain brecciated rock materials of limestone. Productivity is low, permeability is very rapid, leaching is high, and waterholding capacity is very low.

Suitability for agricultural uses: Mainly because of coarse texture, low fertility, flooding hazards, and small individual areas, this soil is poorly suited for most agricultural uses except melons or potatoes.

Suitability for non-agricultural uses: This sandy, excessively-drained, first bottom soil has a narrow range of suitability for non-agricultural uses. It is subject to flooding and its best use would probably be for topsoiling materials and for fill and road subgrade materials.

*70B1 and 70C1 have 2-7% slopes and 7-15% slopes, but other characteristics and use suitability are similar to 70A1.

74B1 HIWASSEE FINE SANDY LOAM, LIGHT SURFACE VARIANT, 2-7% slopes (74C1, 74D1)*

This is a deep, well-drained soil that has formed in old alluvium on the high terrace lands along New and Little Rivers. The alluvium has been washed out of areas that are underlain chiefly by crystalline rock materials, with some sandstone, quartzite, and limestone influence. It has dark yellowish-brown to brown, very friable loam to fine sandy loam surface soil, 6" to 14" thick. The subsoil is strong brown to yellowish-red, slightly sticky, slightly plastic sandy clay loam in the upper part; a red to dark red, with some yellowish-brown and yellowish-red, fine slightly plastic, sticky clay loam to clay in the lower part. The subsoil is from 20" to 60" thick. In most places it overlies substratum consisting of many rounded gravel and cobbles mixed with variable amounts of sand silt and clay soil materials. Thickness of the underlying substratum ranges from a few inches to 20' or more and in some places gravel and cobbles are absent. Depth to the underlying residual land surface is variable over rather short distances but is usually more than 8', being thinner on the rolling and hilly slopes. Sink holes are common where the alluvium overlies certain limestone areas. This soil is strongly acid in reaction, and low to medium in **organic** matter content. It is highly productive under good management. Permeability of the surface is very rapid and in the subsoil is moderately rapid to moderately slow.

Suitability for agricultural uses: Hiwassee fine sandy loam, 2-7% slopes, is well suited for most crops in the area. It is better suited for most garden vegetables than the finer textured soils. Workability is good and short rotations are well suited.

*74C1 and 74D1 differ from 74B1 mainly in having steeper slopes, slightly thinner profile layers, and by being shallower over the underlying residual formation. They are less productive and less well suited to most crops or to non-agricultural uses. 74D1 is better suited to pasture than to crops.

Suitability for non-agricultural uses: In many places the subsoil is too slowly-permeable for septic tank disposal drainage systems. Therefore, it is rated questionable and requires on-site investigation. It is good for pond sites and sewage lagoons except where it overlies limestone formations. It is also good for road subgrades, and fill material, but is subject to slipping where large or deep cuts go into the lower substratum. It is good for house basements and small building sites but questionable for large buildings unless the foundation footings are extended through the substratum. The surface soil is good for topsoiling. It is fair for radar stations, airports, and sanitary land fills.

76A1 CONGAREE SILT LOAM. 0-2% slopes

This is a deep, brown, well-drained, fertile soil that has formed in recent alluvium washed from areas underlaid mainly by crystalline rock materials. It occurs on first bottom lands and is subject to flooding. It is similar in relief, drainage, position and other characteristics to 77A1 Congaree fine sandy loam, except it has slightly finer textures throughout. The water holding and supplying capacity is slightly better than 77A1.

Suitability for agricultural and non-agricultural uses: Suitability is similar to 77A1.

77A1 CONGAREE FINE SANDY LOAM, 0-2% slopes

This soil is a brown, very friable, fertile, well-drained soil that occurs on the first bottom lands. It has formed in recent alluvium washed principally from areas underlain by crystalline rock. It has a dark brown, fine sandy loam surface 40" to 60" thick over faintly mottled, pale brown, dark reddish-brown, and light brownish-gray sandy, loam and gravelly materials. This soil is subject to overflow.

It is medium to strongly acid. Permeability is rapid; workability is good; productivity is high; and conservability of plant nutrients is fair.

Suitability for agricultural uses: Congaree fine sandy loam is well suited to corn and it can be grown in short or long rotations. Other row crops, mixed hays, and vegetables are better suited than alfalfa and small grains. Alfalfa stands are difficult to maintain and small grain lodges badly in some seasons. Pasture grasses and forest make excellent growth under proper management.

Major problems are flooding hazard and acid reaction.

Suitability for non-agricultural uses: This soil is excellent for topsoiling in the surface and subsoil. Because of flooding hazards, it is not suited for home sites or for sewage disposal systems. It is poor for highway road beds, but good for subgrade and fill materials. It is poor for pond sites and fair for pond dam materials. It is poor for sanitary land fills and for underground silos, cemeteries, and airports.

Major problems in non-agricultural uses include flooding hazards, and water table usually at 36" to 50".

78B1 LODI FINE SANDY LOAM, 2-7% slopes (78B2, 78C1,2, 78D1, 78E1)*

This soil is similar to 31B1 except it has a slightly coarser-textured surface and subsoil and is slightly thinner of profile over unweathered rock materials. The parent materials contain a larger proportion of sandstone.

Suitability for agricultural uses: Its uses are similar to that of 31B1 Lodi loam, 2-7% slopes. However, this soil is slightly more porous and therefore subject to more leaching. It is easier to work, but somewhat less productive of most crops.

Suitability for non-agricultural uses: It has better permeability throughout in most places and is therefore better for absorption fields for sewage disposal, road subgrades, basements, pipe lines, and underground cables. Since the material is more permeable, it is slightly better suited for large buildings, airports, and bridge footings.

*78B2 differs from 78B1 mainly in being moderately eroded.

*78C1,2 differs from 78B1,2 mainly in having steeper (7-15%) slopes.

*78D1,2 differs from 78B1,2 in having steeper (15-25%) slopes.

*78E1 has 5-45% slopes.

Soils on the steeper slopes are less suitable for all uses than those on the smoother slopes.

84B1 WICKHAM LOAM 2-7% slopes

This is a deep, brown, well-drained soil that has formed in moderately young alluvium washed mainly from areas underlain by crystalline rock materials. It occupies low terrace positions. Larger areas are found with the Altavista and Augusta soils near Whitethorn along New River, and east of Snowville along Little River. It has brown, very friable loam surface 8" to 14" thick. The subsoil is a strong-brown to reddish-brown, friable, sandy clay loam to clay loam 20" to 50" thick. The underlying substratum is very friable loam and sandy loam, usually mixed with small, rounded quartz gravel. Depth to bed rock is usually more than 10', but ranges from 4' to as much as 15'. This soil is medium to strongly acid in reaction. It has rapid to very rapid permeability in the surface and moderate permeability in the subsoil and substratum. Workability and conservability are good, natural fertility and organic matter content are medium, and productivity for a wide variety of crops is high. It has good water holding capacity and moisture supplying capacity for crops.

Suitability for agricultural uses: Wickham loam, 2-7% slopes, is suitable for short, intensive rotations. It is well suited to corn, alfalfa, small grains, clovers, grasses, and many vegetables and truck crops. Small grains produce large yields but are not as well suited as other crops, mainly because of lodging in wet seasons.

Suitability for non-agricultural uses: Wickham loam is good for building sites, favorable for septic tank drainage fields, good for road subgrade materials, and pipe lines. It is usually too small in area for airports, but would be good **if** in large enough areas. It is good for cemeteries, and for pond dam and fill materials. It is poor for pond sites and very deep sanitary land fills. The surface soil is good for topdressing materials.

The major problem with this soil for non-agricultural uses is that the water table is within the lower substratum and water may interfere with installation of deeply placed structures. It is closely associated with and grades into the soils that are moderately well-drained.

85A1 CHEWACIA SILT LOAM, 0-2% slopes

This is a young, somewhat poorly to moderately well-drained soil that has formed on the first bottom lands from recent alluvium washed principally from areas underlaid by crystalline rock materials. The surface soil is a brown silt loam, 8ⁱⁿ to 16ⁱⁿ thick. The subsoil is mottled, yellowish-brown, strong brown, and gray friable silt loam to slightly sticky silty clay loam, 12ⁱⁿ to 24ⁱⁿ thick. The underlying substratum is a mixture of gravel with a small amount of multicolored loam and silt loam soil material.

Depth of the underlying gravelly substratum is usually less than 4^{ft} but may range from 2 1/2^{ft} to 8^{ft}. Depth is fairly uniform over the area.

This soil is medium to strongly acid. Fertility is medium to high and productivity is medium for most crops except pastures. It is high for pasture. Workability is fair to poor because of drainage conditions. Conservability is good.

Suitability for agricultural uses: It is best suited to corn, pasture, and hay crops other than alfalfa. Small grains tend to lodge most years. This relatively high water table makes cultivation difficult, weeds hard to control, and gives reduced yields in wetter seasons.

Suitability for non-agricultural uses: It is poorly suited to building sites and disposal systems because of flood hazard and slow internal and external drainage. It is poor for subgrade materials, fair for fill material, and for pond sites.

86A1 WEHADKEE SILT LOAM, 0-2% slopes

This is a wet, poorly drained, gray soil developed in recent alluvium on the first bottom lands, subject to flooding. It has developed in alluvium washed from areas underlain chiefly by crystalline rock materials with some sandstone, shale, and quartzite influence. It is predominantly gray, mottled with shades of yellow, brown, and red. It is found on some of the lowest areas with the well-drained Congaree and somewhat poorly-drained Chewacla soils. Larger areas are along Little River and New River. Most individual areas are small and usually occur near the upland foot slopes where seepage water collects and stands in wet seasons.

It is strongly acid in most places, has water table in the surface in wet seasons, is medium in fertility and organic matter, low in productivity, permeable, and low in productivity because of the poor drainage conditions. In many places, it can be drained.

Suitability for agricultural uses: Wehadkee silt loam, 0-2% slopes, is best suited for permanent pastures or forest because of its poor drainage. Drained areas may be used for corn and mixed hay crops.

Suitability for non-agricultural uses: It is poorly suited to most non-agricultural uses except pond sites and wildlife or recreational areas. It is only fair for these uses, mainly because of poor drainage and high flooding hazards.

87E1 LITZ SHALY SILT LOAM, 2-7% slopes (87B1, 87C1,2, 87D1,2, 87E1,2)*

This soil is very shallow and excessively drained. It is similar to 38E1 except it has been moderately eroded. Most of the surface soil has been removed and the present surface consists of many (25% to 50%) shale fragments mixed with brown to brownish-yellow silt loam soil material. Runoff is rapid to very rapid, the water holding capacity is very low, and most areas are best suited to pasture or forest.

Suitability for agricultural and non-agricultural uses: Uses are similar to those for 38E1.

*87B1,2 has 2-7% slopes; 87C1,2 has 7-15% slopes. These phases are better for most uses than the 87E1.

*87E1,2 has 45-60% slopes and is poorly suited to pasture or forest and to most non-agricultural uses except recreational, park, or wildlife.

89E1 RAMSEY SILT LOAM, MODERATELY DEEP, 25-45% slopes (89B1,2 89D1,2 89C1,2 89F1,2)*

This is a shallow to moderately deep, excessively-drained soil that has formed on the uplands from the weathered products of acid shale and some fine-grained sandstone. It occurs in fairly large areas in the southern part of the county between the crystalline rocks of the Blue Ridge Mountains and the calcareous shales of the limestone valley area. It is bordered by quartzite in most places along Pilot Mountain and Poor Mountain. The surface soil is a yellowish-brown, very friable silt loam, 5" to 10" thick. In places a thin subsoil is present that is a yellowish-brown to yellowish-red friable, slightly sticky heavy silt loam to light silty clay loam 1" to 6" thick. The substratum is 50% to 90% variegated yellowish, brownish, and red, and purplish, soft, partly weathered shale fragments mixed with a little silt loam soil material of similar colors. Depth to hard shale and some sandstone is usually less than 20", but may range from 1' to 3 1/2'.

It is very strongly acid throughout. Permeability is rapid in the surface and subsoil. Natural fertility and organic matter content are low, conservability is difficult, workability is poor, and productivity and water holding capacity are low.

*89B1,2, 89C1,2, and 89D1,2 differ from 89E1,2 mainly in having smoother slopes.

*89B1,2 has 2-7% slopes and is found on narrow ridge tops. It has a wider suitability for all uses than the steeper 89E1,2 phases. 89C1,2 has 7-15% slopes and occupies mostly ridge top positions. 89D1,2 has 15-25% slopes and occupies some low ridge sides and more strongly sloping ridge tops. 87E1,2 has very steep (45-60%) slopes and is only suitable for forest, recreational, or wildlife areas.

Suitability for agricultural uses: Because of steep slopes, shallowness, and low natural fertility this soil is best suited to forest. Pastures can be grown, but at high cost.

Suitability for non-agricultural uses: Slope and shallowness limits the use of this soil for many non-agricultural uses. Its best use is for wildlife and recreational areas. It is unfavorable for septic tank drainage systems. It is poor for topsoil materials, sod growing, road fill material, sanitary land fills, bomb shelters, underground storage space, and cemeteries. It is fair for pipe lines and underground cables. It is good to fair for road beds.

91A1 ATKINS SILT LOAM, C-2% slopes

This is a gray wet soil that has formed in alluvium washed mainly out of acid sandstone and shale areas. It is on low first bottom positions with well-drained Pole and the somewhat poorly-drained Philo soils. Most areas are northeast of Ironto along North Fork Roanoke River and Craig and Poverty creeks in the northern part of the county. The surface soil is a friable, grayish-brown silt loam, faintly mottled with shades of brown and light gray, 7" to 12" thick. The subsoil is predominantly gray, friable to firm silt loam to silty clay loam, mottled with strong brown, yellowish-brown, and yellowish-red, 15" to 25" thick. The substratum is mixed grayish and brown silt loam material, containing many quartz, shale, and rounded sandstone gravels and cobbles, ranging in size from 1/2" to 2". Depth to hard rock ranges from 2' to as much as 8', but is usually less than 5'.

This soil is very strongly acid throughout, low in natural plant nutrients, and medium in organic matter content in the surface. It has a high water table but is moderately permeable. The water supplying capacity is very high. Conservability is excellent, workability is very poor, and productivity is very low for most all crops and forest.

Suitability for agricultural and non-agricultural uses: It is poorly suited for most agricultural and non-agricultural uses. It is best suited for forest or permanent pasture that are tolerant to wet conditions, and for recreational or wildlife areas. Where possible drainage would improve this soil for agricultural or other uses.

92C1 TUSQUITEE LOAM, 7-15% slopes (92DL)*

This soil has developed on the colluvial lands from soil debris which has rolled and crept out of the higher-lying Blue Ridge Mountain slopes that are underlain with granite crystalline rock material. It occupies toe slopes and drainage head positions and has brown to dark brown, very friable loam surface soils, 8" to 14" thick. The subsoil is a strong brown to brown, friable fine sandy clay loam to light clay loam 20" to 40" thick. In places there are a few granite cobbles and boulders. The underlying colluvial beds consists of strong brown, yellowish-red and red soil materials mixed with a large amount (25% to 80%) granitic rock fragments ranging in size from a few inches to 20" or more. The colluvial beds are absent or very thin in places but 2" to 10" thick in others. It has rapid permeability in the surface and moderate permeability in the subsoil. In places permeability in the substratum is slow. This soil has a good water holding capacity. It receives some seepage water from surrounding areas which makes it a high moisture-supplying soil for plants. Workability and conservability are good. Productivity for many crops is high.

Suitability for agricultural uses: This soil is well suited to short rotations and to most crops grown in the county. It is exceptionally good for corn and mixed hay crops. Alfalfa grows well but the stands are shorter-lived than on less moist soils. Forests grow rapidly and are of excellent species.

Suitability for non-agricultural uses: Mainly because of its colluvial positions and nature of the colluvial beds in the substratum, this soil is questionable for large building footings unless the colluvium is penetrated and the footings placed on the residuum. This is also true of highway road beds. It is good for small buildings, pond or lagoon sites, and pipe lines, but may slip and create trouble along deeply-dug ditch lines. It is questionable for septic tank drainage systems and poor for sanitary land fills.

*92DL differs from 92C1 mainly in having stronger (15-25%) slopes. It is usually shallower over residual material.

93C2 TUSQUITTEE STONY LOAM, 15-25% slopes

This soil differs from 92C1 mainly in having 15% to 30% of its surface covered by loose cobbles and a few boulders. It has been moderately eroded; 50% or a little more of the surface soil has been removed by erosion.

Suitability for agricultural uses: Because of the many stones, cobbles, and boulders, this soil is best suited for permanent pastures or forest.

Suitability for non-agricultural uses: It is similar to 92D1 for most uses, but many stones, cobbles, and boulders make it less desirable mainly because they have to be moved away.

98B1 MONONGAHELA SILT LOAM, 2-7% slopes (98A1)

This is a somewhat poorly-drained soil that occurs on low terrace lands. It has developed from alluvial material washed from areas underlain by acid shale and sandstone. It occurs with the Holston soil of the terraces and the Adkins, Pope, and Philo soils of the first bottom lands. The surface is a dark, yellowish-brown, friable silt loam to loam 6" to 12" thick. The subsoil is brownish-yellow in the upper 14" and distinctly mottled brownish-yellow, and gray, firm, slightly plastic, slightly sticky clay in the lower part. It ranges in thickness from 20" to 50" and in places a fragipan has formed. The fragipan usually occurs at depths between 18" to 26". Depth to variable sandstone and shale materials is usually more than 5', but may range from 3' to 10'.

Monogahela silt loam is strongly to very strongly acid in reaction. The water table is within 6" to 16" of the surface in wet periods. Permeability of the surface soil is rapid and that of the subsoil is slow. The water holding capacity is high and runoff is slow to moderate. Productivity is low, conservability of soil and added plant nutrients is good, and workability is poor.

Suitability for agricultural uses: This soil is best suited for crops that will tolerate wet conditions, such as fescue, ladino clover or mixed hays. Corn and other row crops can be grown only where the soil is adequately drained. However, tile drainage is difficult because of the fine-textured subsoil. A few farmers have removed the surface water by bedding or surface ditching. Forests are of poor species but make fairly good growth. The major problem is wetness or high water table, low fertility, low pH, and heavy-textured subsoil.

Suitability for non-agricultural uses: It is poor for home sites, large building sites, sewage disposal systems, road subgrades, sanitary land fills, fill materials, topdressing materials, lawns, most shrubs, underground cables and pipe lines, bridge footings, bomb shelters, underground storage space, cemeteries, race tracks, and trench silos. It is suitable for ponds since it will hold water well, but is only fair for earth dam building materials.

100E1 MUSKINGHAM VERY FINE SANDY LOAM, 25-45% slopes (100B1, 100C1, 100D1,2, 100F1,2)*

This soil is similar in most characteristics, use suitability, and management needs to 44E1 Muskingham fine sandy loam, 25-45% slopes. It differs from 44E1 mainly in being slightly finer textured throughout the profile.

*100B1 has 2-7% slopes, 100C1 has 7-15% slopes, and 100D1,2 has 15-25% slopes. These soil phases are found on ridge tops and milder slopes. They are more suitable for most uses than the 40E1,2. 100F1,2 has 45-60% slopes and occupies higher-lying mountain slopes and those near deeply dissected stream areas. It is best suited to forest, wildlife, and park areas.

103B1 HAYESVILLE LOAM, 2-7% slopes (103C1, 103C2, 103D1, 103D2)*

This is a deep, well-drained soil that is found in relatively small areas on narrow ridge tops in the Blue Ridge foot-hill region in the southern part of the county. It has formed from the weathered products of granodiorite. The surface soil is a brown, very friable loam 6" to 9" thick and the subsoil is a red friable clay loam to fine sandy clay loam 15" to 36" thick. The substratum is a friable, deeply-weathered granodiorite which is white, brown, black, yellowish, and grayish in color and a mixture of loam and sandy loam soil materials. Depth to hard bed rock is usually more than 8' but may range from 3' to 15'.

This soil is strongly acid, and low in organic matter content and most plant nutrients. Workability and conservability are good, and productivity is high under good management. The water holding and supplying capacity is moderately high.

Suitability for agricultural uses: This soil is well suited to short rotations. All of the common crops of the area including corn, small grain, alfalfa, red clover, and grasses are well adapted and produce some of the best yields in the county. It is better suited to small grain than corn or other row crops. The major problems are its low fertility and low pH. It is well suited to irrigation and does not compact badly under heavy farm equipment or trampling by livestock.

Suitability for non-agricultural uses: Hayesville is well suited to many non-agricultural uses including roads, small or large building sites, septic tank sewage systems, farm dam building materials, air fields, underground pipe lines, cables, or playgrounds. It is poor for pond sites because of its position on ridge tops, but would hold water satisfactorily. It is ideal for trench silos but is too shallow for very good sanitary land fills. It is good for forestry, wildlife, or recreational areas. The surface soil is good for top dressing material,

Shrubs and lawns do well on this soil. Drainage is good and swell-shrink potentials are very low in the subsoil substratum. The major problems involved are its position on ridge tops and the small size of the areas.

*103C1 Hayesville loam, 7-15% slopes, is the most extensive soil in this series in the county. It differs from 103B1 mainly in having stronger slopes and in being somewhat shallower. Runoff is more rapid and conservation is slightly more difficult.

*103C2 is similar to 103C1 except it is moderately eroded.

*103D1 and 103D2 are similar to 103C1 and 103C2 except for steeper slopes and slightly thinner profiles. These steeper areas are less well suited to agricultural and non-agricultural uses than the units represented by 103B1, 103C1, and 103C2. 103D1 and 103D2 are best suited to long rotations including close-growing crops or permanent pastures.

104B1 EDNEYVILLE FINE SANDY LOAM, 2-7% slopes (104C1, 2, 104D1, 104E1)*

This is a light colored, well-drained soil that has formed in the weathered products of light colored granodiorite rock materials. It is found with the Chester and Brandywine soils in the southern part of the county on the Blue Ridge Mountains. The surface is a grayish-brown to brown, very friable, fine sandy loam, 6" to 12" thick. The subsoil is a weakly developed brown, friable, fine sandy clay loam to light clay loam, 15" to 35" thick. The substratum is weathered granitic rock materials mixed with brown, fine sandy loam soil material. Depth to land bedrock is usually less than 6' but may range from 2' to 10'.

104B1 is strongly to very strongly acid throughout. Permeability of the surface is very rapid, that of the subsoil is moderate, and that of the parent materials is moderately rapid to rapid. The water holding capacity is low to medium, conservability is fair, fertility is low, and productivity is medium to low.

Suitability for agricultural uses: 104B1 Edneyville fine sandy loam is fairly well suited to moderately short rotations. Small grains and mixed hay crops are better adapted than corn and other row crops or alfalfa. Although corn and alfalfa can be grown successfully, yields are lower than on the heavier-textured, less droughty soils. The major problems that affect production are its fine sandy loam surface, moderately permeable subsoil, rapidly permeable substratum, low pH, low natural fertility, and narrow ridge top positions where runoff is moderate to moderately rapid.

Suitability for non-agricultural uses: It is good for home sites, large buildings, septic tank drainage fields, road beds, road subgrade materials and fill material, earth dam building materials, earth work during prolonged wet periods, pipe lines, cemeteries, and storage. It is fair for shallow sanitary land fills. The surface soil is fair for topsoiling materials.

*104C1 Edneyville **fine** sandy loam, 7-15% slopes, differs from 104B1 mainly in having stronger slopes. It occupies mostly ridge tops and low ridge sides and is slightly less well suited for most uses than 104B1.

*104C2 differs from 104C1 mainly in being moderately eroded. A small amount of the subsoil is turned in plowing and occasional gullies have formed in a few places.

*104D1 differs from 104B1 and 104C1 in having 15-25% slopes, thinner depth over rock materials, and thinner profile layers. Its suitability is more limited by strongly sloping relief.

*104E1 has 25-45% slopes, and is more suitable for pasture and forest crops. Non-agricultural uses are limited by steep slopes.

105B1 CHESTER LOAM, 2-7% slopes (105C1,2, 105D1,2 105E1)*

This is a moderately deep to deep, well-drained, brown, relatively fertile soil that has formed from the weathered products of granodiorite or dark colored granitic rock materials. All areas are in the Blue Ridge Mountains along the southern border of the county. It is found with the Brandywine and Hayesville soils of the uplands and the Meadowville soil of recent colluvial lands. The surface is a brown to dark brown, very friable loam, 6" to 9" thick. The subsoil is a strong brown through brown to yellowish-red, friable, fine sandy clay loam to light clay loam, 12" to 36" thick. The substratum is deeply-weathered brown, black, white, yellowish-red, and gray granodiorite mixed with weathered, variegated colored, loamy soil material. Depth to fairly hard bedrock is usually more than 7', but may range from 4' to 15'.

Chester loam is strongly acid throughout. The surface permeability is rapid and the subsoil is moderate to moderately rapid. The soil is easy to till, easily conserved, moderately fertile, and highly productive under good management. Its water holding and supplying capacity for plants is good.

Suitability for agricultural uses: 105B1 Chester loam is well suited for short rotations that may include most any crop grown in the county. The major factors in crop production are low pH, medium fertility, and occurrence in relatively small, widely-scattered areas on narrow or moderately narrow ridge tops.

Suitability for non-agricultural uses: It is well suited for most non-agricultural uses. Mainly because of its position in the landscape, it is poorly suited for pond or lagoon sites. Crushed zones in the formations may cause slippage where soil is deeply excavated, but this is not a common occurrence.

*105C1,2 Chester loam, 7-15% slopes, differs from 105B1 mainly by having stronger slopes. It is slightly thinner of profile layers and over bedrock materials, and runoff is more rapid. Suitability is slightly limited, compared to 105B1.

*105D1,2 has 15-25% slopes and is shallower and less well-suited for most uses than either 105B1 or 105C1,2.

*105E1 has 25-45% slopes and is much thinner over bedrock. It has limited use for pasture or forest, and is limited in suitability for other uses.

107A1 POPE GRAVELLY FINE SANDY LOAM, 0-2% slopes

This is a brown, well- to excessively-drained, gravelly soil that has formed in acid sandstone alluvium on the first bottom lands. It is similar to and associated with 8A1 Pope fine sandy loam, 0-2% slopes, differing from it mainly in having enough small gravel on the surface and throughout the profile to make cultivation difficult and greatly reduce yield of most crops. See 8A1 Pope fine sandy loam.

108A1 HUNTINGTON LOAM, CONCRETIONARY PHASE, 0-2% slopes

This is a well-drained, strongly alkaline soil that has formed in recent alluvium on the first bottom lands. It effervesces violently with a weak solution of HCl and contains many small lime fragments and rounded calcic concretions throughout the entire profile. The main source of the alluvium is from areas underlaid by crushed fault breccia. The springs and creeks in this area carry extremely high amounts of calcium which accumulate as concretionary materials in soils of the bottoms and colluvial lands. The surface is a dark brown, very friable, calcareous loam 8" to 18" thick. The subsoil is a dark grayish brown containing many white lime concretions and some small shale fragments. Shale fragments are coated with calcium carbonates in places. At 20" to 30" this layer gradually passes into predominantly dark yellowish-brown, distinctly mottled with red, black, yellowish-brown and light yellowish-brown, very friable silt loam soil material mixed with 20% to 40% fine shale and calcareous concretions. The underlying strata is largely brown, yellow, red, and black. Most rock fragments are coated with calcareous carbonite materials.

The soil is calcareous throughout the entire profile, with pH of 8 in most places. Permeability is rapid and the watertable is usually below 30" in wet seasons. The water holding capacity is good and surface runoff is slow to very slow. Workability is good, conservability is excellent, and productivity for many crops is high. It is subject to flooding.

Suitability for agricultural uses: 108A1 is suitable for row crops in short or continuous rotations. Corn and mixed hays are better suited than small grains and alfalfa. Small grains lodge in wet seasons and moisture is too abundant during wet periods of the year for long lived stands of alfalfa. However, large yields can be produced 1 or 2 years on many areas. Flooding hazards, high moisture conditions, flat slopes, and high fertility are major factors in uses of the soil.

Suitability for non-agricultural uses: Mainly because of flooding this soil has a narrow range of suitability for uses other than agriculture. See 5A1 Huntington silt loam.

109A1 WEAVERS SILT LOAM, 0-2% slopes

This is a moderately well- to somewhat poorly-drained, calcareous soil that has formed in recent alluvium on the bottom lands. It occurs with 108A1 Huntington loam, concretionary phase. Most areas are along North Fork Roanoke River, Mill Creek, Wilson Creek, and other small creeks and branches that originate in the Pedlar Hill area. Other small areas are near Vicker along Crab Creek. The surface is a very dark grayish brown, very friable silt loam, 6" to 12" thick. The subsoil is a fairly uniform dark grayish-brown, very friable silt loam with faint dark grayish brown and strong brown mottles and many white limey fragments. In other places the subsoil has alternate layers of white, gray, and brown liming material and concretions mixed with little soil material; and layers of very dark brown to dark grayish brown, very firm, very hard, plastic silty clay loam or clay with strong coarse prismatic structure. The substratum is mostly coarse sandy loam, limey soil materials mixed with quartz gravel and rounded calcareous concretions. Beds of marl are common throughout these areas and come to or near the surface in places. Depth to such materials is usually more than 8', but may range from 6' to 15'. Thickness is attributed to deposits of limey materials underneath the profiles.

This soil is calcareous throughout all layers. Lime is not needed. Permeability is rapid in most places in the surface and subsoil layers. The water table rises within 10" to 24" of the surface during wet periods and a few small spots within the area are poorly drained, similar to the Warners soil (not mapped in the county). The water holding capacity is good and abundant water is available for plants most of the year. Conservability is excellent, workability is fair, and productivity is good for plants that tolerate abundant moisture. It is subject to flooding, but floods cause infrequent damage since most drainageways have cut deep channels.

Suitability for agricultural uses: Short rotations can be used and crops that tolerate wet soil conditions are most suitable. Mainly because of the drainage conditions, nearly level relief, flooding hazards, and calcareous conditions, this soil is better suited for corn and mixed hay or pasture crops than for alfalfa and small grains. The larger amount of lime particles and concretions make the permeability and drainage much better than the colors in the profile indicates.

Suitability for non-agricultural uses: Because of drainage conditions, nearly level relief, and flooding hazards, most of this soil is poorly suited for most non-agricultural uses. In places near Shawsville where drainageways have cut deeply into the underlying materials, house basements have been placed in this soil. Streams cut very rapidly into the soft rocks and in a short time flooding is no longer a hazard.

This soil is poorly suited for road beds, road subgrade materials; but fair for fill and topsoiling materials in the surface soil. It is unfavorable for septic tank drainage fields, home sites, pond or lagoon sites, large buildings, bomb shelters, sanitary land fills, underground storage, and cemeteries. It is fair for playgrounds, parks, other recreational areas, and sod production, and poor for air ports, school sites, trench silos, bridge footings, and streets.

110B1 BURGIN SILTY CLAY LOAM, 2-7% slopes (110C1)*

This is a moderately-well to somewhat poorly-drained, fine textured clayey soil that occurs on recent colluvial lands. It has developed in colluvium that has washed from the Carbo, Chilhowie, and Dandridge soils, and has a very dark, grayish-brown, silty clay loam surface 8" to 14" thick. The subsoil is predominately dark grayish-brown, faintly mottled with yellowish-brown, brownish-yellow, and dark reddish-brown, firm, very sticky, very plastic, clay 20" to 45" thick. The substratum consists of massive clay which is mixed in places with shale, quartz, and chert gravel. The colluvium overlies variable kinds of soil and soil materials of the residual formation in the North Fork of the Roanoke River valley. It is mixed with and adjacent to the Robertsville and Taft soils in places. Depth to hard rock ranges from 3' to as much as 10', but is usually less than 7'. Depth is rather uniform over most areas.

Permeability in the surface is slow to moderate and slow in the subsoil. The reaction is medium to slightly acid in most places. Productivity is medium, natural fertility is medium to high, and conservability of plant nutrients and soil are good.

Suitability for agricultural uses: Because of clayey texture, low lying positions, and slow internal drainage, this soil is best suited for permanent pasture; however, corn is grown successfully in some areas.

Suitability for non-agricultural uses: This soil is poorly-suited to most non-agricultural uses.

*110C1 Burgin silty clay loam, 7-15% slopes, differs from 110B1 mainly by having stronger slopes. It is somewhat thinner, lighter in color, and contains more shale fragments.

111E1 RAMSEY LOAM, 25-45% slopes (111B1, 111C1, 111D1, 111D1.2, 111F1)*

This is a shallow, excessively-drained soil that has formed from the weathered products of quartzite, sandstone, and some shale. Most of it is on Poor Mountain in the southwestern corner of the county and on Pilot Mountain in the southern part of the county. It occurs with the other Ramsey soils of the uplands and occupies some of the highest elevations on the Blue Ridge Mountains. It has very little or no subsoil. The surface is a light yellowish-brown loam, 5" to 12" thick. Where there is a subsoil it is a thin (1" to 6" thick) friable loam to light, fine, sandy clay loam. The substratum consists of many (50% to 90%) quartzite sandstone, some shale fragments, mixed loam, and fine sandy loam soil materials. Depth over relatively hard rock is usually less than 18", but ranges from 1' to 2 1/2'.

It is very strongly acid in reaction, and low in natural fertility and organic matter content. The water holding capacity is low, workability is very poor, conservability of soil and added plant nutrients are difficult, and productivity is low.

Suitability for agricultural uses: 111E1 Ramsey loam is best suited to forest but might be used for pasture under intensive and costly management. Steep slopes, shallowness, low fertility, and very strongly acid reaction are major factors that limit its use.

Suitability for non-agricultural uses: Mainly because of shallowness and steep slopes, this soil is poorly suited to most non-agricultural uses. Its best use is for wildlife and recreational areas.

*111B1, has 2-7% slopes, is not extensive, but much better suited for all uses than the steeper 111E1. It is good for road beds, home sites, large or small building sites, radar stations, parks and recreational areas. It is poor for bomb shelters, underground cables or pipe lines, and sanitary land fills, and unfavorable for septic tank drainage fills. It would be good for ponds or lagoons where the slopes are favorable. Most slopes occur on mountain or ridge tops and pond site locations are poor.

*111C1 has 7-15% slopes, is found on rolling ridge tops, and is somewhat thinner and less well suited for all uses than 111B1.

*111D1 has 15-25% slopes, and is found on strongly sloping mountain slopes.

*111F1 has 45-60% slopes and is found on very steep mountain slopes. It is best for forest and wildlife.

112B1 ELK SILT LOAM 2-7% slopes

This is a deep, well-drained soil which developed in moderately young alluvium on the low lying terrace lands. The alluvium washed out of areas underlaid principally with limestone and calcareous shale materials. The surface soil to a depth of 10" is a very dark grayish-brown, very friable silt loam. The subsoil ranges in color from dark yellowish-brown through dark reddish-brown to strong brown, friable to slightly firm, slightly plastic, sandy clay loam to silty clay loam, and is usually more than 40" thick. The substratum is mixed brown silt loam and loam soil materials with many small quartz gravel and cobbles in places. Depth to underlying variable residual rock is usually more than 10', but may range from 5' to 15'.

Elk silt loam is neutral to medium acid in reaction, permeable throughout, naturally medium to high in organic matter content and most essential plant nutrients. It has a high moisture holding and supplying capacity, and is highly productive of many crops. Workability and conservability are good, and erosion hazards are only slight.

Suitability for agricultural uses: This soil is well suited for short rotations and most areas are used for crop production. Row crops can be grown continuously under good management, and all crops of the area, including many vegetable crops, are well adapted. Small grains are not as well suited as corn and hay crops.

The major problems with this soil are the low lying, moist conditions, near flood plains, and slight hazard of flooding during extremely high water. Water table may be at 4' or 6' in some areas.

113B1 MASADA FINE SANDY LOAM, 2-7% slopes

This is a deep, well-drained, light colored soil that has formed in old alluvium on the high terrace lands. The alluvium has been washed mainly from areas underlaid by crystalline rock materials with some sandstone quartzite and shale. It is found with the Hiwassee, Altavista, and Augusta soils, chiefly along New River and Little River. The surface soil is a dark grayish-brown, very friable, fine sandy loam ranging in thickness from 4^{ft} to 12^{ft}. The subsoil is a yellowish-brown, friable, light fine sandy clay loam in the upper part; a yellowish-red clay loam in the middle part; and streaked and mottled yellowish-red, red, reddish-yellow, and very pale brown and gray clay loam in the lower part. The subsoil ranges in thickness from 24^{ft} to 70^{ft}. Thickness of the underlying substratum of alluvial materials ranges from a few inches to 10' to 15'. It consists of many rounded quartzite and sandstone cobbles and gravel, mixed with multicolored sandy loam, loam, clay loam, and clay soil materials.

This soil is strongly to very strongly acid throughout, is low in natural fertility, and in productivity. Conservability is fair, and workability is good. Productivity is good only where liberal amounts of essential plant nutrients are added. Short to moderate rotations are well suited for this soil.

Suitability for agricultural uses: This soil is widely suited to crops of the area. Mixed hays are better suited than alfalfa. Corn, small grain, and many truck crops produce well under high levels of fertility and proper management. Most trees and shrubs grow well.

Suitability for non-agricultural uses: Masada fine sandy loam, 2-7% slopes, is questionable for absorption systems for sewage disposal, and road beds, but good for fill and subgrade materials. It is fair to poor for sanitary land fills and house basements. The soil is good for earth dam building materials, but poor for ponds. The surface soil is good for topsoiling, but most of the subsoil is poor. It is good for large building sites but there is some danger of slippage of the materials where they are deeply excavated. It is questionable for trench silos in many places. Restricted water movement in the lower subsoil and substratum may interfere with basements, fills, deep excavation placement of footings for large buildings, or use of soil for absorption systems and trench silos.

114B1 Altavista Loam 2-7% slopes (114A1, 114C1, 114D1)*

This is a moderately well-drained, moderately deep to deep, light colored soil that has formed along New River and Little River in alluvium which washed out of areas underlaid chiefly by crystalline rock materials. It occurs with the Wickham and Augusta on the low terraces, and with Hiwassee (light surface variant) and Masada on the high terraces.

The surface soil is a yellowish-brown to brown, very friable loam, 8" to 14" thick. The subsoil is a yellowish-brown to strong-brown, friable clay loam that ranges in thickness from 16" to 30". The lower part of the subsoil usually below 18" to 20", is mottled with gray, strong brown, yellow-red, reddish-yellow, and olive-yellow. In places this layer is a weakly-developed compact fragipan. The underlying substratum usually contains small rounded gravel and cobbles. Depth to underlying hard rock of residual origin ranges from 6' to as much as 20', but is usually more than 10'.

Altavista soil is usually strongly acid throughout. Inherent fertility is low, but productivity is moderately high for many crops under good management. Conservability and workability are good. This unit is well suited to short rotations.

Suitability for agricultural uses:

114B1 Altavista loam is in crops or pasture and is well suited for most crops grown in the county, except alfalfa. Alfalfa lasts from 2 to 3 years because of the slow internal drainage. Stands are difficult to establish in wet periods. Pastures yield well if limed and highly fertilized. Forests are of good species and make good growth. Major problems are acid reaction, low fertility, and slow internal drainage.

Suitability for non-agricultural uses: Mainly because of slow internal drainage, this soil is unfavorable for absorption systems for sewage disposal. It is only fair for road subgrade materials. It is poor for small and large building sites. Mainly because of moderately high water table in subsoil it is poor for house basements and underground storage but good for pond sites, and fair for underground cables and pipe lines. Lines can be easily dug, but water table may cause trouble in most areas. Usually shrubs and trees grow well, but some drainage may be needed in places. The surface soil is good for top-soiling material but is poor for trench silos and sanitary landfills. Soil texture is well graded, except in the substratum.

* 114A1 Altavista loam, 0-2% slopes, differs from 114B1 mainly by having smoother slopes. Runoff is slow and this soil collects and retains slightly more moisture.

* 114C1 Altavista loam, 7-15% slopes, and Altavista loam, 15-25% slopes, differ from 114B1 by having stronger slopes, more rapid runoff, and somewhat thinner profiles. They have a narrow range of suitability and are less productive under similar management.

115B1 Jefferson Stony Fine Sandy Loam, 2-7% slopes. (115C1 115D1)*

This unit is similar to 15B1 except it contains enough loose stones to make cultivation extremely difficult. It is found with the non-stoney 15B1 and is best suited to permanent pasture or forest. Stone makes this soil less well suited to non-agricultural uses than the fine sandy loam. It is necessary to remove a lot of stones before the soil is used for building sites, roads, or other uses. All work, including the digging of pipe lines, ditches, basements, etc. is difficult because of the many loose stones and boulders on the surface and throughout the soil.

*115C1 Jefferson stony fine sandy loam 7-15% slopes differs from 115B1 mainly in having slightly stronger slopes. It is found mainly on ridge tops and side slopes. It is not as well suited to agriculture or other uses as 115B1.

*115D1 Jefferson stony fine sandy loam is essentially the same as 115C1 and 115B1 except it has steeper slopes, and shallower layers.

116A1 Augusta Fine Sandy Loam, 0-2% slopes. (116B1, 116C1)*

This is a somewhat poorly-drained, light colored, fine textured soil that has formed in alluvium on the low-and high-stream terraces. The parent alluvium consists principally of materials washed out of areas underlaid by crystalline rocks. The larger areas occur along New River in the vicinity of Radford. Augusta occurs with the Hiwassee (light surface variant), Masada, Altavista, and Wickham soils. The surface soil is a very dark, grayish-brown to very pale-brown, very friable, fine sandy loam 10" thick. The main subsoil is predominantly yellowish-brown mottled with light gray, yellowish-red, and weak red firm plastic, sticky clay from 13" to 24" thick. The substratum is usually a sandy loam containing rounded quartz and quartzite cobbles and gravel, and ranges in thickness from a few inches to several feet. Depth to fixed hard rock ranges from 6' to 20' but is usually less than 15'. This unit is strongly to very strongly acid. Fertility and productivity for most crops is low. Workability is poor; conservability of water and soil is good.

Suitability for agricultural uses: This soil can only be cultivated in a narrow range of moisture conditions. It is fairly well suited for pasture and some mixed hay crops such as ladino and fescue, but poorly suited for corn or other row crops, alfalfa, shrubs, and most vegetables.

Its high water table, slow runoff, and slow internal drainage, heavy plastic, sticky subsoil reduces suitability and productivity. It is difficult to drain with tile because of the heavy-textured subsoil.

Suitability for non-agricultural uses: This soil is unfavorable for absorption systems for sewage disposal; poor for road subgrades, basements, building sites, pipe lines, underground cable lines, power poles, irrigation, fill material, topsoiling materials, trench silos, sanitary fills; but good for pond sites.

* 116B1 and 116C1 Augusta fine sandy loam, 2-7% and 7-15% slopes, differ from 116A1 mainly by having stronger slopes. Runoff is slightly more rapid and less water is collected or retained on the surface. Therefore, moisture conditions for crops are somewhat more favorable than on the level 116A1 areas.

117C1 Hagerstown - Pisgah Very Rocky Silt Loams. (117D1, 117E1)*

This is, as the name indicates, a complex of Hagerstown and Pisgah soils which are so intricately mixed that they could not be separated at the scale of the map used. Rock outcroppings of high calcic limestones occupy 15% to 30% of the surface and make cultivation difficult. These rock outcrops extend from a few inches to several feet above the surface of the land, and the soil between the outcrops is similar to the Pisgah and Hagerstown soils. The surface soil ranges from dark brown to dark reddish-brown silt loams to silty clay loams, 2⁰ to 10⁰ thick. In places near the rock outcrops there is no subsoil and the surface soils are thin and usually silty clay loam in texture. The soils between the rock outcrops have yellowish-brown to red and dark red firm plastic sticky subsoils, 10⁰ to 40⁰ thick. Many small, rounded manganese concretions, many sinks, good bluegrass and white clover pastures, and scattered black locust and walnut trees are characteristic. Spaces between the rock outcroppings can be used for crop production but are usually too small for anything except gardens or special crops. Depth to bedrock ranges up to 10⁰.

These soils are among the most fertile in the county, being medium to high in natural fertility, and mostly medium in reaction and organic matter. Areas near the rocks are usually neutral in reaction and these soils seldom need lime for pasture crops. Workability is poor, conservability is good, water holding capacity is moderate to low, and productivity for permanent pasture is moderate to low mainly because of the rock outcroppings. Quality of pastures is good and they need little fertilization or liming.

Suitability for agricultural uses: Mainly because of the numerous rock outcroppings of limestone ledges these soils are best suited to permanent pasture.

Suitability for non-agricultural uses: Rock outcroppings and heavy-textured soils reduce the suitability of these soils for many uses. They are fair for home sites, and make very strong bases for large building footings, but the many sinks may interfere with big buildings. Roads are difficult to build through these areas, and they are poor for anything that needs to be put under the ground, such as pipe lines, cables, bomb shelters, etc. They are mostly unfavorable for septic tank drainage systems, and subterranean drainage of surface and ground water make contamination from effluent dangerous.

Most of the rocks in these outcroppings are good to make road building materials. There is a large quarry near Ellett.

*117D1 has 15-25% slopes, is thinner of profile among the rocks, and is better suited for most uses than 117C1.

*117E1 has 25-45% slopes, and is very limited in its uses except for pasture, forest, or recreational areas.

118C1 WELLSTON LOAM, 7-15% slopes (118B1, 118D1, 118E1)*

This is a moderately deep, well-drained soil that has developed from acid sandstone, silt stone, and shale materials. It occurs on the smoother ridge tops in the mountainous areas with the steeper Muskingum soils. It differs from the Muskingum soils mainly in having moderately well developed subsoils, and thicker profiles. The larger areas are found on the ridge tops and on south facing slopes of Brush Mountain. The surface soil in wooded areas is a dark yellowish-brown, very friable loam or silt loam to fine sandy loam 6" to 10" thick. The subsoil is a yellowish-brown clay loam 6" to 24" thick. The substratum is highly mottled with red, yellow, brown, white, olive, and gray, very friable silt loam to sandy loam soil, mixed with 50% to 90% rock fragments of similar color. The soil is deeper and finer in texture where it occurs over conglomerate. Many areas contain cobbles and loose stone.

Depth to bed rock is usually less than 4', but may range from 2' to 7'.

This soil is mostly strongly acid throughout. Permeability is good, natural fertility is low, conservability is fair, and workability is good. Productivity is fair to good under proper management.

Suitability for agricultural uses: Because of the sloping relief it is not suited for short rotations. Rotations should include close-growing crops at least 2 or 3 years out of every 5 years. Most areas are in forest or idle land but are fairly well suited to corn, small grains, or mixed hays, including alfalfa, other legumes, and grasses. Small grains and mixed hays are better suited than corn and alfalfa. Most vegetables of the area can be produced under good management. The major soil characteristic that affects crop productivity are low fertility, moderately low water holding and supplying capacity and isolation of small areas within soils that are best suited to forest.

Suitability for non-agricultural uses: Wellston loam, 7-15% slopes, is favorable for home sites and septic tank drainage systems. It is good for road subgrades, large building sites, playgrounds and parks, radar stations, and cemeteries; but only fair for pipe lines, water lines, underground cables, and pond sites. The surface soil is good for topsoiling. It is too shallow to hardrock for underground storage or for deep bomb shelters, and usually unsuitable for air ports because of area size and their location on narrow back mountain slopes. There are areas of this soil along the southern-exposed slopes of Brush Mountain that would make beautiful home sites from the soil and scenic standpoints. Water is a limiting factor in many areas, but in some good water can be obtained from deep wells or from nearby springs in the lower drainageways. Many acid-loving shrubs grow well and lawns will produce well under proper management.

*118B1 differs from 118C1 mainly in having smoother (2-7%) slopes. 118D1 and E1 have 15-25% slopes and are less well suited for all uses.

119C1 BOLTON LOAM, 2-7% slopes (119B1, 119D1, 119E1, and 119F1)*

This is a deep, well-drained, porous soil that has formed mostly in the weathered products of mixed or stratified dolomitic limestone and sandstone. It occurs mostly on north and east-facing slopes with the Lodi soils. The surface soil is mostly dark brown, very friable loam, 7ⁱⁿ to 12ⁱⁿ thick. The subsoil is a strong brown to reddish-brown and yellowish-red clay loam to clay. Depth to hard rock ranges from 18ⁱⁿ to 15^{ft}, but is usually more than 12^{ft}. Enough loose cobbles and stones are present on a few local areas to materially interfere with cultivation and pasture management.

119C1 Bolton loam, 7-15% slopes, is usually strongly acid throughout, but may be medium acid in places in the lower subsoil and substratum. Natural fertility is low to medium, and productivity under good management is moderately high. Conservability of soil and water and workability are good. Infiltration is rapid and erosion is comparatively low, except on the steeper slopes.

Suitability for agricultural uses: This soil is well suited for crops grown in the county and suitable to fairly short rotations. Alfalfa yields are reduced in some seasons by freezes which heave the **young** plants out of the ground. Therefore, it is better suited to mixed hay in most places. Apples and peaches usually do well.

Suitability for non-agricultural uses: It is well suited for many engineering uses. However, it is not suitable for farm pond sites and is questionable for septic disposal drainage systems. The surface soil is good for topdressing.

*119B1 Bolton loam, 2-7% slopes, differs from 119C1 mainly by having smoother slopes, by occupying ridge tops, by being slightly thicker in profile, and by being more widely adapted for shorter rotations and more intensive use.

*119D1 has 15-25% slopes and is better suited for long rotations and more close growing crops or pasture. Non-agricultural uses are good, but the moderately steep slopes reduce their use suitability and make practices more difficult and costly.

*119E1, 119F1 have steep (25-45%) and very steep (45-60%) slopes, are somewhat shallower, have more rapid runoff, and are best suited for permanent pasture or forest. Non-agricultural uses are limited because of the steep slopes.

120E1,2 LITZ-TEAS SHALY SILT LOAMS. 25-45% slopes (120B1,2; 120C1,2; 120D1,2; 120F1,2)*

This is a shallow to very shallow, excessively-drained, steeply sloping soil that has formed from the weathered products of deeply leached calcareous shale rock materials with a small amount of limestone and fine grained sandstone. It is similar to Litz-Teas silt loam 25-45% slopes, differing from them mainly in having surfaces with 25% to 35% small shale fragments. More areas have been moderately eroded and occur on south and west facing slopes. (See 39E1)

Suitability for agricultural uses: These soils are best suited to pasture or forest but less well suited than 39E1,2 Litz-Teas silt loams.

Suitability for non-agricultural uses: (See 39E1,2 Litz-Teas silt loam, 25-45% slopes, page 70 and 71.)

*120B1,2 has 2-7% slopes, is slightly thicker, and occurs mainly on ridge tops. It is fairly well suited to corn, small grains, and mixed hay crops and fair for many non-agricultural uses.

*120C1,2 has 7-15% slopes, and is found on ridge tops and wider ridge slopes. It is fair for agricultural and other uses.

*120D1,2 has 15-25% slopes and 120F1,2 has 45-60% slopes, and are poorly suited to most uses except forest and recreational areas.

121B1 MASADA COBBLY FINE SANDY LOAM, 2-7% slopes (121C1, 121D1,2, 121E1)*

This soil has formed in old alluvium deposits on the high terrace lands. The alluvium has washed out of areas underlaid by crystalline rock materials including granite, schist, and some quartzite and sandstones. It is found as widely-scattered, thick to thin deposits on top of the uplands, mostly along Little River and New River. It is similar to 113B1 Masada fine sandy loam, 2-7% slopes, differing from it mainly in having many (15% to 40%) loose rounded cobbles and gravel scattered over the surface, throughout the profile, and in the substratum. (See 113B1).

Suitability for agricultural uses: Cobbles and gravel on this soil greatly interfere with cultivating, and in most places it is best suited to permanent pasture or forest than to crops. It requires high levels of fertilization and liming for good pasture production.

Suitability for non-agricultural uses: The suitability of this soil is similar to 113B1 Masada fine sandy loam, 2-7% slopes. Many loose cobbles and gravel make it somewhat more difficult to handle for non-agricultural uses than the fine sandy loam. (See 113B1, page 125).

*121C1 has 7-15% slopes and 121D1 has 15-25% slopes. These phases are thinner of profile and less well suited for most uses than 121B1. 121E1, has 25-45% slopes and is poorly suited to crops or pasture and to other uses except forest, wildlife, or recreation.

123E1 RAMSEY STONY LOAM, 25-45% slopes (123C1, 123D1, 123F1)*

This soil is a very shallow, excessively-drained soil that has formed from the weathered products of quartzite, sandstone, and acid shale of the Blue Ridge Mountains. It is similar to 111E1 except for the presence of many stones (20% to 50%) on the surface and throughout the profile. Stones include some fixed ledges, but are mostly loose stones and cobbles. (See 111E1.)

The suitability of this soil for agricultural and non-agricultural uses is limited by the loose stone and cobbles. It is more poorly suited to all uses than the (111E1) Ramsey loam.

*123C1 has 7-15% slopes, is slightly thicker of profile, is found on narrow ridge tops, and is better suited to most uses than the steep 123E1.

*123D1 has 15-25% slopes, is found on strongly sloping ridge sides and strongly sloping ridge tops, and is slightly better suited to most uses than 123E1.

*123F1 has 45-60% slopes, and occurs on very steep, high-lying mountain slopes. It is poorly suited to most uses and is best for forest, wildlife, and recreational areas.

126A1 TAFT SILT LOAM, 0-2% slopes (126B1, 126C1, 126D1)

This is a somewhat poorly drained, gray, clayey soil that has formed in alluvium washed principally out of areas underlaid by limestone. For the most part it is found on low-lying terrace land of the Roanoke River valley areas in the eastern portion of the county. The surface soil is grayish brown faintly mottled with yellowish-brown in places, friable silt loam to light silty clay loam, 8" to 10" thick. The upper 6" to 10" of the subsoil is usually yellowish brown, distinctly mottled with gray, friable silty clay loam. The main or lower subsoil is distinctly mottled gray, yellowish fine plastic, hard clay loam to silty clay about 20" thick. Usually there is a weak fragipan consisting of lightly mottled clay loam and compacted platy materials. The substratum is mottled brown, gray, and yellow, friable sandy loam or silt loam soil material, usually mixed with 50% or more of rounded quartz gravel and cobbles. Depth to rock materials is variable, usually being 2' to 8'.

Taft silt loam, 0-2% slopes, is medium acid throughout in most places but may range from slightly to strongly acid. It is usually less acid in the substratum. Mainly because of the slow drainage and high water table, it is difficult to work, and not productive of many crops. Natural fertility and organic matter content is medium. Its water holding capacity is high and moisture is too abundant for many crops much of the year.

Suitability for agricultural uses: This soil has a narrow range of moisture conditions under which it can be cultivate and it is not widely suited to many crops. Areas are small and usually occur with the Robertsville and Captaina soils. It is best suited to permanent pastures or other hay crops such as ladino clover and fescue tolerate wet soil conditions. However, with some surface drainage, corn and small grains are grown successfully with relatively low yields, especially in wet seasons. Red clover can be grown and gives fair yields.

Suitability for non-agricultural uses: This soil is poorly suited to most non-agricultural uses except for pond sites.

127A1 MIXED ALLUVIAL LAND (slightly acid to alkaline), 0-2% slopes

This land type consists of variable lands of young stratified soil and soil materials along first bottoms mainly of the smaller streams. Drainage ranges from poor to excessive, but most areas are somewhat poor. It is subject to frequent flooding and consists of gravel bars, sand bars, loamy sand soil materials and brown, grayish-brown, and dark brown silt loam strata of soil over mixed gravel, shale, and sandy materials and thin profiles of poorly-drained and somewhat poorly-drained soils similar to those of the Melvin and Lindside soils. Workability is poor, conservability is fair to poor, and natural fertility is very low to high. The reaction is mildly alkaline to strongly acid.

Suitability for agricultural uses: This land is best suited to permanent pasture and forest.

Suitability for non-agricultural uses: It is poorly suited to most non-agricultural uses, except for recreational areas.

129E1,2 PEDLAR-CARBO SILT LOAMS, 2-7% slopes (129B1, 129E1,2, 129D1,2, 129F1,2)*

This unit, as the name implies, consists of 2 soils that have been mapped together as a complex. They occur chiefly in the Pedlar Hills section of the county north of Elliston and Shawsville and are underlaid by limestone and calcareous shale, crushed-fault, breccia rock materials. The rock underlying the Pedlar soils is highly crushed and is called crushed conglomerate in places. That under the Carbo soil has not been crushed or slightly shattered in most places.

Pedlar silt loam is shallow, dark reddish brown, mildly alkaline in most places and occupies 60% to 70% of the complex. The moderately deep, slowly permeable, hard, very plastic, sticky, neutral to medium acid Carbo silt loam makes up the remainder unit.

A few limestone outcroppings are characteristic and a small extent of shaly soils that resemble the Blacksburg and Litz-Teas soils occur in small areas throughout the unit as mapped. Depth to bed rock is usually less than 3' but may range from 12' to 20' or more within short distances.

The natural fertility is medium, reaction is neutral to medium acid in the Carbo silt loam and mildly to moderately alkaline in the Pedlar silt loam. Conservability is fair, water holding capacity is very low to medium, productivity is low to medium, and workability is poor.

Suitability for agricultural uses: This unit is best suited to pasture or forest, except on the smoother B and C slopes which may be used for mixed hays, alfalfa, small grain, or occasional row crops.

Suitability for non-agricultural uses: The steeper slopes, shallowness, and heavy-textured subsoils of the Carbo soils make this unit poorly suited to many non-agricultural uses.

*129B1 (2-7% slopes), 129C1,2 (7-15% slopes), and 129D1,2 (15-25% slopes) differ from 129E1,2 mainly in having smoother slopes. They are better suited to most agricultural and non-agricultural uses than 129E1,2 and 129F1,2.

*129F1,2 differs from 129E1,2 mainly in having steeper slopes, somewhat thinner layers, being shallower over bedrock.

130B1 CARBO-CHILHOWIE VERY ROCKY SILTY CLAY LOAMS, 2-7% slopes (130C1,2, 130D1,2, 130E1,2, 130F1,2)*

This is a unit in which the Carbo and Chilhowie soils have been mapped together as a complex. These soils occur together in a mixed pattern that is too complex to separate at the scale used. They are found mainly in the North Fork section of the Roanoke River Valley in the east central part of the county. Most areas are narrow ridge tops along the foot slopes of Paris Mountain. Bed rock outcroppings of muddy limestone, some loose limestone, and shale fragments cover 25% to 50% of the surfaces. The Carbo soil is a moderately deep, slowly permeable soil with a yellowish-brown to brown, silty clay loam surface, 5" to 9" thick. The subsoil is a mostly strong brown, very plastic, sticky, clay 10" to 30" thick. The underlying substratum is thin, and hard, muddy limestone at depths between 24" and 50". The Chilhowie silt loam is a shallow brown soil that has little or no subsoil. It is usually less than 18" thick over muddy limestone rock. Sinks and underground streams are characteristic in this area.

Reaction of these soils ranges from neutral to medium acid, being less acid in Chilhowie soil. Most areas effervesce with dilute acid in the substratum near the muddy limestone rock materials. Mainly because of many rock outcroppings and fine texture, these soils have poor workability, and low infiltration and water-supplying capacity. Erosion hazards are great and productivity is low.

Suitability for non-agricultural uses: These rocky, plastic, clayey soils are unsuited for septic tank disposal systems; poor for road bed and subgrade materials, house basements, sanitary fills, pipe lines, underground cables, and underground storage. They are also poor for sopsoling materials, road fill material, pond sites, trench silos, airports, cemeteries, playgrounds, parking lots and pond dam building materials. Large building footings would need to be placed on bed rock and sinks or underground caverns may cause failures of the footings.

Suitability for agricultural uses: Because of rockiness, these soils are best suited to pasture. Tree growth is slow. Red cedar, walnut, locus, and red bud are the most common trees on these soils.

*130C1,2 differs from 130B1, mainly by having 7-15% slopes.

*130D1,2 has 15-25% slopes and is slightly shallower than 130B1.

*130E1,2 has 25-45% slopes and is slightly shallower than 130B1.

*130F1,2 has 45-60% slopes and is slightly shallower than 130B1.

These steeper soils are not as well suited for pasture or non-agricultural uses, or forest, as the 130B1,2 and 130C1,2.

131A1 HUNTINGTON LOAM, 0-2% slopes

This soil differs from 5A1 mainly in having coarser-textured layers throughout the entire soil. It is therefore, less retentive of moisture and less productive but more easily cultivated than the 5A1. About 1 acre was mapped on 2-7% slope, and 2 acres were mapped on a 7-15% slope. (See 5A1.)

132A1 ROBERTSVILLE SILT LOAM, 0-2% slopes

This is a poorly-drained, gray soil that is commonly called crayfish land. It has developed in alluvium washed from areas underlaid mainly by limestone and occupies low lying terrace positions along the Roanoke River. It has a faintly mottled, grayish brown silt loam and silty clay loam surface 6" to 14" thick, and distinctly mottled, very plastic, sticky, clay subsoil 20" to 60" thick. Small quartz and chert gravel and many manganese concretions are common in the substratum and in places in the subsoil. Depth to bed rock of the underlying materials is usually more than 5', but may range from 3' to 12'. Fertility is medium to high and reaction is medium to strongly acid. Because of the high water table and poor overall drainage, this soil is difficult to work or till, and very low in productivity for most crops.

Suitability for agricultural uses: It is best suited to forest or pasture, but needs surface drainage to improve pasture grasses.

Suitability for non-agricultural uses: Because of high water table and fine textures, this soil is poorly suited to most non-agricultural uses except for pond or lagoon sites.

133B1 ETOWAH SILT LOAM, 2-7% slopes (133C1, 133D1,2)*

This soil is a deep, well-drained, soil that occurs on the terrace lands. It has formed in old alluvium washed from soils underlain principally by limestone. Most areas are associated with the Captina, Taft, and Robertsville soils near Shawsville and along the Roanoke River valleys. The surface soil, about 8" to 10" thick, is a brown, friable silt loam. The subsoil is a yellowish-red to strong brown, slightly firm, slightly plastic, sticky clay loam to clay, 20" to 50" thick. The underlying substratum is mottled yellowish brown, strong brown, yellow, and black, friable, slightly plastic and sticky, silt loam soil material mixed with a few fine rounded sandstone, shale, and quartzite gravel and cobbles. In many places these gravel and cobbles are absent in the substratum and the soil blends into the underlying residual soil materials.

This soil is medium to strongly acid, medium in natural fertility, easy to work and conserve, and highly productive of many crops of the county. The water holding capacity is high.

Suitability for agricultural uses: This soil (133B1) is well suited to short rotations and to most crops in the county. It is slightly better suited to corn and hay than to small grains or vegetables.

Suitability for non-agricultural uses: It is questionable for septic tank disposal systems, but good for house basements, and fair to good for road subgrade materials. It is fair for fill and dam building materials, but usually not too stable in deeply excavated road banks, or trench silos. The surface soil is good for topdressing but the subsoil is poor. It is good for pipe lines, underground cables, lawns, and shrubs. It may be necessary to dig through this soil to the underlying strata for large, heavy buildings.

*133C1 Etowah silt loam, 7-15% slopes, differs from 133B1 mainly in having steeper slopes, slightly thinner profiles, and depth of alluvial deposit over bed rock or other land surfaces.

*133D1,2 Etowah silt loam, 15-25% slopes, has steeper slopes and much thinner depth and thickness of profile than 133B1 or 133C1. A good part of it is found on narrow terrace breaks. This steeper phase is less well suited to agricultural crops and non-agricultural uses than 133B1.

134B1 SWAIM SILTY CLAY LOAM, 2-7% slopes (134C1)*

This is a deep, moderately well-drained, fine-textured soil that has formed from recent colluvial and local alluvial materials washed mostly from the surfaces of the Carbo, Chilhowie, Dandridge, and Westmoreland soils. It is found in depressions near the heads of drainageways and at the base of steep slopes.

The surface soil is a brown, friable, silty clay loam 8" to 12" thick. The subsoil is a yellowish-brown, slightly plastic, slightly sticky, silty clay or clay that is mottled with shades of brown, gray, and yellow in the lower part. It is 10" to 50" thick. Shale fragments are common on the surface and in the substratum. This soil is medium acid in most places, medium in organic matter and natural fertility, fairly easy to conserve, fairly difficult to work, and fairly productive of the major crops in the county. The waterholding capacity is very high.

Suitability for agricultural uses: Swaim silty clay loam, because of its fine texture, slow internal drainage, and concave slope position, is better suited to corn and mixed hay crops than to alfalfa, small grains, or vegetable crops. Short rotations can be used best. Most areas are small and generally associated with less suitable steeper soils.

Suitability for non-agricultural uses: Mainly because of its depressional position, fine texture, and moderately good drainage, this soil is poorly suited to many non-agricultural uses.

*134C1 Swaim silty clay loam differs from 134B1 mainly in having steeper slopes. It usually is found on first slope positions and runoff is greater than on the smoother 134B1.

138C1 BLACKSBURG SILT LOAM, 7-15% slopes (138B1, 138D1, 138E1, 138F1)*

This is a shallow to deep, well- to somewhat excessively-drained soil that has been formed from the weathered products of limestone and shale breccia. It occurs with the porous substrata phases of the Groseclose, Frederick, and Lodi soils which have formed in similar rock materials. The areas are widely scattered over many parts of the county. The surface soil is a dark yellowish-brown, very friable silt loam, 6" to 10" thick. The subsoil is a variegated yellowish-brown-yellow, strong brown, reddish-yellow, and grayish-brown silt loam to silty clay soil material with plugs, pockets, and strata of different sizes and shapes. These plugs, pockets, and strata occupy many different positions in the subsoil and substratum. Hard, unweathered rock is usually at depths of more than 25' and may range from 4' to 100' or more. Very few limestone outcrops are present in this area.

This unit is medium to strongly acid in most places in the upper horizon, but is mildly acid to neutral in the substratum in places. Natural fertility is low to medium and productivity is fair for many crops under good management. It is fairly easy to conserve and work. Infiltration of rain water is good.
Suitability for agricultural uses: Most of this soil is used for crops or pasture.

It is better suited to mixed hay crops and small grain than to row crops such as corn or sorghum. However, these crops can be grown successfully under good management. Alfalfa is not as well adapted as grasses and clovers because of the more excessive drainage and shaly nature of some areas.

Suitability for non-agricultural uses: Except for a slightly-low compaction, this soil is well suited for most non-agricultural uses. It is poorly suited in thickly-populated developments.

*138B1 Blacksburg silt loam 2-7% slopes, differs from 138C1 mainly in having smoother slopes. A small acreage was mapped.

*138D1 and 138E1 have moderately steep (15-25%) and steep (25-45%) slopes. They are somewhat shallower, have more rapid runoff, and are consequently more excessively-drained and less productive for all crops except permanent pasture. Non-agricultural uses are more limited because of steeper slopes.

*138F1 has steep slopes (45-60%) and is best suited for forest and poorly suited for most non-agricultural uses.

139C1 CALVIN SILT LOAM, 7-15% slopes (139D1,2. 139E1,2. 139F1,2)*

This is a shallow excessively-drained soil that has been formed from the weathered products of reddish acid shale, shaly sandstone, and silt stone. Most areas occur on moderately steep and steep slopes near the foothills of Prices Mountain and Brush Mountain. The surface soil is a reddish-brown, very friable silt loam 5" to 8" thick. There is usually no subsoil and the weathered substratum is reddish-brown shale and silt stone mixed with a small amount of reddish-brown silt loam soil material. Bedrock of hard, acid shale, silt stone, and shaly sandstone is usually less than 20" beneath the surface and may range from 5" to 30". In places there is rock outcrop; and loose shale makes up more than 25% of the surface layers.

Calvin silt loam (139B1), 2-7% slopes, is strongly acid, and low in natural fertility and organic matter content. Permeability is rapid to very rapid; productivity for most crops is low; conservability is poor, and workability is fairly easy.

Suitability for agricultural uses: Mainly because of shallowness, and consequent low water holding and water supplying capacity, most of the Calvin soils are best suited for pasture or forest. The smoother slopes produce fairly good small grain and mixed hay when well fertilized. The major problems are caused by shallowness, low fertility, strong acidity, and steepness of slope.

Suitability for non-agricultural uses: This soil is poor for sewage disposal systems. Many areas will percolate rapidly, but contamination of ground water supplies may be a problem where septic drainage systems are used. It is suitable for large building foundations and road beds, except on steeper slopes. It is poor for cemeteries, underground pipe lines, sanitary land fills, dug sites, airports, or topsoiling materials. It is good for pond sites but poor for dam building materials. The major problems are shallowness to hard rock and steepness of slopes.

*139D1 differs from 139C1,2 by having steeper (15-25%) slopes. It is also slightly thinner over hard rock and less well suited for agriculture and other uses.

*139E1 Calvin shaly silt loam, 25-45% slopes, and 139F2, Calvin shaly silt loam, 45-60% slopes, are poorly suited for pasture, forest, and most non-agricultural uses.

140C1,2 BRANDYWINE LOAM, 7-15% slopes, (140B1,2; 140D1,2; 140E1,2; 140F1,2)*

This is a shallow, brown, friable, loamy soil that has formed from weathered, dark-colored granite, gneiss, and granodiorite rock materials. It is mostly on sloping, narrow, sharp-breaking ridge tops and milder ridge slopes in the upland, and occurs with the better developed Chester and Hayesville soils. The surface soil is a yellowish-brown to brown, very friable loam 7" to 12" thick. In those places where a weakly-developed subsoil is present, it is a yellowish-brown, friable, light fine sandy clay loam 2" to 6" thick. The substratum is brown, black, white, and yellowish-brown weathered rock material mixed with a small amount of loam soil materials. Depth to bed rock is usually less than 24", but may range from 1' to 6'. Depth ranges are variable within short distances.

This soil is usually strongly acid in reaction. Fertility is naturally low to medium, conservability is poor, workability is fair, and productivity is medium to low for most crops.

Suitability for agricultural uses: Mainly because of shallowness, it is best suited for small grain, mixed hay, or permanent pasture. It is not suitable for many row crops and needs close-growing crops or long rotations to maintain productivity. Alfalfa can be grown but yields are relatively low and stands are costly to maintain for long periods. Forest and shrubs grow well, but make shorter growth than on the deeper Chester soils.

Suitability for non-agricultural uses: This soil is good for footings for large buildings, questionable for septic tank disposal systems, good for highway subgrades, and fair for topsoiling materials, but usually too shallow for fill materials. It is poor for pond sites but fair for pond dam-building materials.

It is fair to poor for trench silos and cemeteries, pipe lines, water lines, and underground cables. Areas are usually too small for airports. Surface soil is good for topdressing materials.

*140B1 differs from 140C1,2 mainly by having smoother (2-7%) slopes, slightly thick profiles, and by being mostly on ridge tops.

*140D1,2 has 15-25% slopes, is slightly thinner over bed rock, and thinner of profile than 140B1,2 and 140C1,2. It is best suited for pasture or forest, and less well-suited for non-agricultural use than 140C1,2.

*140E1,2 has 25-45% slopes and is best suited for pasture or forest.

*140F1,2 has 45-60% slopes and is best suited for forest. All non-agricultural uses become more difficult and costly on these steep and extremely steep soils.

143D1,2 RAMSEY SHALY SILT LOAM, 15-25% slopes (143B1; 143C1,2; 143E1,2; 143F2)*

This soil is similar to (89) Ramsey silt loam in most characteristics except that it is more severely eroded. It has lost 50% of its surface soil and the surface contains 20% or more small shaly fragments. Flowed areas expose larger amounts of shale from the substratum. Depth to bedrock is 4" to 6". Also, conservability, fertility, workability, and the waterholding capacity and productivity are poorer on this eroded phase.

Suitability for agricultural uses: This soil is best suited for forest and pasture, but produces poor pasture and slow-growing trees.

Suitability for non-agricultural uses: These shale soils are more poorly-suited for most non-agricultural uses than the non-eroded (89) Ramsey silt loam.

*143B1 and 143C1,2 differ from 143D1,2 mainly by having smoother slopes. 143B1 has 2-7% slopes; 143C1,2 has 7-15% slopes.

*143E1 has 25-45% slopes.

*143F2 has 45-60% slopes.

The steeper slopes are less well-suited for agricultural and non-agricultural uses.

152C1 ROCKLAND (crystalline rock), 7-15% slopes (152D1, 152E1, 152F1)*

A shallow land type comprising areas that include 90% or more rock outcroppings of granite, granodiorite, and schist rock materials mixed with a small amount of soil similar to Brandywine between the rock outcroppings. It occurs as small areas in the uplands in the southern portion of the county with the Brandywine, Clinton, Louisburg, and Hayesville soils.

Suitability for agricultural uses: This soil is best suited for forest, but produces slow growing trees.

Suitability for non-agricultural uses: It is poor for most uses, but best suited for recreational or park areas. Good for building footings but difficult to move or dig into.

*152D1, 152E1, and 152F1 differ from 152C1 mainly by having steeper slopes. 152D1 has 15-25% slopes, 152E1 has 25-45% slopes, and 152F1 has 45-60% slopes and some areas are precipitious bluffer along Little River.

192B1 MEADOWVILLE SILT LOAM, 2-7% slopes (92C1)*

This is a brown, deep, well- to moderately well-drained soil. It has formed in recent colluvium that has washed out of the Chester, Brandywine, and Hayesville soils areas. It occurs on depressed slopes near the heads of drainageways and on toe slopes. It is not extensive and occurs in small, widely scattered areas in the southern part of the country. The surface soil is a brown, reddish-brown and dark brown, very friable loam, 12" to 24" thick. The subsoil is weakly developed, mostly strong brown and yellowish-red, friable, sandy clay loam to silty clay loam 10" to 20" thick. In the lower part the subsoil is mottled with pale brown, light gray, and yellowish-red and overlies residual soil and soil materials. A few areas are gravelly in the substratum and contain heavy plastic lower layers.

Depth to hard rock is usually more than 15' but may range from 5' to 25'. It is naturally productive of many crops, easy to conserve and work. Moisture capacity for crops is relatively high.

Suitability for agricultural uses: This soil is better suited for corn, mixed hays, and vegetables than for alfalfa and small grains. Alfalfa stands die out after 2 to 3 years. Short rotations can be used on most areas. Abundant moisture content and low-lying portions cause soil to have a narrow range of moisture conditions for cultivation. Abundant moisture and high organic matter cause lodging of small grain and reduce productivity for alfalfa and some vegetables.

Suitability for non-agricultural uses: Meadowville loam is questionable for septic tank drainage disposal systems, good for topsoiling materials fill and dam building materials, and fair to poor for home sites, big building sites, and road subgrades. It is only fairly well-suited for earth work during prolonged wet periods. Shrink swell ratio is low, but slow internal drainage in lower layers make soil difficult to handle for house basements and in road bed subgrades.

*192C1 Meadowville loam, 7-15% slopes, differs from 192B1 mainly by having steeper slopes. It is slightly more erodible.

203B1 MATNEY SILT LOAM, 2-7% slopes (203C1, 203D1)*

This is a shallow to moderately deep, infertile soil formed on the uplands from the weathered products of phylitic rock materials. It occurs on narrow ridge tops in the southern part of the county in the Blue Ridge Mountains. The surface soil is a yellowish-brown, very friable, silt loam 5ⁱⁿ to 8ⁱⁿ thick. The subsoil is a strong brown to yellowish-red, friable, silty clay loam 6ⁱⁿ to 20ⁱⁿ thick. The substratum is partly weathered, but usually relatively hard at shallow depths, and consists of fairly hard platy phylite mixed with a small amount of silt loam soil materials. Small, finely-divided mica are common throughout the subsoil and substratum. Depth to bed rock ranges, in short distances, from 1 1/2^{ft} to 4^{ft}. This soil is very strongly to strongly acid; low in organic matter, natural fertility and productivity. Conservability is difficult and the water holding capacity is low.

Suitability for agricultural uses: This soil is best suited for small grains and mixed hays mainly because of shallowness and consequent droughty conditions. Alfalfa gives low yields at a high cost, and corn and other row crops suffer for moisture in most seasons.

Suitability for non-agricultural uses: Matney silt loam is unfavorable for septic tank disposal systems, only fair for pipe lines, underground cables, and basements. It is poor for bomb shelters, sanitary land fills, pond sites; and fair for dam building materials, trench silos, and cemeteries. It is only fair for road beds and road fill materials because of mica content and difficulty of compaction. It is poor for topdressing materials in landscaping.

*203C1 Matney silt loam, 7-15% slopes, differs from 203B1 mainly by having steeper slopes, thinner profiles, and shallower depths over rock materials. It is slightly more erosive and less well suited for crops.

*203D1 has hilly slopes (15-25%) and is best suited for pasture or forest. It is more poorly-suited for non-agricultural uses than 203B1 or 203C1.

204C1 LOUISBURG FINE SANDY LOAM, 2-7% slopes (204D1, 204E1)*

This is a shallow, light colored soil developed over the weathered products or Arkosic sandstone materials. It is small in extent and occurs on narrow ridge tops in the southern part of the county, just east and west of Pilot. It occurs with the Matney, Ramsey, and Edneyville soils.

The surface soil is a yellowish-brown, very friable, fine sandy loam 6" to 10" thick. The substratum is mixed fine sandy loam and fine gravelly materials.

Depth to bed rock of Arkosic sandstone ranges from 6" to 3', being less than 15" in most places. This shallow, droughty soil is strongly to very strongly acid; low in natural plant nutrients and organic matter content. Workability is good but conservability is poor and productivity is low. The water holding capacity is very low.

Suitability for agricultural uses: This soil is best suited for pasture or forest. Forests make good growth on lower slopes with northern and eastern exposures.

Suitability for non-agricultural uses: Because of shallowness, this soil is poor for many non-agricultural uses. It is good for large or small building footings and for road bed, questionable for septic tank disposal systems, and poor for most other uses considered in this report.

*204D1 Louisburg fine sandy loam, 15-25% slopes, differs from 204C1 mainly by having steeper slopes. It is best suited for forest or pasture.

*204E1 Louisburg fine sandy loam, 25-45% slopes, has steeper slopes and somewhat thinner profiles than 204C1 or 204D1, and is less well-suited for pasture crops or non-agricultural uses.

205B1 CHESTER-BRANDYWINE LOAM, 2-7% slopes (205C1,2; 205D1,2; 205E1,2)*

As the name indicates, this is a mapping unit of 2 soils so intricately mixed in occurrence that they could not be separated on the scale used. The Chester soil is brown, moderately deep to deep, well-drained, and is highly productive and widely suited for agricultural and non-agricultural uses. The Brandywine soil is shallow brown, somewhat excessively-drained, and has a narrow range of suitability for crops and non-agricultural uses. These soils occur in the southern part of the county and are strongly acid throughout. Depth to bed rock is variable, ranging from 2' to 20' over relatively short distances. Workability is good, conservability is fair, and fertility is medium to low. Productivity is medium.

Suitability for agricultural uses: These soils are better suited for small grain and mixed hay crops than for row crops and alfalfa. However, they are fair for corn and alfalfa. Major problem for agricultural and non-agricultural uses is shallowness of the Brandywine soil.

Suitability for non-agricultural uses: The Chester soil is widely suitable for most non-agricultural uses, and the shallow Brandywine soils are poorly suited for many uses but are good for road bed material, sites for large or small buildings and building footings. They are fair for fill and pond dam building materials.

*205C1,2 Chester-Brandywine loam, 7-15% slopes, differs from 205B1 mainly by having steeper slopes, which makes it less well-suited for crops and other uses.

*205D1,2 Chester-Brandywine loam, 15-25% slopes, has thinner profiles and depth to rock. It is best suited for pasture or forest.

*205E1,2 Chester-Brandywine loam, 25-45% slopes, is best suited to forest, and poorly suited for most non-agricultural uses except parks.

229Bl CARBO SILT LOAM, 2-7% slopes (229D1, 229D2, 229E1)*

This soil differs from 29Bl Carbo silty clay loam mainly in having coarser-textured surface soils, and by being formed mostly from the weathered products of crushed or brecciated limestones and shales. Other characteristics including use suitability and management needs, are similar to 29Bl Carbo silty clay loam, 2-7% slopes. (See 29Bl.)

*229C1 Carbo silt loam, 7-15% slopes, differs from 229Bl mainly by having steeper slopes.

*229D1,2 Carbo silty loam, 15-25% slopes.

*229E1 Carbo Silt loam, 25-45% slopes, differ from 229Bl primarily by having steeper slopes and thinner **solums**. These steeper phases are less well-suited for agricultural and non-agricultural uses than 229Bl.

239B1 UNGERS SILT LOAM, 2-7% slopes (239C1)*

This is a shallow to moderately deep, well-drained soil that has formed on the uplands from the weathered products of red acid shale and silt stone materials. It occurs on moderately narrow, upland ridge tops with the shallow, excessively-drained Calvin and moderately deep, light-colored Wellston soils. The surface soil is a reddish brown to brown, very friable, silt loam 6" to 9" thick. The subsoil is usually less than 20" thick, and is a red silty clay loam. Depth to unweathered red shaly and silty rock materials is usually less than 3', but may range from 2' to as much as 6'.

This soil is very strongly acid throughout; low in organic matter and available plant nutrients. Workability is good, conservability is fair, and productivity is fair. The water holding capacity is medium.

Suitability for agricultural uses: This soil is best suited for small grains and mixed hays but will produce fair corn and other row crops. It is fair for vegetables and truck crops.

Suitability for non-agricultural uses: Unger 239B1 silt loam is questionable for septic tank disposal systems; good for road subgrades, road beds, and large and small building sites. It is fair for compacted fill materials, pond dam building materials, and trench silos. It is poor for top dressing materials in landscaping; fair to good for lawns, cemeteries, underground cables, pipe lines, and house basements.

*239C1 Ungers silt loam, 7-15% slopes, differs from 239B1 mainly by having steeper slopes, somewhat shallower profiles, and depth over hard rock materials. It is less well-suited for most agricultural and non-agricultural uses.

240C1 RAMSEY SILT LOAM (Hazel), 7-15% slopes (240B1, 240D1, 240E1, 240F1)*

This is a shallow, excessively-drained soil formed over hard phyllite rock materials. It occurs with the Matney and other Ramsey soils in the northern part of the county in the Blue Ridge Mountains. The surface soil is a grayish-brown to brown, silt loam 5" to 7" thick. There is no subsoil and the substratum is variegated brown, gray, and yellowish, partly weathered phyllitic rock materials mixed with a small portion of yellowish-brown, silt loam soil material. Bed rock is usually at depths less than 15", but may range from 6" to 24".

This soil is strongly acid throughout; low in natural fertility and organic matter content. The water holding capacity is very low. Workability and conser-ability is difficult and productivity of crops, pasture, and forest is low.

Suitability for agricultural uses: This sloping soil is best suited for pasture or forest and produces low yields of both.

Suitability for non-agricultural uses: This soil is poorly suited for most non-agricultural uses except home sites and footings for large or small buildings. It is fair for road beds and for park or recreational areas.

*240B1 Ramsey silt loam, 2-7% slopes, differs from 240C1 mainly by having smoother slopes.

*240D1 Ramsey silt loam, 15-25% slopes, is steeper and shallower than 240B1 or 240C1 and less well-suited for pasture or forest.

*240E1 Ramsey silt loam, 25-45% slopes, and 240F1 Ramsey silt loam, 45-60% slopes, are steeper and shallower of profile, and best suited for forest. They are poorly suited for most non-agricultural uses.

Percolation table - Soils of Montgomery County, Virginia

All soils of Montgomery County have been divided into 4 classes (Flood Plains, Favorable, Questionable, Unfavorable), based on their relative suitability for absorption systems for individual sewage disposal. The Montgomery County soil survey, in cooperation with the County Health Department, has made _____ tests on most of the representative soils to use as a basis for percolation ratings. Procedures similar to those in effect with the County Health Department were used. In fact, most of the measurements of percolation were taken by, or in the presence of, sanitarians of the County Health Department. These data are compiled in Table 2. The compilation includes studied previously and later correlated with various soils, supplemented by known facts pertaining to percolation, such as texture, structure, permeability, internal drainage, and depth over rock. These ratings are close estimates of soil percolation potentials throughout the county. It is impossible to accurately predict exact or nearly exact percolation for all soils for absorption systems. However, a good correlation was obtained on 85% of the sites tested.

A brief description of the 4 classes follows:

Soils with Favorable percolation potentials. In most places these soils offer few problems in percolation if absorption systems are properly installed. Ninety-five percent or more of these soils should pass percolation standards. Areas that may give trouble are allowable variations near boundaries of unfavorable or questionable soils, or are areas that may be satisfactory if trenches are dug slightly deeper, etc. They are usually moderate to deep, well-to excessively-drained soils over fairly deeply weathered, soft-rock materials.

Soils with Questionable percolation potentials: Many of these soils may pass percolation, but will need to be tested or closely examined in most places before accurate percolation potentials can be established. Many are deep, well-drained soils that have heavy plastic clay subsoils and hold their texture to deep depths. Frederick and Lodi soils developed over massive rock materials are good examples. Proper installations and good management are essential for this class of soils and should help to insure better percolation rates in many of them.

Soils with Unfavorable percolation potentials: Most of the soils in this class are not suited for absorption systems for sewage disposal, although these may be properly installed and well managed. The soils in this class may contain high water tables, plastic clay subsoils, hard impervious rock at shallow depths, or are too steep or shallow for drainage fields.

Soils of the Flood Plains: Many of these soils will have good to excellent percolation potentials but are all subject to frequent flooding hazards. They are not suitable for home sites. If septic absorption systems are used in these soils, high water tables and flooding would create a health hazard in surrounding or downstream areas.

There are several characteristics that the sanitarian may detect in soils of the county that will help him eliminate unfavorable ones, so he can avoid making percolation tests:

1. If a soil is predominately gray throughout, it usually has a high water table in wet periods, and is an unfavorable soil.

2. If a soil has gray mottles above 20" in the subsoil, it has a moderately high water table in wet periods and is an unfavorable soil.
3. If a soil is shallow (less than 20") to hard, impervious rock it is an unfavorable soil for septic tank drainage fields. A tank and field would be hard to install if the soil were good.
4. Soils on slopes above 25 or 30% would be unfavorable or highly questionable unless they have thick, porous layers where lines could be cut level or nearly level.
5. Soils which have hardpan or fragipan layers at 20" or less beneath the surface usually have a perched water table and are unfavorable for absorption fields.
6. Some shallow, shaly, and sandy soils may have favorable percolation rates, but the effluent may enter rock crevices and possibly contaminate wells or springs in the area. This could happen in some of our deeply-weathered porous soils and contamination may eventually restrict their use.
7. The way the surface of the land lies has much to do with movement of water from the surface and the way it percolates through soil. Avoid concave or saucer-like slopes, sinks, toe-slopes, and low depressions. Soils in these positions may percolate well in dry periods, but seepage water will accumulate and cause trouble in wet seasons. Flat land is usually wet. The more rolling or gently sloping areas usually contain soils with better drainage, and runoff is moderate to rapid.

8. Where the perk test hole is dug on the land surface has a lot to do with whether soils will percolate properly or not. Soils change drastically with abrupt, or sometimes with slight, changes in relief or topography.
9. In limestone valleys where underground crevices and caves occur in the rock materials great danger of water contamination in wells and springs may be expected if septic tank disposal systems are used.

Productivity Ratings

Productivity ratings for crops and pastures are given in Table ____.

The productivity rating for each crop is a percentage of the standard yield, which is given at the top of the column for the stated crop. The standard is approximately average yield obtained (without use of fertilizer or other amendments) on the more productive soils in the United States where the crop is most extensively grown. A productivity rating of 50 for a Montgomery County soil means that it is about half as productive for a certain crop as soil with the standard yield. Soils that have been limed or fertilized or that are unusually productive may have a rating of more than 100 for some crops.

The productivity rating index is calculated as follows:

$$\text{Productivity rating index} = \frac{\text{Expected yield per acre} \times 100}{\text{Standard yield per acre}}$$

These ratings cannot be interpreted directly into land values because many other factors, such as distance to market, must be considered. The ratings can be used for comparing yields of specific crops on different soils within the county and for comparing Montgomery County soils with those in other parts of the United States.

The yield data were collected by soil scientists in the field at the time of this survey. Some ratings are based on data obtained from experiment stations and from farm records. Where sufficient data were not available, yields were obtained by comparison with soils on which data were available, by field observations, and by consultations with farmers and agricultural specialists.

The figures in columns A show the percentage of standard yield that can be expected under common management. Such management includes crop rotations and the use of low to moderate amounts of fertilizer for corn, small grain, and vegetables.

Common management practices are not the same on all soils. Some of the common uses and management practices on different soils are given in the section entitled Soil Series, Types, and Phases.

Just as different crops require different treatment on the same soil, the same crop may have different requirements on different soils. Also, a level may be reached where it is no longer economically feasible to intensify the management. This level depends on the soil, the crops, the type of farm, prices, and many other factors. The uncertainty of these factors makes it impossible to define the practical limits to production.

The figures in columns B show the percentage of standard yields that may be expected under good management. Good management includes the proper choice and rotation of crops; the correct use of commercial fertilizer, lime, and manure; proper tillage methods; the return of organic matter to the soil, and engineering measures to control water on the land where necessary. The yields in columns B, when compared with those in columns A, give expected responses of crops to good soil management. They may be considered as production goals to be reached by feasible management practices.

TABLE 3. RELATIONSHIPS OF THE SOIL SERIES ACCORDING TO TOPOGRAPHIC POSITION, PARENT MATERIAL, AND DRAINAGE

Position and Parent Material	Excessively Drained	Somewhat Excessively Drained	Well Drained	Moderately Well Drained
Uplands-sedimentary rocks				
High calcic limestone			Hagerstown, Pisgah	
Argillaceous limestone		Chilhowie	Carbo	
Cherty dolomitic limestone			Frederick (cherty)	
Very cherty dolomitic limestone			Bodine (shallow)	
Siliceous dolomitic limestone and mixed limestone and sandstone (dolomitic)			Lodi, Bolton	
Limestone, dolomitic limestone and shale breccia (calcareous)	Pedlar	Blacksburg	Groseclose, Frederick	
Interbedded limestone and calcareous shale	Dandridge	Westmoreland	Lodi	
Calcareous shale with some limestone and sandstone	Litz-Teas			
Acid shale and some sandstone	Montevallo		Ungers	
Acid sandstone and some shale	Calvin			
Quartzite acid sandstone and shale	Muskingum	Ramsey (sil)	Wellston	
Phyllite and schist	Ramsey			
Granite gneiss and granodiorite	Sylvatus			
Colluvial lands		Brandywine	Chester, Hayesville	
colluvium and local alluvium from:				
Soils underlain by high calcic limestone argillaceous limestone and breccia			Emory	Swaim
Soils underlain by dolomitic limestone, siliceous limestone, and calcareous shale and breccia				
Soils underlain mainly by acid shale			Greendale	Andisburg
Soils underlain mainly by sandstone and some shale			Jefferson*	Leadvale
Soils underlain mainly by crystalline rock granite gneiss and granodiorite			Allen	
				Meadowville

Table 3. Page 2

Position and Parent Material	Well Drained	Moderately Well Drained	Somewhat Poorly Drained	Poorly Drained
Stream terrace lands: Mainly from limestone and calcareous shale	Etowah** Elk	Captina-Capshaw	Taft	Robertsville
Mainly from acid shale, sandstone and quartzite	Holston,***Monongahela			
Mainly from crystalline rock, granite and granodiorite (some sandstone, shale, quartzite, and limestone influence)	Hiwassee, Masada Wickham	Altavista	Augusta	Roanoke
Bottom lands or flood plains: Mainly from limestone and calcareous shale	Huntington Huntington (calcium)	Lindside	Newark	Melvin****
Mainly from fault breccia		-----Mixed Alluvia		-----
Mainly from sandstone, quartzite and acid shale			Mixed	Alluvia*****
Mainly from crystalline rocks granite gneiss and granodiorite	Congaree	Chewacla		Wehadkee

* Includes some Hayter.
 ** Includes some dark red (Cumberland) soils, not mapped in County.
 *** Includes some Sequatchie.
 **** Includes some Dunning.
 ***** Includes small acreage of Pope, Philo and Atkins.

Table 4. (1) continued

Mixed Hay 100=2 tons	Pasture 100=210 Cow-Acre-Days	
	A	B
	45	85
80	100	60
50	90	36
80	95	70
75	90	65
	60	80
		65
75	95	65
70	90	60
		85
60	85	60
		50
		80
		70

Table 4. (2) continued

Mixed Hay 100±2 tons		Pasture 100±210 Cow-Acre-Days	
A	B	A	B
55	70	40	60
85	105	80	110
85	105	80	110
85	100	75	100
80	95	70	95
75	90	65	90
		50	80
		60	80
		50	75
		45	70
		40	65
			55

Table 4. Page 3

Soil	Corn 100=50 bu.		Wheat 100=25 bu.		Rye 100=25 bu.		Oats 100=50 bu.		Alfalfa 100=4 tons		Red Clover 100=2 tons	
	A	B	A	B	A	B	A	B	A	B	A	B
105B1 Chester loam, gently sloping	130	170	75	105	80	110	80	110	80	105	95	115
105C1 Chester loam, sloping	110	140	70	95	70	100	70	100	70	90	85	100
105D1 Chester loam, moderately steep	--	--	60	80	60	90	60	90	60	80	75	90
205C1 Chester-Brandywine loams, sloping	100	130	65	80	60	90	60	90	60	85	85	100
205D1 Chester-Brandywine loams, moderately steep	--	--	55	75	55	85	55	85	--	75	70	85
85A1 Chewacla silt loam	110	160										
77A1 Congaree fine sandy loam	130	175										
35C1 Dandridge silt loam, sloping	--	70	40	70	40	70	40	60	--	--	55	75
36D2 Dandridge silt loam, moderately steep, eroded												
36E2 Dandridge silt loam, steep, eroded												
112B1 Elk silt loam, gently sloping	160	200	70	95	75	100	75	105	75	95	100	120
17B1 Emory silt loam, gently sloping	130	185	90	110	90	110	100	115	75	100	95	115
17C1 Emory silt loam, sloping	120	175	85	105	85	105	90	110	70	90	85	105
17D1 Emory silt loam, moderately steep	--	--	70	90	70	90	75	95	--	80	70	95

Table 4. (3) continued

Mixed Hay 100=2 tons	Pastures 100=210 Cow-Acre-Days	
	A	B
95	125	95
90	110	80
75	95	70
75	95	80
70	90	70
80	100	95
90	110	100
60	80	55
		45
		70
100	125	100
95	125	90
85	110	80
75	100	70

Table 4. (4) continued

Mixed Hay 100-2 tons	Pastures 100-210 Cow-Acre-Days	
	A	B
95	125	95
85	110	85
75	95	80
75	100	70
75		65
60	80	60
		60
80	105	90
75	100	85
70	95	80
		45
		40
		40

Table 4 (5) continued

Mixed Hay 100=2 tons	Pastures 100=210 Cow-Acre-Days	
	A	B
80	105	85
75	100	80
70	90	75
65	85	70
75	95	80
70	90	75
65	85	70
60	80	65
		60
		55
		95
		110
		115
		120
		125
		110
		105
		100
		95
		60

Table 4. (6) continued

Mixed Hay 100=2 tons	Pastures 100-210 Cow-Acre-Days	
	A	B
90	110	95
85	105	90
80	100	85
		75
85	105	75
		110
90	110	80
85	105	75
		65
75	95	60
110	130	115
100	120	110
120	140	125
		135
		130
		125
		115
		110
		100
		95
		150
		145
		160

Table 4. (7) continued

Mixed Hay 100-2 tons	Pastures 100-210 Cow-Acre-Days	
	A	B
70	55	90
	50	85
75	60	95
70	55	90
65	50	85
	40	70
105	100	140
100	95	135
70	55	85
65	50	80
110	110	140

Table 4. (8) continued

Mixed Hay 100=2 tons		Pastures 100=210 Cow-Acre-Days	
A	B	A	B
		50	80
		--	55
70	95	65	85
60	85	65	85
55	75	50	75
		45	70
65	85	60	80
		50	80
		--	65

Table 4. Page 9

Soil	Corn 100=50 bu.		Wheat 100=25 bu.		Rye 100=25 bu.		Oats 100=50 bu.		Alfalfa 100=4 tons		Red Clover 100=2 tons	
	A	B	A	B	A	B	A	B	A	B	A	B
39B1 Litzz-Teas silt loams, gently sloping	70	95	50	100	50	100	--	--	--	75	70	95
39C1 Litzz-Teas silt loams, sloping	65	90	45	85	45	85	--	--	--	60	65	90
39D1 Litzz-Teas silt loams, moderately steep												
39E1 Litzz-Teas silt loams, steep												
39F1 Litzz-Teas silt loams, very steep												
32B1 Lodi cherty loam, gently sloping	85	120	65	115	65	105	55	95	60	80	70	90
32C1 Lodi Cherty loam, sloping												
32D1 Lodi cherty loam, moderately steep												
32E1 Lodi cherty loam, steep												
32E2 Lodi cherty loam, steep, eroded												
31D1 Lodi loam, moderately steep	75	105	60	110	60	100	50	90	55	75	60	85
31E1 Lodi loam, steep												
31B1, 98B1 Lodi loam, porous substratum, gently sloping	100	150	70	120	70	110	60	100	70	90	75	95
31C2 Lodi loam, porous sub- stratum, gently sloping, eroded	90	120	65	115	65	105	55	95	65	85	75	90
31C1 Lodi loam, porous substratum, sloping	90	120	65	115	65	105	55	95	65	85	70	90
31D2 Lodi loam, porous substratum, sloping, eroded	80	110	60	110	60	100	50	90	60	80	65	85

Table 4. (9) continued

Mixed Hay 100=2 tons	Pastures 100-210 Cow-Acre-Days	
	A	B
75	95	70
70	90	65
60	80	65
		45
70	95	60
		85
60	80	55
		50
75	100	65
70	95	60
70	90	60
65	85	55
		80
		75
		90
		85
		85
		80

Table 4 (10) continued

Mixed Hay 100±2 tons	Pastures 100±210 Cow-Acre-Days	
	A	B
	40	70
85	100	110
80	95	105
75	90	100
95	115	130
	55	110
	70	95
	75	110
50	70	90

Table 4. (11) continued

Mixed Hay 100=2 tons		Pastures 100=210 Cow-Acre-Days	
A	B	A	B
			40
50	50	--	50
50	70	40	60
		35	55
		25	45
50	70	40	60
		35	55

Table 4. Page 12

Soil	Corn 100=50 bu.	Wheat 100=25 bu.	Rye 100=25 bu.	Oats 100=50 bu.	Alfalfa 100=4 tons	Red Clover 100=2 tons
	A B	A B	A B	A B	A B	A B
46D1 Pedlar very rocky silt loam, moderately steep						
46E1 Pedlar very rocky silt loam, steep						
46F1 Pedlar very rocky silt loam, very steep						
129C1 Pedlar-Carbo very rocky silt loams, sloping						
129D1 Pedlar-Carbo very rocky silt loams, moderately steep						
129E1 Pedlar-Carbo very rocky silt loams, steep						
129F1 Pedlar-Carbo very rocky silt loams, very steep						
111D1 Ramsey loam, moderately steep						
111E1 Ramsey loam, steep						
143D2 Ramsey shaly silt loam, moderately deep, moderately steep, eroded						
143E2 Ramsey shaly silt loam, moderately deep, steep, eroded						
143F2 Ramsey shaly silt loam, moderately deep, very steep, eroded						
240D1 Ramsey silt loam, moderately steep						
240E1 Ramsey silt loam, steep						
240F1 Ramsey silt loam, very steep						

Table 4. (12) continued

Mixed Hay 100=2 tons	Pasture 100-210 Cow-Acre-Days	
	A	B
	60	80
	50	70
	75	95
	65	85
	55	70
55	45	65
	40	60
	40	55
	50	65
	45	60

Table 4. (13) continued

Mixed Hay 100=2 tons	Pasture 100=210 Cow-Acre-Days	
	A	B
50	75	55
		80
		50
		70
		50
		45
		85
		25
		40
90	105	90
		120

Table 4. Page 14

Soil	Corn 100=50 bu.		Wheat 100=25 bu.		Rye 100=25 bu.		Oats 100=50 bu.		Alfalfa 100=4 tons		Red Clover 100=2 tons	
	A	B	A	B	A	B	A	B	A	B	A	B
126A1 Taft silt loam												
239B1 Ungers silt loam, gently sloping	90	120	60	90	60	90	50	85	--	75	65	85
109A1 Weaver loam	160	210										
86A1 Wehadkee silt loam												
118E2 Wellston loam, sloping	70	105	50	90	50	90	50	90	--	50	50	85
33D1 Westmoreland silt loam, moderately steep												
33E1 Westmoreland silt loam, steep												
33F1 Westmoreland silt loam, very steep												
84B1 Wickham loam, gently sloping	150	190	75	100	75	100	80	110	80	100	95	100

Table 4. (14) continued

Mixed Hay 100-2 tons	Pasture 100-210 Cow-Acre-Days	
	A	B
60	85	75
70	90	65
120	140	120
		45
55	90	60
55	70	60
		55
95	120	95
		85
		80
		70
		100
		150
		90
		85
		130

ENGINEERING CHARACTERISTICS OF MONTGOMERY COUNTY SOILS

This report contains Information about the soils of Montgomery County that will be helpful to engineers in selecting sites for buildings and other structures; in choosing locations for highways and airports; installing individual absorption systems for septic tank sewage disposal; locating areas for sanitary fills; in determining the trafficability of soils; in locating sand and gravel for use in construction; and in planning dams, ponds, and other structures to control floods and conserve water and soil.

The soil map and accompanying report are too generalized for some engineering purposes, but provide information valuable in planning detailed field surveys and tests to determine the in-place condition of soils at proposed sites for construction. After testing soil materials and observing their behavior under varying conditions, the engineer can anticipate with reasonable accuracy the characteristics of individual soil units wherever they are mapped.

ENGINEERING DATA

Certain soil information needed by engineers can be obtained from the soil map and Table ____, Soil Properties Important to Engineering. This table lists some of the in-place properties of soil types in the county. It was prepared mainly with agricultural emphasis, but it includes information important to other fields of engineering. More information and data can be obtained by referring to other sections of the report, particularly to the

sections entitled "The Soils of Montgomery County." "The soil descriptions of the soil's of the county," and the productivity ratings.

Under hydrologic ratings in Table ____, the soils of Montgomery County have been rated according to their ability to absorb water during periods of sustained rainfall. This rating is based on the whole soil profile and underlying, unconsolidated parent material. It assumes that the soils have natural drainage and a uniform plant cover. This rating is relative, and Elk silt loam--a deep, medium-textured, permeable soil--is the basis for comparison. The rate of infiltration for Elk silt loam is considered medium to good. Soils may have a high, medium, low, or very low rate of infiltration. In determining the suitability of soil materials for constructing ponds, soil capactability of porosity of underlying bedrock are considered. Pond sites are usually selected in drainageways or incipient drainageways; therefore, those ratings are concerned with functions underneath the soil material and the kind of soil material available for building dams.

Many soils in Montgomery County contain rock fragments and/or overlie hard rock at varying depths. Such conditions make excavation difficult or prevent the use of tamping rollers to compact materials placed in embankments. If stony soil material is used in foundations or pavement and base courses for roads, the large fragments must be crushed or removed. Soils that have a high percentage of rock fragments and shallow depth to bedrock may be the only ones that can be excavated in winter.

In road building, it is particularly important to know the location of somewhat poorly and poorly-drained soils, and to know about clays of the 2:1 type (soils that are the swelling and expanding kind). Seepage along the

backslope of cuts in wet soil may result in slumping or sliding of the overlying material. A perched water table beneath the road pavement may result in freezing and thawing in the saturated foundation material. Members of the Captina series are examples of soils with fragipans having such water tables. This, in turn, causes differential volume changes and differences in bearing capacity. Poorly-drained areas should be inspected in greater detail to determine the need for interceptor drains and underdrains.

Poorly-drained soils, especially those relatively high in organic matter content, are severely limited for most types of construction. They should be bypassed where feasible when building roads. Where cuts are made in poorly-drained areas, or in areas of clay with high swelling characteristics, the excavated material should not be used as fill for embankments. Suitable fill from other areas should be used for both embankments and foundations below gradeline in cuts. Swelling and expanding clays should not be used in fills or as road bed material because they tend to expand and "blow the road."

Information about the textural characteristics and parent materials of soils will be useful in locating construction materials. Soil materials that have a high percentage of silt and clay particles are susceptible to frost action, and are more suitable for use in the upper part of subgrades and for pavement foundations.

Where installations of individual absorption systems for sewage disposal are planned, it is important to know about the permeability of various soils. Percolation rates are directly affected by the texture, structure, parent material, kind and amount of clay, depth to hard, non-porous rock, and other soil characteristics.

Table 5 gives general suitability for septic tank sewage systems in the main soil series of the county. This general rating is based on estimated percolation potentials (in inches per hour) below 28" for the different soils. Much of the percolation data was taken from actual percolation tests made in major soils of the county, and by soil surveys made in cooperation with local health sanitarians.

TABLE 5. PROPERTIES OF THE SOILS IMPORTANT TO ENGINEERING

Map Symbol and Soils	Depth ² (In.)	Dominant Texture	Permeability	Shrink-Swell Potential	Depth to and Kind of Bedrock	Min. Depth to Water-table During Wet Periods
114D1 Allen cobbly fine sandy loam, 15-25% slopes	0-4 4-9 11-17 17-26 26-36 36-46 46-56	Cobbly fsal Cobbly fsal scl cl cl hcl cl	Very rapid Rapid Moderate Moderate Mod. slow	Low to mod.	4 to 20' over mostly sandstone shale & cherty rock (soil solum is usually less than 5' over beds of colluvium) variable.	20' †
114B1 Altavista loam, 2-7% slopes	0-10 10-14 14-27 27-48	l & sil sil scl sac1	Very rap. Rapid Mod. slow slow	Low	6-15' over variable rock materials	30"
116A1 Augusta fine sandy loam, 0-2% slopes	0-2 2-8 8-11 11-17 17-21 21-34 34-66	fsal fsal fsal ltfisac1 Hc-cl c c	Very rap. Rapid Moderate Slow slow Very slow Very slow	High	5-14' over variable rock materials, mostly shales, granites and limestone	16"

Table 5. (1) continued

	Suitability for				Remarks
	Farm Ponds	Septic Tanks	Irrigation	Earthwork during Prolonged Wet Periods	
Fair to Poor	Favorable	Good	Good	Good	Very thick surface soil in many places. Cobbles removed from a few areas.
Good	Unfavorable	Fair	Fair	Fair	
Good	Unfavorable	Poor	Poor	Very Poor	Low lying positions on stream terraces. Inextensive.

Table 5. Page 2

Map Symbol and Soils	Depth ² (In.)	Dominant Texture	Permeability	Shrink-Swell Potential	Depth to and Kind of Bedrock	Min. Depth to Water-table During Wet Periods
138C1 Blacksburg silt loam, 7-15	0-2 2-8 8-12 12-20 20-25 25-36 36-50	sil sil sicl sicl sicl si soil 5% sil	Very rapid Rapid Moderate Moderate Rapid Rapid Rapid	Low- Very Low	2-20' plus over lime-stone and shale breccia	20' plus
27D1 Bodine very cherty silt loam, shallow, 15-25	0-3 3-9 9-22 22+	ch sil v ch sil ch sil ch	Very Rapid Rapid Mod. slow Very slow	Low	1 1/2 to 4' to hard cherty rock materials	10' plus

Table 5. (2) continued

	Suitability for		Remarks
	Septic Tanks	Earthwork During Prolonged Wet Periods	
Farm Ponds	Irrigation	Earthwork During Prolonged Wet Periods	
Poor	Favorable	Good to Fair	Variable in horizon sequence and coarse fragment content. Percolation retarded when hard rock is near surface. Steep slopes not suited for septic tank disposal systems. Percolation of effluent in substratum May cause some contamination of well waters in thickly developed areas.
Good to Fair	Unfavorable	Fair to Good	Smoother slopes are deeper and better for most crops and Urban uses.

Table 5 Page 3

Map Symbol and Soils	Depth ² (In.)	Dominant Texture	Permeability	Shrink-Swell Potential	Depth to and Kind of Bedrock	Min. Depth to Water-table During Wet Periods
119E1 Bolton loam, 25-45	0-1 1-11 11-15 15-33 33-50 50-102	loam loam loam cl cl c	Very rapid Very rapid Rapid Moderate Moderate Mod. slow	Mod. to high	5-20' to mixed dolomite and sandstone rock strata	20' plus
140D1 Brandywine loam, 15-45+	0-2 2-7 7-18 18-30	loam loam loam loam	Very rapid Very rapid Rapid Rapid to mod. slow	Very low	1-5' over granodiorite and dark granitic rocks	10'+
139C1 Calvin silt loam, 7-15	0-1 1-8 8-16 16-26	silt silt shaly silt shaly silt	Very rapid Rapid Rapid Rapid-slow	Low	1/2-3' to red acid shale and sandstone	10' plus

Table 5. (3) continued

Suitability for				Remarks
Farm Ponds	Septic Tanks	Irrigation	Earthwork During Prolonged Wet Periods	
Poor to Fair	Favorable	Good	Fair to Poor	Heavy textured subsoil may prevent percolation in some areas where soil is shallow over bedrock.
Fair	Favorable	Fair	Good	Depth to bedrock and steepness of slope may prevent the use of septic tanks in places. Some areas are too coarse for good pond sites and pond dam material.
Good	Unfavorable	Fair	Good	This soil is unfavorable for septic tanks mostly because of shallowness to bedrock. Effluent drains well through broken shale in places and poses problem of contamination of well water.

Table 5. Page 4

Map Symbol and Soils	Depth ² (In.)	Dominant Texture	Permeability	Shrink-Swell Potential	Depth to and Kind of Bedrock	Min. Depth to Water-table During Wet Periods
2B1 Captina and Capshaw silt loam, 0-7	0-10	sil		Mod. to high	6-10' plus to variable bed-rock	3'
	10-14	sil-sicl				
	14-20	sicl				
	20-29	sic				
	29-53	sicl				
	53-83	loam				
2901 Carbo silty clay loam, 2-25	0-2	sicl	Moderate	Very high	2-5' over muddy massive and shaly limestones	15' plus
	2-7	sicl	Slow			
	7-9	sic	Slow			
	9-21	c				
	21-29	c				
13001 Carbo-Chilhowie very rocky silty clay loams, 7-60	0-5	rocky sil & sicl	Moderate	Very High	0-2' over muddy and shaly massive limestones	12' plus
	5-14	rocky clay	Slow			

Table 5. (4) continued

Farm Ponds	Suitability for			Remarks
	Septic Tanks	Irrigation	Earthwork during Prolonged Wet Periods	
Good	Unfavorable	Fair	Poor	Perched water--table at 20-30" on fragipan in Captina soil.
Poor	Unfavorable	fair to Good	Very Poor	Sinks and rock outcrops are characteristic. Poor soil material for road subgrades.
Poor	Unfavorable	Poor	Very poor	Chilhowie soil occurs only in complexes with the Carbo soil. Very droughty.

Table 5. Page 5

Map Symbol and Soils	Depth ² (in.)	Dominant Texture	Permeability	Shrink-Swell Potential	Depth to and Kind of Bedrock	Min. Depth to Water-table during Wet Periods
105B1 Chester loam, 2-7	0-2 2-7 7-18 18-23 23-34	loam loam fi sacl loam loam (many mtl) loam (mtl) loamy (rock mtl)	Very rapid Rapid Moderate Moderate Moderate	Low to Mod.	4-15' plus over grano-diorite and dark-colored granite gneiss	1-5 plus
205C1 Chester-Brandywine loams, 7-15	Very similar to Chester and Brandywine soils. Both are mapped as one unit.			Very low to mod.	1-15' over dark colored granite gneiss and grandioirite	10-15 plus
85A1 Chewacla silt loam, 0-2	0-14 14-20 20-40 40-44	sil sil sil-sicl sil & l (80-90% gravel)	Rapid Slow Slow Slow	Very low	3-10' to variable rock materials	1-1 1/2'

Table 5. (5) continued

	Suitability for			Remarks
	Septic Tanks	Irrigation	Earthwork during Prolonged Wet Periods	
Good to Fair	Favorable	Good	Good	Occurs on narrow to moderately wide ridge tops. Few sites are favorable for farm ponds.
Good to Fair	Favorable	Good to Fair	Good	This complex is more variable in its suitability than either of the two soils. Some areas of Brandywine are questionable for septic tank because of shallowness.
Good	Unfavorable	Fair	Poor	Inextensive. Occurs in small areas and is subject to frequent flooding.

Table 5. Page 6

Map Symbol and Soils	Depth ² (In.)	Dominant Texture	Permeability	Shrink-Swell Potential	Depth to and Kind of Bedrock	Min. Depth to Water-table During Wet Periods
77A1 Congaree fine sandy loam, 0-2	0-12 12-21 21-58 58-78	fisal lfisal lfisa sal	Very rap. Very rap. Very rap. Very rap.	Very low	5-12' to variable rock materials	2 1/2-4'
35C1 Dandridge silt loam, 7-15	0-2 2-5 5-10 10-17	sil sil sil (70-90% mtL) Dk cal shale	Very rap. Very rap. Rapid Slow	Very low	1/2-3' over calcareous shale	10 plus
112B1 ELk silt loam, 2-7	0-3 3-12 12-38 38-48 48-73	hsil-sicl sicl sicl sicl sac1	Rapid Moderate Moderate Moderate Rapid	Low	4-10' to variable rock materials	5-10'
17C1 Emory silt loam, 5-15	0-8 8-20 20-38 38-62 62-88	sil sil lsicl sic sicl	Very rap. Rapid Moderate Mod.-slow Moderate	Mod. low	5-15' over variable rock materials	3-6'

Table 5. (6) continued

		Suitability for			Remarks
Farm Ponds	Septic Tanks	Irrigation	Earthwork during Prolonged Wet Periods		
Fair	Unfavorable	Good (usually not needed)	Very good	Unfavorable for septic tanks because of flooding.	
Good	Unfavorable	Poor	Very good	Shallow over bedrock.	
Fair	Favorable	Good	Good	Soil may flood in extremely high water periods.	
Fair to Poor	Ques.	Good (seedom needed)	Fair to Good	Percolation rate good in dry seasons but seepage may be a problem in wet seasons. Sinks are common.	

Table 5. Page 7

Map Symbol and Scils	Depth ² (in.)	Dominant Texture	Permeability	Shrink-Swell Potential	Depth to and Kind of Bedrock	Min. Depth to Water-table During Wet Periods
13B1 Etowah silt loam 2-7	0-9 9-13 13-26 26-42 42-84 84-96	sil sicl sicl sic sic sicl	Rapid Moderate Slow Slow	Mod.	6-15' over variable rock materials	4-10' plus
26B1 Frederick cherty 2-7	0-7 7-14 14-22 22-74 74-86	chsil sicl c or sic c c	Rapid Moderate Slow Slow Slow	High	4-15' plus to cherty dolomitic Limestone	20' plus
25B1 Frederick silt loam, porous substratum, 2-7	0-2 2-7 7-12 12-25 25-50 50-66 66-94	sil sil sil sic c c c	Rapid Moderate Moderate Slow Slow Slow Moderate	High	10-25' plus over limestone and shale breccia	20 plus
28C1 Frederick-Lodi very rocky silt loams, 2-7	Very similar to Frederick and Lodi except for rock ledges			High	0-15' over dolomitic limestone and sandstone	15 plus

Table 5. (7) continued

Farm Ponds	Suitability for			Remarks
	Septic Tanks	Irrigation	Earthwork During Prolonged Wet periods	
Good	Ques. to Fav.	Good	Fair to Poor	The redder heavier textured soils in this unit probably will not percolate at a rate of 1 ^w per hour. Two out of 3 holes tested passed percolation rates.
Fair to Poor	Unfavorable	Good	Fair	Percolation rates are very low on this soil except near fault zones. Many septic tanks have failed in short periods. Crevices in underlying rock cause water to leak out of many ponds.
Poor	Favorable	Good	Fair to Good	Absorption systems should be dug to 36" or more for best percolation.
Poor	Unfavorable	Fair	Poor	Small areas among rocks may be suitable for home sites.

Table 5. Page 8

Map Symbol and Soils	Depth ² (In.)	Dominant Texture	Permeability	Shrink-Swell Potential	Depth to and Kind of Bedrock	Min. Depth to Water-table During Wet Periods
18B1 Greendale silt loam, gently sloping, 2-7	0-1 1-7 7-23 23-34 34-37 37-47 47-64 64-82	sil sil sil sicl sicl c c c	Very rap. Very rap. Rapid Moderate Moderate Mod.slow Slow Slow	Low to Mod.	6-10' plus variable rock materials, mostly breccia, limestone and shale	4-10' plus
24B1 Groseclose silt loam, porous substratum, 2-7	0-1 1-7 7-11 11-25 25-32 32-88	sil sil sic & sicl c sicl-sic sil soil material	Rapid Moderate Slow Slow Moderate Rapid	High	10-25' plus over limestone and shale breccia	20 plus
9 Gullied land	variable	variable	Mod.-slow	High-Low	Variable to variable materials	8' plus
22B1 Hagerstown silt loam, 2-7	0-8 8-24 24-50 50-70	sil c c c	Rapid Moderate Moderate Moderate	Mod.	3-10' over limestone and limestone and shale breccia	10' plus

Table 5. (8) continued

Suitability for				Remarks
Farm Ponds	Septic Tanks	Irrigation	Earthwork During Prolonged Wet Periods	
Poor over breccia rock <u>Good</u> over shale	Unfavorable to Ques.	Fair (usually not needed)	Fair	Soil occurs in depressions and along foot slopes and is subject to seepage during wet periods. Will percolate rapidly during dry seasons.
Poor	Favorable	Good	Fair to Good	Contamination of well water may occur in thickly populated areas.
Poor	Unfavorable	Poor	Fair to Poor	Inextensive. Mostly soil material with little true soils.
Poor	Ques.	Good	Fair to Poor	Many sinks characteristic; swelling may prevent rapid percolation; percolation rates variable.

Table 5. Page 9

Map Symbol and Soils	Depth ² (In.)	Dominant Texture	Permeability	Shrink-Swell Potential	Depth to and Kind of Bedrock	Min. Depth to Water-table During Wet Periods
117D1 Hagerstown-Pisgah very rocky silt loams, 7-25	very variable soils between rocky ledges		Mod.- Very slow	Mod. to High	0-5' plus	10-20 plus
103B1 Hayesville fine sandy loam, light surface variant, 2-7	l cl cl cl sl - coarse sl		Very rap. Moderate Moderate Moderate Rapid - slow	Low	4-15' over granodiorite and granite gneiss	20' plus
74B1 Hiwassee fine sandy loam, light surface variant, 2-7	fsl fsl h l fsl c c		Very rap. Rapid Rapid Moderate Mod.-slow Mod.-slow	Mod.	8-30' to variable kinds of rock	8-12' plus
3B1 Holston loam, 2-7	l l l scl scl c		Very rap. Rapid Moderate Mod.-slow Slow Very slow	Mod. to Low	5-10' plus to sandstone and shale rock material	2-3'

Table 5. (9) continued

	Suitability for			Remarks
	Farm Ponds	Septic Tanks	Irrigation	
Very Poor	Very Poor	Poor	Poor	Soils usually finer textured than in non-rocky areas; sinks are characteristic.
Good	Favorable	Good	Good	Should dig through B horizon for best percolation for septic tank disposal systems.
Good	Good	Good	Fair	The sandier areas of this soil are favorable for septic tank disposal systems.
Good	Unfavorable	Fair	Fair to Poor	Inextensive; usually has perched water after wet periods.

Table 5. Page 10

Map Symbol and Soils	Depth ² (In.)	Dominant Texture	Permeability	Shrink-Swell Potential	Depth to and Kind of Bedrock	Min. Depth to Water-table During Wet Periods
131A1 Huntington loam, 0-2	0-2 2-30 30-56	sil sil-sicl lfsacl	Rapid Moderate Rapid	Low	4-10' to variable rock materials	2 1/2-4'
108A1 Huntington loam, calcareous, 0-2	0-8 8-22 22-37 37-55	1 sil sil sil (many lime conc) marl mtl.	Very rap. Very rap. Very rap. Rapid	Low	4-10' to variable rocks-mostly marl rock	3-6' plus
5A1 Huntington silt loam, 0-2	0-21 21-32 32-72 72-105	fsl fsl l l	Very rap. Very rap. Rapid Rapid	Low	4-10' to variable rock materials	3-6' plus
115B1 Jefferson stony fine sandy loam, 2-7	0-3 3-8 8-13 13-31 31-41 41-55 55-65	fsl fsl fsc1 fsc1 fsc1 fsc1 weathered shale and sic1 mtl.	Very rap. Very rap. Rapid Moderate Moderate Moderate Very slow	Low	3-20' to variable rock, mostly acid shales	8-20' plus

Table 5. (10) continued

Farm Ponds	Suitability for			Remarks
	Septic Tanks	Irrigation	Earthwork During Prolonged Wet Periods	
Poor	Unfavorable	Fair (usually not needed)	Good	Subject to flooding.
Poor	Unfavorable	Good	Good	Subject to flooding.
Poor	Unfavorable	Good	Good	Subject to flooding.
Fair to Good	Ques.	Good	Good	Shallower areas over acid shale have slow percolation rates.

Table 5. Page 11

foot note — PROFILES DIVIDED INTO LAYERS SIGNIFICANT TO ENGINEERS

Map Symbol and Soils	Depth ² (In.)	Dominant Texture	Permeability	Shrink-Swell Potential	Depth to and Kind of Bedrock	Min. Depth to Water-table during Wet Periods
18B1 Landisburg silt lcam, 2-7	0-9 9-16 16-26 26-29 29-41 41-51 51-63	sil sil sic sic sicl sic c	Very rap. Moderate Moderate Mod.slow Slow Slow Slow	Low to Mod.	6-10' plus over variable rock materials, mostly breccia limestone and shale	3-10' plus (has perched water table on top of fragipan)
19A1 Leadvale silt lcam, 0-2	0-2 2-6 6-22 22-25 25-68	sil sil sic sic sic	Moderate Moderate Slow Very slow Very slow	Mod.	3-8' to variable bedrock, mostly shale and sandstone	2-6'
6A1 Lindside silt lcam, 0-2	0-8 8-16 16-24 24-50	sil sil sil sil-sicl	Very rap. Rapid Rapid Mod.rapid	Low	4-10' over variable rock materials	20"
38C1 Litz silt loam, 2-7	0-3 3-7 7-13	sil sil sil	Rapid Rapid Rapid-Mod.	Low	1-3' to shale rock materials (calcareous in fresh state)	15' plus

Table 5. (11) continued

Farm Ponds	Suitability for			Remarks
	Septic Tanks	Irrigation	Earthwork During Prolonged Wet Periods	
Poor over breccia rock Good over shale	Unfavorable	Fair (usually not needed)	Poor	Soil has perched water table because of fragipan. Clay underneath the pan is similar to that of Carbo soils.
Good	Unfavorable	Fair	Poor	Inextensive; usually occurs along foot slopes and depressions; fragipan in places.
Good	Unfavorable	Poor (not usually needed)	Poor	Subject to flooding.
Good to Fair	Ques.	Fair	Good	Soil is too shallow for septic tank drainage fields in many places and too steep for home sites in many places.

Table 5. Page 12

Map Symbol and Soils	Depth ² (In.)	Dominant Texture	Permeability	Shrink-Swell Potential	Depth to and Kind of Bedrock	Min. Depth to Water-table during Wet Periods
<p>→ 32B1 Lodi cherty loam, gently 7-15</p>	<p>0-8 8-12 12-20 20-45 45-53</p>	<p>chl sicl-cl c c c</p>	<p>Very rap. Mod.rapid Slow Slow Slow</p>	<p>High</p>	<p>5-15' over stratified dolomitic limestone and sandstone or siliceous limestone</p>	<p>15' plus</p>
<p>→ 31D1 Lodi loam, moderately 25-45</p> <p>31C1 Lodi Loam 7-25</p>	<p>0-7 7-10 10-20 20-46 46-60 60-96</p>	<p>l fsc1 cl-c c c c</p>	<p>Very rap. Moderate Moderate Mod.slow Mod.slow Moderate</p>	<p>High</p>	<p>4-10' plus stratified dolomitic limestone and Sandstone and /or siliceous dolomitic limestone</p>	<p>20' plus</p>
<p>→ 31B1 & 78B1 Lodi loam, porous substratum 2-7</p>	<p>0-2 2-8 8-13 13-19 19-41 41-52 52-106</p>	<p>l l sil-l sic c c sicl</p>	<p>Rapid Rapid Moderate Moderate Mod.slow Mod.slow Mod.-rapid</p>	<p>High</p>	<p>5-20' plus over limestone and shale breccia</p>	<p>10-20' plus</p>

Table 5. (L2) continued

Farm Ponds	Suitability For				Remarks
	Septic Tanks	Irrigation	Earthwork During Prolonged Wet Periods		
Fair to Poor	Ques.	Good	Fair to Poor		Tests show slow percolation except along fault zones and areas over breccia.
Poor to Fair	Ques.	Good	Poor to Fair		Many areas of this soil have percolation rates less than 1 st per hour and many septic tank systems have failed after short periods of time.
Poor	Favorable (below 4 feet)	Good	Fair		Septic tank disposal systems should go into C or B ₃ horizons usually below 48 inches.

Table 5. Page 13

Map Symbol and Soils	Depth ² (In.)	Dominant Texture	Permeability	Shrink-Swell Potential	Depth to and Kind of Bedrock	Min. Depth to Water-table During Wet Periods
113B1 Masada fine sandy loam, 2-7	0-2 2-9 9-15 15-22 22-37 37-88 88-109	fsl fsl fsl scl c scl lsacl	Very rap. Rapid Rapid Moderate Mod.-slow Moderate Rapid	Low to Mod.	5-25' plus over variable rock materials	3-10' plus
192C1 Meadowville loam, 2-15	0-14 14-30 30-45	l hl-fscl sac1-cl	Very rap. Mod.rapid Moderate	Low	3-10' over variable rock materials, mostly granite and schists	3-6'
7A1 Melvin silt loam, 0-2	0-1 1-10 10-16 16-28 28-32 32-42	sil sil sicl c sic-sicl sic (30-55% gravel)	Very rap. Rapid Moderate Slow Mod.slow Rapid	Mod. to High	5-12' over variable rock materials	1'
164A1 Mixed Alluvial land (acid) 0-2	Very variable in texture, depth and permeability			Very Low	2-10' over variable rock materials	1-4'

Table 5. (13) continued

Farm Ponds	Suitability for				Remarks
	Septic Tanks	Irrigation	Earthwork During Prolonged Wet Periods		
Good	Ques.	Good	Good to Fair		Moderately well drained in places.
Good	Ques.	Good	Fair		Subject to seepage water from surrounding slopes.
Good	Unfavorable	Poor	Very Poor		Subject to flooding.
Fair to Good	Poor	Poor	Poor to Good		Subject to flooding.

Table 5. Page 14

Map Symbol and Soils	Depth ² (In.)	Dominant Texture	Permeability	Shrink-Swell Potential	Depth to and Kind of Bedrock	Min. Depth to Water-table During Wet Periods
127A1 Mixed Alluvial land (slightly acid to basic) 0-2	Very variable in texture, depth and permeability			Very Low	2-10' over variable rock materials	1-4'
98B1 Monongahela silt loam, 0-7	0-8 8-18 18-32 32-38 38-48	silt silt-sicl sicl-cl mostly gravel with 1 soil material	Rapid Moderate Slow Mod.-slow Mod.-slow	Mod. to Low	3-10' over mostly acid shale rock	3'
42C1 Montevallo silt loam, 7-15	0-1 1-7 7-21	silt silt silt-sicl (mostly shale frag.)	Rapid Moderate Slow-Mod.	Low	1/2-2' over hard acid shale	10' plus
44E1 Muskingum fine sandy loam, 15-45	0-2 2-8 8-15 15-23	fsl fsl fsl fsl	Very rap. Rapid Rapid Rapid	Very Low	1-2-3/4' over acid sandstones (variable)	10' plus

Table 5. (14) continued

Farm Ponds	Suitability for			Remarks
	Septic Tanks	Irrigation	Earthwork During Prolonged Wet Periods	
Fair to Good	Poor	Poor	Poor to Good	Subject to flooding.
Good	Unfavorable	Poor to Fair	Poor	Inextensive and variable.
Good	Poor	Poor	Good	Shallowness of soil in most places restricts the use of septic tank disposal systems. Pond dam soil materials are limited.
Fair	Ques.	Fair	Good	Stony types vary from 0-3-1/2 over hard rock. Soil percolation is rapid but shallowness restricts septic tank installation in many places.

Table 5. Page 15

Map Symbol and Soils	Depth ² (In.)	Dominant Texture	Permeability	Shrink-Swell Potential	Depth to and Kind of Bedrock	Min. Depth to Water-table During Wet Periods
100C1 Muskingum very fine sandy loam, 7-15	0-1 1-9 9-17 17-28	vfs1 vfs1 sil-h1 sil-scl	Very rap. Rapid Rapid Rapid	Very Low	1-2-1/2' over stratified acid shale and fine grained sandstone	10' plus
6A1 Newark silt loam, 0-2 (Mapped only in complex with Lindside)	0-7 7-12 12-17 17-23 23-46	sil sil Hsil Hsil sil-sicl	Very rap. Rapid Rapid Mod.rapid Moderate	Low	4-9' over variable rock materials	1-1/2'
46E1 Pedlar very rocky silt loams, steep 2-60	0-7 7-14	sil-sicl sil-sicl	Very rap. Rapid	Low to Mod.	0-2-1/2' to limestone and shale breccia	20' plus
129E1 Pedlar-Carbo very rocky silt loams, 25-45	Very variable	Variable usually sil& sicl surface & sil-very plastic clay subsoil	Very rap. in surface Rapid to very slow in subsoil	Mod. to Very High	0-6' to limestone and shale breccia	20' plus

Table 5. (15) continued

Farm Ponds	Suitability for			Remarks
	Septic Tanks	Irrigation	Earthwork During Prolonged Wet Periods	
Fair	Ques.	Poor	Good	Most areas are unfavorable due to shallowness and steep slopes.
Good	Unfavorable	Poor	Poor	Subject to flooding.
Poor	Unfavorable	Poor	Fair to Good	Shallowness, steep and very steep slopes restrict engineering uses.
Poor	Unfavorable	Poor to Fair	Poor to Fair	Variable.

Table 5. Page 16

Map Symbol and Soils	Depth ² (In.)	Dominant Texture	Permeability	Shrink-Swell Potential	Depth to and Kind of Bedrock	Min. Depth to Water-table During Wet Periods
89D1 Ramsey silt loam moderately deep, 15-25	0-1 1-6 6-13 13-34	sil sil sil sil (90% rock)	Very rap. Rapid Rapid-Mod. Slow	Low to very Low	1-3-1 1/2 ^o over hard acid shale rock materials	10 plus
240E1 Ramsey silt loam, 25-45	0-1 1-6 6-16	sil sil sil	Very rap. Rapid Slow	Low	1/2-1 1/2 ^o over hard acid phyllic materials, very variable	10 plus
123E1 Ramsey stony loam, 25-45	0-2 2-7 7-18	l l l	Very rap. Rapid Rapid	Very Low	0-2 1/2 ^o to quartzite and sandstone	10 plus
132A1 Robertsville loam, 0-2	0-9 9-37 37-48 48-51 51-66	sic l c c c	Moderate Slow Slow Slow Slow	Very High	4-10 ^o over variable rock materials	1 ^o
Rock outcrop, 2-45	90-100% outcrop of sandstone and Lime-stone	rock of sandstone and Lime-stone	Very slow	None	0-1 ^o to sandstone, quartzite and limestone	20 ^o plus

16. Water table - The upper limit of that part of the soil or underlying material wholly saturated with water.
17. Breccia - Cementation of pebbles or fragments that are not rounded.
18. Conglomerate - Rounded pebbles of quartz or other rocks cemented together with similar materials as sandstone (many kinds).
19. Shale - Hardened beds of mud or clay. Some limestones are formed in part from muds high in lime or calcite. Many shales contain calcite.
20. Limestone - Rock consisting chiefly of calcium carbonate and yielding lime when burned.
21. Dolomitic Limestone - Rock consisting chiefly of calcium carbonate and also magnesium carbonate.
22. Sandstone - Quartz cemented together by clay, iron oxide, calcite or silica.
23. Calcareous Rocks - Rocks that are largely composed of the minerals calcite and dolomite. Include the many limestones and marble.
24. Granite - Rocks which consist of quartz, orthoclase, feldspar, and one, two, or all three of the minerals mica, hornblende, and augite.
25. Parent Material - The slightly altered or unweathered material beneath the solum; similar to that from which the soil was formed.

GLOSSARY OF SOIL TERMS

1. Alluvial soils - Soils developed from recently deposited alluvium, so young that there has been little or no change in the soil material by processes of soil formation.
2. Alluvium - Sand, mud, and other sediments deposited on the land by streams.
3. Colluvium - Heterogeneous deposits of rock fragments and soil material accumulated at the base of comparatively steep slopes through the influence of gravity.
4. Cobbles - Rounded or partially rounded fragments of rock ranging from 3 to 10 inches in diameter.
5. Drainage, (soil) - Rapidity and extent of the removal of water from the soil in relation to additions of water.

Well drained - Water is removed from the soil readily, but not rapidly.

Moderately well drained - Water is removed from the soil somewhat slowly, so that the profile is wet for a small but significant part of the time.

Somewhat poorly drained - Water is removed from the soil slowly enough to keep it wet for significant periods but not all of the time.

Poorly drained - Water is removed from the soil so slowly that the soil remains wet for a large part of the time. The water table is commonly near or at the surface during a considerable part of the year.
6. Foot slopes - Sloping lands generally occurring at the base of higher elevations.
7. Plastic - Soil can be formed into many shapes without breaking apart.
8. Friable - Easily crumbled in the fingers.
9. Firm - Moderately hard to crumble in the fingers.
10. Hardpan - A general term used to denote very compact horizons rich in silt, sand or both, and usually relatively low in clay. When dry, the compact material appears to be indurated, but the apparent induration disappears upon moistening. In Fairfax County a more accurate technical term for these layers is "fragipan" or "brittle pan".
11. Mottling - A variation of colors in soils. Generally, described as to abundance, size and contrast.
12. pH - A notation used to indicate acidity or alkalinity, as in soils.
13. Quartz - A common mineral composed of silica (SiO_2), colorless to white.
14. Schist and Phyllite - A foliated crystalline metamorphic rocks which has distinct cleavage.
15. Strata - Layers (geological) under the soil inherited from the parent material.

Footnotes for Table 5

Properties of the Soils Important to Engineering

¹Representative profile of each soil series; for series subject to erosion, the second layer of the described profile is generally the surface layer of the severely eroded phase.

²Profiles are divided into layers significant to engineers.

³Amount and kind of clay are the chief determinants.

Table 5. (19) continued

Farm Ponds	Suitability for			Remarks
	Septic Tanks	Irrigation	Earthwork During Prolonged Wet Periods	
Good	Unfavorable	Very Poor (not needed)	Very Poor	Subject to frequent flooding.
Good	Favorable	Good	Good	Soil occupies ridge tops where few pond sites are available.
Good	Ques.	Fair	Good	Inextensive; usually too steep for septic tank disposal systems.
Fair	Favorable	Good	Good to Fair	Transitional areas adjacent to Altavista have predominantly slower percolation rates.

Table 5. Page 19

Map Symbol and Scils	Depth ² (In.)	Dominant Texture	Permeability	Shrink-Swell Potential	Depth to and Kind of Bedrock	Min. Depth to Water-table During Wet Periods
86A1 Wehadkee silt loam, 0-2	0-9 9-20 20-38 38-53	sil sil lt. silcl sl (many gravel)	Rapid Mod.rap. Moderate Rapid	Low	4-10' over variable rock materials	1'
118B1 Wellston loam, 7-15	0-1 1-7 7-10 10-20 20-23 23-52	l l sil silcl sac1 sac1	Very rap. Rapid Rapid Moderate Moderate Rapid	Low to Mod.	2-6' over acid sandstone and shales interbedded	10' plus
33E1 Westmoreland silt loam, 25-45	0-2 2-8 8-12 12-24 24-36	sil sil hsil hsil sil (many shale frag.)	Rapid Rapid Rapid Moderate Rapid	Low	1 1/2-3 1/2' over limestone and shale interbedded	10' plus
84B1 Wickham loam, 2-7	0-10 10-15 15-28 28-38 38-50 50-78	l l-fisac1 fisac1 fisac1 sal Isa	Very rap. Rapid Moderate Moderate Rapid Very rap.	Low	6-10' plus to variable bedrock	4-10' plus

Table 5. Page 18 continued

Farm Ponds	Suitability for			Remarks
	Septic Tanks	Irrigation	Earthwork During Prolonged Wet Periods	
Good	Unfavorable	Poor	Very Poor	Low lying soil on low stream terrace alluvium.
Good	Ques.	Fair to Poor	Good	Steep slopes and shallowness restricts the use of this soil for septic disposal systems in most places
Good	Ques.	Fair	Fair	Areas tested have moderate to rapid percolation rates because water ran into shattered shale rock. May be contamination problem.
Poor	Poor	Poor (usually not needed)	Fair to Good	Occurs on first bottoms but very little is subject to flooding because of deep drainageways that have cut into the loamy soil materials. Marl beds are common.

Table 5. Page 18

Map Symbol and Soils	Depth ² (In.)	Dominant Texture	Permeability	Shrink-Swell Potential	Depth to and Kind of Bedrock	Min. Depth to Water-table During Wet Periods
126A1 Taft silt loam, 0-15	0-9 9-14 14-33 33-39 39-60	sil sil hsicl cl sal	Rapid Rapid slow Moderate Rapid	Mod. to High	5-12' over variable rock materials	1- 1/2'
120E1 Teas silt loam, (mapped only in complex with Litz Teas) 25-60	0-3 3-7 7-14	sil sil sil	Very rap. Very rap. Moderate	Low	1-3' over purplish shale(shale is calcareous in fresh state)	10' plus
239B1 Ungers silt loams, 2-7	0-6 6-21 21-36	sil sicl sicl (50 -70% sha. frag.)	Rapid Moderate Moderate	Low	2-4' over reddish shale, shaly sandstone and siltstone.	10' plus
109A1 Weavers loam, 0-2	0-8 8-14 14-36 36-54	sil sil sil l	Very rap. Rapid Moderate Very rap.	Mod. to Low	6-18' over variable rock materials	2-5' plus

Table 5. (17) continued

Suitability for				Remarks
Farm Ponds	Septic Tanks	Irrigation	Earthwork During Prolonged Wet Periods	
Very Poor	Unfavorable	Very Poor	Very Poor	Variable.
Very Poor to Fair	Unfavorable	Very Poor	Mostly Rock-Fair	Very variable.
Poor	Unfavorable	Very Poor	Fair to Poor	Subject to seepage from surrounding slopes. Occurs in depressions mostly along intermittent drains.
Good	Unfavorable	Fair	Poor	Inextensive; occurs on foot slopes and depressions; subject to seepage from surrounding slopes.

Table 5. Page 17

Map Symbol and Soils	Depth ² (in.)	Dominant Texture	Permeability	Shrink-Swell Potential	Depth to and Kind of Bedrock	Min. Depth to Water-table During Wet Periods
40CDEF Rockland (limestone) 7-60	Variable	Mostly 40-90% rock outcrops of limestone mixed with little soil	Very slow-medium	None to Very high	0-3' or 4' various limestones	20' plus
52CDEF Rockland (sandstone and quartzite) 15-60	Mostly 40-90% rock outcrops of sandstone and quartzite with little sandy and silty soils.		Very slow to rapid	Very Low	0-1 1/2' to sandstone & quartzite rock	20' plus
55CD Stony colluvium 7-25	Variable	Mostly loose sandstone & quartzite stones & boulders with little soil materials	Very rapid to very slow	Very Low	0-10' to variable rock materials	5-10' plus
134C1 Swaim silty clay loam, 2-15	0-6 6-10 10-18 18-36 36-44 44-50	sic1 sic1 c c sic mostly shale	Moderate Moderate Slow Slow Mod. slow Moderate	High	4-8' over variable rock materials, mostly massive limestones	3-6' plus

Table 5. (16) continued

Farm Ponds	Suitability for			Remarks
	Septic Tanks	Irrigation	Earthwork During Prolonged Wet Periods	
Good	Unfavorable	Poor	Fair to Good	May be favorable for septic tank disposal systems on smoother slopes where shale is deeply weathered.
Good	Unfavorable	Poor	Good	Very shallow in many places.
Good to Fair	Unfavorable	Poor	Good	Too shallow and steep for septic tank disposal systems in most places.
Good	Unfavorable	Poor	Very Poor	Poorly drained and water stands for long periods on surface in places after rains.
Very Poor	Unfavorable	Very Poor	Poor Mostly rock	Variable.