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Supplemental Data for Soil Surveys of James City, York, and New Kent Counties and Camp Peary and Fort Eustis, Virginia

R. L. Hodges and W. J. Edmonds

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The Virginia Agricultural and Mechanical College came into being in 1872 upon acceptance by the Commonwealth of the provisions of the Morrill Act of 1862 "to promote the liberal and practical education of the industrial classes in the several pursuits and professions of life." Research and investigations were first authorized at Virginia's land-grant college when the Virginia Agricultural Experiment Station was established by the Virginia General Assembly in 1886.

The Virginia Agricultural Experiment Station received its first allotment upon passage of the Hatch Act by the United States Congress in 1887. Other related Acts followed, and all were consolidated in 1955 under the Amended Hatch Act which states "It shall be the object and duty of the State agricultural experiment stations . . . to conduct original and other researches, investigations and experiments bearing directly on and contributing to the establishment and maintenance of a permanent and effective agricultural industry of the United States, including the researches basic to the problems of agriculture and its broadest aspects and such investigations as have for their purpose the development and improvement of the rural home and rural life and the maximum contributions by agriculture to the welfare of the consumer . . ."

In 1962, Congress passed the McIntire-Stennis Cooperative Forestry Research Act to encourage and assist the states in carrying on a program of forestry research, including reforestation, land management, watershed management, rangeland management, wildlife habitat improvement, outdoor recreation, harvesting and marketing of forest products, and "such other studies as may be necessary to obtain the fullest and most effective use of forest resources."

In 1966, the Virginia General Assembly "established within the Virginia Polytechnic Institute a division to be known as the Research Division . . . which shall encompass the now existing Virginia Agricultural Experiment Station . . ."

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JAMES CITY, YORK, AND NEW KENT COUNTIES
AND CAMP PEARY AND FORT EUSTIS, VIRGINIA**

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Cover - Replicas of the ships, Godspeed, Susan B. Constant, and Discovery, that brought the first English settlers to Jamestown in 1607. The soils on Jamestown Island played an important part in the survival of the colony.

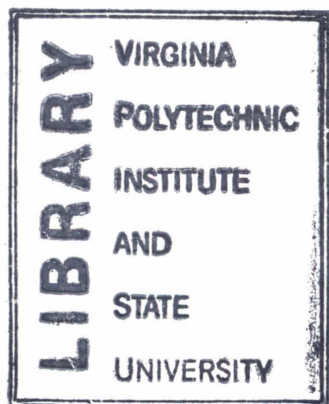


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INTRODUCTION

Soil surveys for James City and York Counties were completed in June 1980 and for New Kent County in 1985. The soil surveys for Camp Peary and Fort Eustis were completed in 1981 and 1984, respectively. These surveys were conducted by the Agronomy Department of Virginia Polytechnic Institute and State University, Research Division, in cooperation with the Soil Conservation Service of the United States Department of Agriculture, the Colonial Soil and Water Conservation District, the respective boards of supervisors of the above counties, and the commands of the above military installations.

These surveys were made to determine the kinds of soils within these survey areas and to determine potential uses of the soils. Soil scientists observed steepness, length, and shape of slopes; size of streams and general pattern of drainage; kinds of native plants or crops; and kinds of sediments and rocks. They dug many pits to describe and sample soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. It extends from the surface down into the parent material or unconsolidated sediments which have been changed little by plant roots.

Soil maps are produced when soil scientists draw boundaries on aerial photographs of the kinds of soils observed in the survey area. These photographs show trees, buildings, fields, roads, and other natural and cultural features that were used to locate soil boundaries. Map units are collections of delineations of natural landscape units of soils identified by the same symbol on soil maps. Most map units represent natural landscape units composed of one kind of soil or of soils with similar properties and responses to use and management. Other map units represent natural landscape units composed of two or more kinds of dissimilar soils.

Since the above published soil surveys do not include the actual laboratory data used to characterize, classify, and interpret the soils within the map units, this supplemental report presents these data. In addition, these published soil survey reports cannot present all possible interpretations for uses of the soils within these survey areas because uses of the soils are possible that are not currently known to the authors. Therefore, data included in this publication can be used by professional agricultural workers and engineers to make interpretations for these soils that are not included in the published soil survey reports.

History and Development

James City County, named for James I of England, was one of the eight original shires into which Virginia was divided. It can rightly be called the birthplace

of Virginia and of the United States because it was in this area in 1607 that the first English settlement in America was established.

From 1607 to 1698, Jamestown was the colonial capital of Virginia and one of the most important centers of trade and government in the colonies. In 1633, a second settlement was made several miles to the north at the middle plantation, which was on high ground and had better drainage, good water, and less danger from disease. When the State House in Jamestown burned in 1698, the capital of Virginia was moved to Middle Plantation. In 1699, Middle Plantation was renamed the City of Williamsburg in honor of King William III, and in 1779 the capital was moved to Richmond. Williamsburg is the county seat of James City County.

York County was also one of the eight original shires into which Virginia was divided. It was originally named Charles River County and was renamed York in 1643, either after Charles Duke of York who became Charles I, or in honor of James who became Duke of York and later James II. The county was settled at an early date, and by 1691 the Town of York was established. Yorktown has always been the county seat.

It was at Yorktown in 1781 that Cornwallis surrendered his British army to the allied American and French forces, bringing the Revolutionary War to an end. In 1862, York County was involved in the famous Peninsula campaign of the Civil War. In 1917 and 1918, during World War I, the York River was the base of the Atlantic Fleet of the U.S. Navy. During World War II, several important military installations were established or enlarged. These installations included the U.S. Coast Guard Officers School, the Naval Weapons Station, and Camp Peary northwest of Yorktown, near Williamsburg.

From 1779 to 1927, the growth of the population and the economy in the Peninsula outside Richmond and the greater Hampton Roads trade centers remained static or declined.

In 1927, the restoration of Williamsburg was begun by John D. Rockefeller, Jr. The old colonial capital has been restored and serves as one of the major tourist attractions on the east coast. Jamestown Island has been restored by the National Parkway Service, and a unique parkway now connects Jamestown, Williamsburg, and Yorktown in a historic triangle. In recent years, this triangle and its associated tourist industries have been highly important to the local economy.

Since World War II, the great ocean terminals of Hampton Roads have markedly expanded northward. The economy depends heavily upon shipping, defense industries, military bases, and research centers. As Newport News and Hampton expanded up the Peninsula, James City County and the City of Williamsburg became very desirable residential locations. The completion of the interstate highway has made commuting a reasonable alternative to living in the more metropolitan areas and has led to increased residential development within the county.

New Kent County was formed from York County in 1654 and was probably named for the English County of Kent. The county seat is located at New Kent. Saint Peter's Church, which is still standing today, was built in 1703 and claims Martha Custis Washington as one of its parishioners.

New Kent County had a variety of roles in many of the wars and rebellions. Men of the county were numerous in the army of Bacon's Rebellion in 1677, and also played an important role in the Tobacco Riots of 1682.

During the American Revolution, both Benedict Arnold and Lord Cornwallis led their troops through the area.

In 1862 Martha Washington's home the White House, was burned by Union soldiers. Also the area was in the line of march during McClelland's Peninsula Campaign.

Because many of the historical events that have influenced the governments of Virginia and the United States took place in these survey areas, we have attempted to relate soils to history in the captions of photographs.

Materials and Methods

The data for typical and supplemental soil profiles within the map units are presented in the following order:

Morphological Descriptions

The morphology of each soil profile was described according to National Cooperative Soil Survey standards specified by the *Soil Survey Manual* (Soil Survey Staff, 1951), *Soil Taxonomy* (Soil Survey Staff, 1975), and the *National Soils Handbook* (USDA, 1983)

Laboratory Procedures

The laboratory data for the profiles described and sampled are presented in the following Tables:

- A - Particle-size Distribution
- B - Chemical Properties
- C - Chemical Properties
- D - Clay Mineralogy
- E - Sand Mineralogy
- F - Chemical Properties
- G - Chemical and Physical Properties

Table A - Particle-size Distribution

Table A gives the g kg^{-1} of soil for:

1. Very coarse sand (2.0 - 1.0 mm)
2. Coarse sand (1.0 - 0.5 mm)
3. Medium sand (0.5 - 0.25 mm)
4. Fine sand (0.25 - 0.1 mm)
5. Very fine sand (0.1 - 0.05 mm)
6. Total sand (2.0 - 0.05 mm)
7. Silt (0.05 - 0.002 mm)
8. Clay (< 0.002 mm)

These particle sizes were determined by the hydrometer method of Bouyoucos (1962) or the pipette method of Day (1965).

Table B - Chemical Properties

Table B gives:

1. NH_4OAc , pH 7.0, extractable bases of Ca^{2+} , Mg^{2+} , and K^+ in cmol (+) kg^{-1} of soil
2. Exchange acidity, H^+ , in cmol (+) kg^{-1} of soil
3. Cation exchange capacity, CEC, by sum of Ca^{2+} , Mg^{2+} , K^+ , and H^+ in cmol (+) kg^{-1} of soil
4. Base saturation, BS, estimated by the sum of exchangeable bases of Ca^{2+} , Mg^{2+} , and K^+ divided by the CEC time 100.

Exchangeable bases of Ca^{2+} , Mg^{2+} , and K^+ were determined by N NH_4OAc , pH 7.0, extraction with quantification by atomic absorption spectroscopy (SCS, 1972). Exchange acidity (H^+) was determined by the BaCl_2 -TEA, pH 8.2, method (SCS, 1972; Peech, 1965).

Table C - Chemical Properties

Table C gives:

1. Organic matter content in g kg^{-1} of soil
2. pH in $-\log [\text{H}^+]$
3. N KCl extractable Al^{3+} in cmol (+) kg^{-1} of soil
4. Effective cation-exchange capacity, ECEC, by sum of exchangeable bases of Ca^{2+} , Mg^{2+} , and K^+ and KCl extractable Al^{3+} in cmol (+) kg^{-1} of soil
5. Effective base saturation, EBS, was estimated by exchangeable bases of Ca^{2+} , Mg^{2+} , and K^+ divided by ECEC times 100.

Organic matter content was determined by the acid-dichromate digestion method of Allison (1965). Soil reaction was determined for 1-to-1 soil-to-water suspension using a glass electrode. Exchangeable Al^{3+} was determined by the method of McLean (1965).

Table D - Clay Mineralogy

Table D gives minerals present in the clay fractions.

Semiquantitative determinations of the amount of gibbsite and kaolinite in clay fractions were made by integrating areas under respective differential scanning calorimeter endothermic peaks at approximately 280°C and 520°C and comparing with endothermic peaks of Reynolds synthetic gibbsite RH-31F and poorly crystalline Georgia kaolinite obtained from the University of Missouri clay mineral repository. Estimates of other clay minerals were made by proportioning integrated peak areas of appropriate x-ray diffractograms, using kaolinite as an internal standard, and assuming minerals detected were equal to 100.

Table E - Sand Mineralogy

Table E gives minerals present in the sand fractions.

Samples for mineralogical analysis were pretreated with H_2O_2 and NaOAc adjusted to pH 5.0 followed by citrate-dithionite-bicarbonate to remove organic matter and oxide coatings.

Each sample was fractionated into sand, silt, and clay. The sand-size fraction was separated by sieving. Clay was separated from silt by centrifugation and decantation using dilute NaHCO_3 adjusted to pH 9.5, as a dispersant (Tanner and Jackson, 1947; Jackson et al., 1950; Day, 1965; Jackson, 1979).

Grain mounts were prepared using that portion of the sand fraction that passed a 40-mesh sieve, i.e. the 0.05 mm to 0.40 mm fraction, which constituted the major portion of the total sand fraction and was assumed to be representative. Sand-size minerals were identified using a Ziess Universal M polarizing microscope. Grain counts were determined by the line-count method of Galehouse (1971) and reported as g kg^{-1} of soil.

Table F - Soil Test Data

Table F gives:

1. Ca^{2+} in ppm
2. Mg^{2+} in ppm
3. P in ppm
4. K^{+} in ppm
5. Zn in ppm
6. Mn in ppm

These properties were determined by the procedures used by the Soil Testing Laboratory, Agronomy Department, VPI&SU, Blacksburg, Virginia 24061-0404 (Donohue and McCoy, 1972).

Table G - Chemical and Physical Properties

Table G gives:

1. n-value
2. Mineral content
3. Organic carbon
4. Field moisture
5. 15-bar water
6. Percent sulfur
7. pH 1-to-2 soil-to-0.01 *N* CaCl_2
8. pH 1-to-1 soil-to-water

These properties were determined by the United States Department of Agriculture, Soil Conservation Service, National Soil Survey Laboratory, Lincoln, Nebraska, by the procedures given in USDA, SCS (1982).

Classification of the Soils

"When the fixed limits of soil taxa are superimposed on the fixed pattern of soils in nature, limits of taxonomic classes rarely, if ever, coincide precisely with mappable areas" (USDA, 1983, p. 602-603). Therefore, only the typical profiles are required to be members of the soil series used to name map units. Supplemental profiles may be members of other similar or dissimilar series.

This supplemental report is to be used in conjunction with the Soil Surveys of James City, York, and New Kent Counties and the military establishments of Camp Peary and Fort Eustis. Therefore, no interpretations for the map units or data are presented.

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Appendix A - Profile Descriptions and Data

Altavista Series

Soils of the Altavista series are very deep and moderately well drained. They formed in loamy fluvial sediments. They are on stream terraces. Slopes range from 0 to 2 percent.

Typical pedon of Altavista fine sandy loam, 0 to 2 percent slopes, about 1,800 feet south of junction of VA-636 and VA-273 and 100 feet northwest of VA-273 in New Kent County.

Ap--0 to 9 inches; brown (10YR 5/3) fine sandy loam; weak fine granular structure; friable, slightly sticky, nonplastic; few fine roots; common fine tubular pores; strongly acid; abrupt smooth boundary.

E--9 to 13 inches; light yellowish brown (10YR 6/4) fine sandy loam; weak fine granular structure; friable, slightly sticky, nonplastic; few fine roots; common fine tubular and few fine vesicular pores; few fine flakes of mica; moderately acid; clear smooth boundary.

Bt1--13 to 18 inches; yellowish brown (10YR 5/6) fine sandy loam; weak medium and fine subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; common fine and medium tubular pores; few faint clay films on faces of peds; few fine flakes of mica; moderately acid; clear smooth boundary.

Bt2--18 to 28 inches; yellowish brown (10YR 5/8) sandy clay loam; few fine distinct strong brown (7.5YR 5/8) mottles and few fine faint light brownish gray (10YR 6/2) mottles in the lower 4 inches; weak medium and fine subangular blocky structure; friable, sticky, plastic; few fine roots; common fine tubular pores; common distinct clay films on faces of peds; moderately acid; gradual smooth boundary.

Bt3--28 to 39 inches; mottled yellowish brown (10YR 5/6), light brownish gray (10YR 6/2), and strong brown (7.5YR 5/6) sandy clay loam; moderate medium subangular blocky structure; friable, sticky, plastic; few fine roots; common fine and medium tubular pores; common faint clay films on faces of peds; few fine flakes of mica; strongly acid; gradual smooth boundary.

BC--39 to 47 inches; mottled light brownish gray (10YR 6/2), yellowish brown (10YR 5/6), and strong brown (7.5YR 5/6) sandy clay loam; weak coarse subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; few fine tubular pores; common distinct clay films along vertical faces of some peds; few fine flakes of mica; very strongly acid; clear smooth boundary.

C--47 to 74 inches; streaked and mottled yellowish brown (10YR 5/6), strong brown (7.5YR 5/6), and pale brown (10YR 6/3) stratified fine sandy loam, loamy fine sand, and fine sand; massive; compact in place; friable, slightly sticky, nonplastic; few fine flakes of mica; very strongly acid.

Table A: Particle-size distribution* for Altavista fine sandy loam

| Depth | Sand | | | | | Total | Silt | Clay |
|---------------|----------------------------------|----|----|-----|-----|-------|------|------|
| | VC | C | M | F | VF | | | |
| <u>inches</u> | <u>g kg⁻¹ of soil</u> | | | | | | | |
| 0-9 | 0 | 14 | 81 | 435 | 205 | 735 | 205 | 60 |
| 9-13 | 1 | 8 | 60 | 355 | 196 | 620 | 295 | 85 |
| 13-18 | 1 | 7 | 45 | 309 | 206 | 568 | 304 | 128 |
| 18-28 | 1 | 5 | 37 | 312 | 197 | 552 | 239 | 219 |
| 28-39 | 0 | 2 | 21 | 341 | 223 | 587 | 131 | 282 |
| 39-47 | 0 | 3 | 53 | 437 | 209 | 702 | 93 | 205 |
| 47-74 | 1 | 3 | 85 | 565 | 190 | 844 | 36 | 120 |
| 74-84 | 9 | 1 | 21 | 393 | 148 | 572 | 177 | 253 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table B. Chemical properties for Altavista fine sandy loam

| Depth | Exchangeable cations | | | | CEC* | BS** |
|---------------|--|------------------|----------------|----------------|-------|----------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| <u>inches</u> | <u>cmol (+) kg⁻¹ soil</u> | | | | | <u>%</u> |
| 0-9 | 1.33 | 0.49 | 0.19 | 2.31 | 4.32 | 46.53 |
| 9-13 | 0.68 | 0.35 | 0.21 | 1.26 | 2.50 | 49.60 |
| 13-18 | 1.37 | 0.64 | 0.21 | 4.20 | 6.42 | 34.58 |
| 18-28 | 2.33 | 0.68 | 0.27 | 6.72 | 10.00 | 32.80 |
| 28-39 | 3.17 | 0.61 | 0.22 | 7.56 | 11.56 | 34.60 |
| 39-47 | 2.07 | 0.36 | 0.16 | 6.72 | 9.31 | 27.82 |
| 47-74 | 0.96 | 0.20 | 0.24 | 5.67 | 7.07 | 19.80 |
| 74-84 | 1.20 | 0.76 | 0.16 | 10.06 | 12.18 | 17.41 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.

**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for Altavista fine sandy loam

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|------|--|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 0-9 | --- | 5.45 | 0.10 | 2.11 | 95.26 |
| 9-13 | --- | 5.96 | 0.10 | 1.34 | 92.54 |
| 13-18 | --- | 6.00 | 0.05 | 2.27 | 97.80 |
| 18-28 | --- | 5.68 | 1.15 | 4.43 | 74.04 |
| 28-39 | --- | 5.13 | 1.95 | 5.95 | 67.23 |
| 39-47 | --- | 5.03 | 2.25 | 4.84 | 53.51 |
| 47-74 | --- | 5.08 | 1.75 | 3.15 | 44.44 |
| 74-84 | --- | 4.90 | 4.15 | 6.27 | 33.81 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.

**EBS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{ECEC}} \times 100$.

Table E: Sand mineralogy for Altavista fine sandy loam

| Depth | Quartz | Feldspar | Mica | Opaque Minerals* | Heavy Minerals* | Misc* |
|---------------|----------------------------------|----------|------|------------------|-----------------|-------|
| <u>inches</u> | <u>g kg⁻¹ of sand</u> | | | | | |
| 18-39 | 970 | 10 | Tr | 10 | ND | 10 |

*Opaque Minerals are ilmenite, magnetite, hematite, etc. Heavy Minerals are translucent zircon, tourmaline, rutile, epidote, hornblende, etc. Misc = rock fragments.

Altavista Series - Supplemental Profile 1

Pedon of Altavista fine sandy loam, about 1500 feet north of the junction of Highways VA-713 and VA-718, 300 feet west of the VA-173, 200 feet south of parking lot at Yorktown refinery's main entrance in York County.

A1--0 to 5 inches; dark gray (10YR 5/1) fine sandy loam; weak fine granular structure; very friable, nonsticky, nonplastic; many fine, medium and coarse roots; many fine and medium tubular pores; very strongly acid; clear smooth boundary.

E--5 to 13 inches; light olive brown (2.5Y 5/4) fine sandy loam; weak fine granular structure; very friable, nonsticky, nonplastic; few coarse and common fine and medium roots; common fine and medium tubular pores; very strongly acid; clear smooth boundary.

Bt1--13 to 19 inches; yellowish brown (10YR 5/4) fine sandy loam; weak fine and medium subangular blocky structure and weak medium granular structure; friable, slightly sticky, slightly plastic; common fine and medium roots; common fine and medium tubular pores; clay bridging between sand grains; few quartz gravel; very strongly acid; clear smooth boundary.

Bt2--19 to 26 inches; yellowish brown (10YR 5/6) sandy clay loam; few fine faint pale brown (10YR 6/3) mottles and few fine prominent strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; friable, sticky, plastic; few fine and medium roots; common fine and medium tubular pores; few faint clay films on faces of peds; few quartz gravel; few fine flakes of mica; very strongly acid; gradual smooth boundary.

Bt3--26 to 42 inches; mottled yellowish brown (10YR 5/6), strong brown (7.5YR 5/8), and light brownish gray (10YR 6/2) sandy clay loam; moderate medium subangular blocky structure; friable, sticky, plastic; few fine and medium roots; few fine pores; common distinct clay films on faces of peds; common concretions; few fine flakes of mica; very strongly acid; gradual smooth boundary.

Btg--42 to 53 inches; gray (5Y 6/1) sandy clay loam; many medium prominent yellowish brown (10YR 5/6) and strong brown (7.5YR 5/8) mottles; weak coarse subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; common fine pores; few faint clay films on faces of peds; few concretions; few fine flakes of mica; very strongly acid; gradual smooth boundary.

Cg--53 to 65 inches; gray (5Y 6/1) fine sandy loam; many coarse prominent yellowish brown (10YR 5/6) and strong brown (7.5YR 5/8) mottles; massive; friable, slightly sticky, slightly plastic; few fine roots; few fine and medium pores; few concretions; few fine flakes of mica; very strongly acid.

Table A: Particle-size distribution* for Altavista fine sandy loam

| Depth | Sand | | | | | Total | Silt | Clay |
|---------------|----------------------------------|----|----|-----|-----|-------|------|------|
| | VC | C | M | F | VF | | | |
| <u>inches</u> | <u>g kg⁻¹ of soil</u> | | | | | | | |
| 0-5 | 13 | 31 | 91 | 555 | 66 | 756 | 190 | 54 |
| 5-13 | 10 | 23 | 61 | 488 | 110 | 692 | 254 | 54 |
| 13-19 | 14 | 23 | 68 | 469 | 77 | 651 | 206 | 143 |
| 19-26 | 18 | 26 | 72 | 469 | 84 | 669 | 127 | 204 |
| 26-42 | 6 | 6 | 16 | 498 | 112 | 638 | 123 | 239 |
| 42-53 | 2 | 6 | 9 | 530 | 120 | 667 | 127 | 206 |
| 53-65 | 0 | 1 | 0 | 572 | 132 | 705 | 126 | 169 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table B. Chemical properties for Altavista fine sandy loam

| Depth | Exchangeable cations | | | | CEC* | BS** |
|---------------|--------------------------------------|------------------|----------------|----------------|-------|----------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| <u>inches</u> | <u>cmol (+) kg⁻¹ soil</u> | | | | | <u>%</u> |
| 63 | 2.96 | 1.42 | 0.20 | 7.81 | 12.39 | 36.97 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.

**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for Altavista fine sandy loam

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|------|--------------------------------------|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 63 | ND | 4.60 | 3.04 | 6.72 | 68.52 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.

**EBS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{ECEC}} \times 100$.

Table E: Sand mineralogy for Altavista fine sandy loam

| Depth | Quartz | Feldspar | Mica | Opaque Minerals* | Heavy Minerals* | Misc* |
|---------------|----------------------------------|----------|------|------------------|-----------------|-------|
| <u>inches</u> | <u>g kg⁻¹ of sand</u> | | | | | |
| 12-19 | 815 | 115 | 10 | 0 | 6 | 0 |

*Opaque Minerals are ilmenite, magnetite, hematite, etc. Heavy Minerals are translucent zircon, tourmaline, rutile, epidote, hornblende, etc. Misc = rock fragments.

Altavista Series - Supplemental Profile 2

Pedon of Altavista fine sandy loam, about 800 feet east of airstrip, 200 feet southwest of Rifle Road, Camp Peary, York County.

A1--0 to 5 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak medium granular structure; very friable, slightly sticky, nonplastic; many fine, medium, and coarse roots; common fine and medium tubular pores; very strongly acid; abrupt smooth boundary.

E--5 to 13 inches; light yellowish brown (10YR 6/4) fine sandy loam; weak fine granular structure; friable, slightly sticky, nonplastic; many fine, medium, and coarse roots; common fine and medium tubular pores; very strongly acid; clear smooth boundary.

Bt1--13 to 16 inches; yellowish brown (10YR 5/6) sandy clay loam; common medium faint light yellowish brown (10YR 6/4) mottles; weak medium subangular blocky structure; friable, sticky, plastic; common fine and medium roots; few fine tubular pores; few faint clay films on faces of peds; few fine flakes of mica; very strongly acid; clear smooth boundary.

Bt2--16 to 26 inches; yellowish brown (10YR 5/4) sandy clay loam; few fine faint pale brown (10YR 6/3) mottles; moderate medium subangular blocky structure; friable, sticky, plastic; common fine and medium roots; few faint clay films on faces of peds; few fine flakes of mica; very strongly acid; clear smooth boundary.

Bt3--26 to 38 inches; yellowish brown (10YR 5/4) sandy clay loam; moderate medium subangular blocky structure; friable, sticky, plastic; common fine and medium roots; few fine tubular pores; few faint clay films on faces of peds; few fine flakes of mica; very strongly acid; gradual smooth boundary.

Bt4--38 to 49 inches; mottled gray (5Y 6/1), yellowish brown (10YR 5/6), and strong brown (7.5YR 5/8) sandy clay loam; weak medium subangular blocky structure; friable, sticky, plastic; few fine and medium roots; few fine tubular pores; few faint clay films on faces of peds; few fine flakes of mica; very strongly acid; gradual smooth boundary.

Bg and Cg--49 to 72 inches; gray (5Y 6/1) stratified sandy clay loam and clay loam; common medium distinct yellowish brown (10YR 5/6) and strong brown (7.5YR 5/8) mottles; weak medium subangular blocky and massive structure; friable, sticky, plastic; few fine roots; few fine and medium tubular pores; few faint clay films on faces of peds; few fine flakes of mica; very strongly acid; gradual smooth boundary.

Cg--72 to 90 inches; light olive gray (5Y 6/2) fine sandy loam; common medium distinct yellowish brown mottles; massive; friable, slightly sticky, slightly plastic; few fine flakes of mica; very strongly acid.

Table A: Particle-size distribution* for Altavista fine sandy loam

| Depth | Sand | | | | | Total | Silt | Clay |
|---------------|----------------------------------|----|-----|-----|----|-------|------|------|
| | VC | C | M | F | VF | | | |
| <u>inches</u> | <u>g kg⁻¹ of soil</u> | | | | | | | |
| 13-33 | 11 | 52 | 252 | 268 | 44 | 627 | 171 | 202 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table B. Chemical properties for Altavista fine sandy loam

| Depth | Exchangeable cations | | | | CEC* | BS** |
|---------------|--------------------------------------|------------------|----------------|----------------|------|----------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| <u>inches</u> | <u>cmol (+) kg⁻¹ soil</u> | | | | | <u>%</u> |
| 63 | 0 | 0.23 | 0.15 | 7.40 | 7.78 | 4.88 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.

**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for Altavista fine sandy loam

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|------|--------------------------------------|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 63 | ND | 3.81 | 5.25 | 5.63 | 6.75 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.

**EBS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{ECEC}} \times 100$.

Table F. Chemical properties* for Altavista fine sandy loam

| Depth | OM | pH | Ca ²⁺ | Mg ²⁺ | P | K ⁺ | Zn | Mn |
|---------------|----------|----|------------------|------------------|---|----------------|-----|-----|
| <u>inches</u> | <u>%</u> | | <u>ppm</u> | | | | | |
| 0-5 | - | - | 17 | 10 | 3 | 28 | 1.2 | 9.7 |
| 5-13 | - | - | 34 | 6 | 4 | 8 | 0.6 | 1.8 |
| 13-16 | - | - | 34 | 24 | 3 | 19 | 0.5 | 0.7 |
| 16-26 | - | - | 34 | 50 | 2 | 19 | 0.6 | 0.6 |
| 26-38 | - | - | 34 | 108 | 2 | 23 | 0.5 | 0.5 |
| 38-49 | - | - | 34 | 96 | 2 | 41 | 0.6 | 0.3 |
| 49-62 | - | - | 34 | 64 | 2 | 54 | 0.5 | 0.4 |
| 62-70 | - | - | 34 | 38 | 2 | 41 | 0.6 | 0.3 |

*Soil Testing and Plant Analysis Laboratory, Agronomy Department, Va Tech, Blacksburg, VA 24061.

Augusta Series

Soils of the Augusta are deep and somewhat poorly drained. They formed in loamy fluvial sediments. Augusta soils are on low-lying stream terraces on the Coastal Plain. Slopes range from 0 to 2 percent.

Typical pedon of Augusta fine sandy loam, about 600 feet northeast of end of VA-657 and 400 feet south of Chisman Creek in York County.

Ap--0 to 11 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak fine granular structure; very friable, nonsticky, nonplastic; many fine and medium and few coarse roots; common medium and fine tubular pores; very strongly acid; abrupt smooth boundary.

E--11 to 17 inches; light yellowish brown (2.5Y 6/4) fine sandy loam; common fine faint yellowish brown (10YR 6/4) mottles and common fine distinct dark yellowish brown (10YR 4/4) mottles; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; common fine and medium roots; many medium and fine tubular pores; few krotovina up to 1/4 inch in diameter filled with Ap material: very strongly acid; clear smooth boundary.

Bt1--17 to 22 inches; mottled light olive brown (2.5Y 5/4), pale olive (5Y 6/3), and yellowish brown (10YR 5/4) sandy clay loam; weak coarse subangular blocky structure; friable, slightly sticky, slightly plastic; common fine and medium roots; many medium and fine tubular pores; few fine prominent dark yellowish brown (10YR 4/4) concretions; few fine flakes of mica; very strongly acid; clear smooth boundary.

Bt2--22 to 27 inches; grayish brown (10YR 5/2) loam; many medium distinct light olive brown (2.5Y 5/4) mottles; few fine faint yellowish brown (10YR 5/4) mottles, and common medium prominent olive (5Y 5/3) mottles on faces of peds; weak medium and coarse subangular blocky structure; friable, sticky, plastic; common fine and medium roots; common medium and fine tubular pores; few faint clay films on face of peds; few quartz gravel up to 1/4 inch in diameter; few fine flakes of mica; very strongly acid; gradual smooth boundary.

Bt3--27 to 41 inches; grayish brown (10YR 5/2) sandy clay loam; common medium prominent light olive brown (2.5Y 5/4) mottles and few fine faint yellowish brown (10YR 5/4) mottles; weak medium and coarse subangular blocky structure; friable, sticky, plastic; common fine and medium roots; common fine and medium tubular pores; common faint clay films on faces of peds; few quartz gravel up to 1/4 inch in diameter; common fine flakes of mica; very strongly acid; gradual smooth boundary.

Bt4--41 to 56 inches; gray (N 6/) sandy clay loam; common medium prominent yellowish brown (10YR 5/8), light olive brown (2.5Y 5/4), and strong brown (7.5YR 5/6) mottles; weak coarse and medium subangular blocky structure; friable, sticky, plastic; few fine roots; common fine and medium tubular pores; few faint clay films on faces of peds; common fine flakes of mica; very strongly acid; gradual smooth boundary.

C--56 to 70 inches; gray (5Y 6/1) sandy loam; common medium prominent yellowish brown (10YR 5/6) and strong brown (7.5YR 5/8) mottles; massive; friable; slightly sticky, nonplastic; few fine roots; common fine tubular pores; common fine flakes of mica; very strongly acid.

Table A: Particle-size distribution* for Augusta fine sandy loam

| Depth | Sand | | | | | Total | Silt | Clay |
|---------------|----------------------------------|----|-----|-----|----|-------|------|------|
| | VC | C | M | F | VF | | | |
| <u>inches</u> | <u>g kg⁻¹ of soil</u> | | | | | | | |
| 0-11 | 45 | 52 | 51 | 380 | 55 | 583 | 370 | 47 |
| 11-17 | 30 | 40 | 213 | 344 | 53 | 680 | 200 | 120 |
| 17-22 | 4 | 37 | 190 | 291 | 40 | 562 | 228 | 210 |
| 22-27 | 3 | 34 | 172 | 260 | 35 | 504 | 231 | 265 |
| 27-41 | 4 | 46 | 229 | 333 | 44 | 656 | 124 | 220 |
| 41-56 | 1 | 18 | 93 | 494 | 85 | 691 | 79 | 230 |
| 56-70 | 0 | 1 | 9 | 609 | 98 | 717 | 103 | 180 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table B. Chemical properties for Augusta fine sandy loam

| Depth | Exchangeable cations | | | | CEC* | BS** |
|---------------|--|------------------|----------------|----------------|-------|----------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| <u>inches</u> | <u>cmol (+) kg⁻¹ soil</u> | | | | | <u>%</u> |
| 68 | 2.58 | 1.33 | 0.14 | 7.00 | 11.05 | 36.65 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.

**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for Augusta fine sandy loam

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|------|--|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 68 | ND | 4.86 | 1.25 | 5.30 | 76.42 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.

**EBS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{ECEC}} \times 100$.

Augusta Series - Supplemental Profile 1

Typical pedon of Augusta fine sandy loam, 0 to 2 percent slopes, about 300 feet southwest of South York Baptist Church, York County.

Ap--0 to 6 inches; very dark grayish brown (10YR 3/2) fine sandy loam; weak fine granular structure; very friable, nonsticky, nonplastic; many fine medium and coarse roots; common fine tubular pores; very strongly acid; abrupt smooth boundary.

E--6 to 15 inches; light yellowish brown (2.5Y 6/4) fine sandy loam; weak fine granular structure; very friable, slightly sticky, slightly plastic; common fine, medium, and coarse roots; common fine and medium tubular pores; few gravel; very strongly acid; clear smooth boundary.

Bt--15 to 21 inches; olive (5Y 5/3) fine sandy loam; few fine prominent brownish yellow (10YR 6/8) and few fine distinct light olive brown (2.5Y 5/6) mottles; weak coarse subangular blocky structure; friable, slightly sticky, nonplastic; common fine, medium, and coarse roots; common fine tubular pores; few faint clay films on faces of ped; few gravel; very strongly acid; gradual smooth boundary.

Btg1--21 to 33 inches; olive gray (5Y 5/2) fine sandy loam; common medium distinct olive (2.5Y 5/4) mottles; weak coarse subangular blocky structure; friable, slightly sticky, slightly plastic; common fine and medium roots; common fine tubular pores; few faint clay films on faces of ped; few rock fragments 1/4 to 5 inches in diameter; few fine flakes of mica; very strongly acid; gradual smooth boundary.

Btg2--33 to 49 inches; gray (10YR 6/1) fine sandy loam; common coarse distinct yellowish brown (10YR 5/6) and common medium distinct olive (2.5Y 5/4) mottles; weak medium subangular blocky structure; friable, sticky, plastic; common fine and medium roots; common fine tubular pores; few faint clay films on faces of ped; 10 percent rock fragments 1/4 to 6 inches in diameter; few fine flakes of mica; very strongly acid; gradual smooth boundary.

Btg3--49 to 61 inches; mottled gray (10YR 6/1) and yellowish brown (10YR 5/6) sandy clay loam; weak coarse subangular blocky structure; friable, sticky, plastic; few fine roots; few fine tubular pores; few gravel and cobbles; few fine flakes of mica; very strongly acid; gradual smooth boundary.

C--61 to 70 inches; mottled yellowish brown (10YR 5/8) and gray (10YR 6/1) fine sandy loam; massive; friable, sticky, plastic; few fine roots; few fine tubular pores; few rock fragments 1/4 to 6 inches in diameter; few fine flakes of mica; very strongly acid.

Table A: Particle-size distribution* for Augusta fine sandy loam

| Depth | Sand | | | | | Total | Silt | Clay |
|--------|----------------------------|----|----|-----|----|-------|------|------|
| | VC | C | M | F | VF | | | |
| inches | g kg ⁻¹ of soil | | | | | | | |
| 0-6 | 2 | 13 | 5 | 568 | 68 | 656 | 284 | 60 |
| 6-15 | 3 | 12 | 4 | 579 | 66 | 664 | 231 | 105 |
| 15-21 | 5 | 10 | 4 | 550 | 61 | 630 | 225 | 145 |
| 21-33 | 6 | 12 | 47 | 568 | 61 | 694 | 156 | 150 |
| 33-49 | 3 | 10 | 44 | 535 | 59 | 651 | 164 | 185 |
| 49-61 | 2 | 7 | 23 | 603 | 62 | 697 | 103 | 200 |
| 61-70 | 2 | 4 | 9 | 633 | 69 | 717 | 113 | 170 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table B. Chemical properties for Augusta fine sandy loam

| Depth | Exchangeable cations | | | | CEC* | BS** |
|---------------|--------------------------------------|------------------|----------------|----------------|-------|----------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| <u>inches</u> | <u>cmol (+) kg⁻¹ soil</u> | | | | | <u>%</u> |
| 65 | 2.86 | 0.87 | 0.16 | 8.00 | 11.89 | 32.72 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.

**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for Augusta fine sandy loam

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|------|--------------------------------------|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 65 | ND | 4.19 | 3.35 | 7.24 | 53.73 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.

**EBS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{ECEC}} \times 100$.

Table F. Chemical properties* for Augusta fine sandy loam

| Depth | OM | pH | Ca ²⁺ | Mg ²⁺ | P | K ⁺ | Zn | Mn |
|---------------|----------|----|------------------|------------------|----|----------------|-----|-----|
| <u>inches</u> | <u>%</u> | | <u>ppm</u> | | | | | |
| 0-6 | - | - | 252 | 28 | 13 | 23 | 3.9 | 6.9 |
| 6-15 | - | - | 51 | 8 | 11 | 10 | 2.1 | 1.2 |
| 15-21 | - | - | 67 | 12 | 10 | 12 | 2.4 | 0.2 |
| 21-33 | - | - | 51 | 12 | 9 | 15 | 1.4 | 0.4 |
| 33-49 | - | - | 67 | 32 | 11 | 13 | 0.7 | 0.5 |
| 49-61 | - | - | 17 | 54 | 9 | 20 | 0.6 | 0.2 |
| 61-70 | - | - | 571 | 102 | 29 | 34 | 1.4 | 1.6 |

*Soil Testing and Plant Analysis Laboratory, Agronomy Department, Va Tech, Blacksburg, VA 24061.

Axis Series

Soils of the Axis series are deep and very poorly drained. They formed in thick, loamy fluvial and marine sediments. Axis soils are along creeks and rivers on tidal marshes that are inundated twice daily by saline or brackish water. Slopes are less than 1 percent.

Typical pedon of Axis very fine sandy loam, about 2,500 feet north of junction of VA-622 and VA-712, 300 feet northwest of VA-712, York County:

A1--0 to 14 inches; very dark grayish brown (10YR3/2) very fine sandy loam; massive; slightly sticky, slightly plastic; flows through fingers when squeezed and leaves residue in hand; many fine and medium roots; weak sulfur odor; moderately acid; clear smooth boundary.

Cg1--14 to 35 inches; gray (5Y5/1) very fine sandy loam; common medium distinct olive (5Y 5/4) mottles and few fine prominent dark yellowish brown (10YR 4/4) mottles; massive; slightly sticky, slightly plastic; moderate sulfur odor; moderately acid; gradual smooth boundary.

Cg2--35 to 50 inches; dark gray (5Y 4/1) fine sandy loam; common medium distinct olive (5Y 5/4) mottles; massive; slightly sticky, slightly plastic; moderate sulfur odor; mildly alkaline; gradual smooth boundary.

Cg3--50 to 70 inches; mottled gray (5Y 6/1) and light olive brown (2.5Y 6/1) fine sandy loam; massive; nonsticky, nonplastic; few fine flakes of mica; moderate sulfur odor; moderately alkaline.

Table A: Particle-size distribution for Axis very fine sandy loam

| Depth | Sand | | | | | | Silt | Clay |
|---------------|----------------------------------|----|----|-----|-----|-------|------|------|
| | VC | C | M | F | VF | Total | | |
| <u>inches</u> | <u>g kg⁻¹ of soil</u> | | | | | | | |
| 0-14 | 27 | 35 | 52 | 168 | 428 | 710 | 234 | 56 |
| 14-35 | 26 | 30 | 40 | 166 | 404 | 666 | 228 | 106 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061

Table G: Chemical and physical properties* for Axis very fine sandy loam

| Depth | n-value | Minerals Content | Organic Carbon | Field Moisture | 15 bar Water | Sulfur | pH1@ | pH2# | |
|---------------|---------|------------------|----------------|----------------|--------------|--------|------|------|--|
| <u>inches</u> | | <u>percent</u> | | | | | | | |
| 0-14 | 3.9 | 87 | 3.19 | 104.0 | 6.3 | 0.1 | 5.6 | 5.5 | |
| 14-35 | 0.4 | 98 | 0.46 | 23.1 | 5.4 | 0.1 | 5.6 | 5.5 | |

*By USDA, SCS, National Soil Survey Laboratory, Lincoln, NE. @1 - 1 Soil - water. #1 - 2 Soil - 0.01 N CaCl₂

Axis Series - Supplemental Profile 1

Pedon of Axis mucky loam, area 5 about 1000 feet from end of road to picnic area, 1500 feet southeast of mouth of Skimino Creek, Camp Peary, York County.

Oa1g--0 to 20 inches; dark olive gray (5Y 3/2) mucky loam; sapric materials; about 10 percent fiber rubbed; massive; sticky, nonplastic; squeezes easily between fingers; many fine and medium roots in upper 6 inches; weak sulfur odor; moderately acid; gradual smooth boundary;

Cg1--20 to 40 inches; dark olive gray (5Y 3/2) mucky loam; sapric material; about 15 percent fiber rubbed; massive; sticky, nonplastic; moderate sulfur odor; neutral; gradual smooth boundary.

Cg2--40 to 60 inches; gray (5Y 5/1) mucky loam; massive; sticky, plastic; squeezes easily between fingers; moderate sulfur odor; moderately alkaline.

Table A: Particle-size distribution for Axis mucky loam

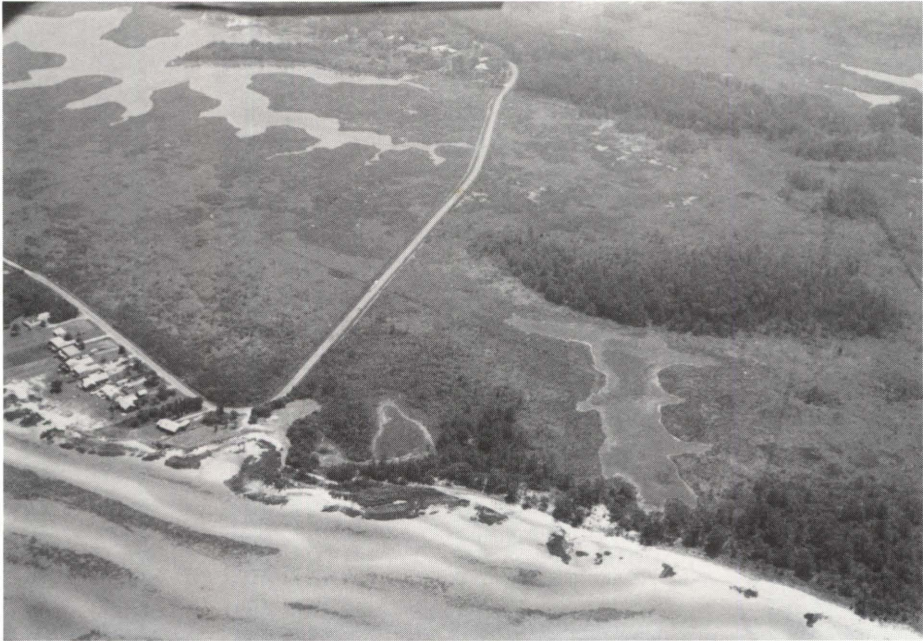
| Depth | Sand | | | | | Total | Silt | Clay |
|--------|----------------------------|----|-----|-----|----|-------|------|------|
| | VC | C | M | F | VF | | | |
| inches | g kg ⁻¹ of soil | | | | | | | |
| 0-20 | 8 | 21 | 84 | 293 | 77 | 483 | 459 | 58 |
| 20-40 | 7 | 17 | 104 | 289 | 6 | 423 | 294 | 283 |
| 40-60 | 3 | 19 | 173 | 576 | 23 | 794 | 111 | 95 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061

Figure 1: Axis soils on Goodwin Island in York County.



Figure 2: Axis soils on Bay Tree Point in York County. Buildings are on Dragston soils.



Bethera Series

Soils of the Bethera series are deep and poorly drained. They formed in clayey fluvial and marine sediments. Bethera soils are on upland flats and depressions in the Coastal Plain. Slopes range from 0 to 2 percent.

Typical pedon of Bethera silt loam, about 4200 feet southwest of intersection of VA-613 and VA-614, and 350 feet west of VA-613, James City County.

A1--0 to 3 inches; dark grayish brown (10YR 4/2) silt loam; moderate medium granular structure; friable, slightly sticky, slightly plastic; many fine roots; extremely acid; abrupt smooth boundary.

E--3 to 7 inches; light brownish gray (2.5Y 6/2) silt loam; few fine prominent yellowish brown (10YR 5/6) mottles; moderate medium and fine subangular blocky structure; friable, slightly sticky, slightly plastic; common fine and few coarse roots; many very fine tubular pores; very strongly acid; clear smooth boundary.

Btg1--7 to 12 inches; light gray (5Y 7/1) clay loam; many fine prominent strong brown (7.5YR 5/8) mottles; weak medium and fine subangular blocky structure; friable, slightly sticky, slightly plastic; few fine and few coarse roots; many very fine tubular pores; common distinct clay films on faces of peds and in pores; extremely acid; gradual smooth boundary.

Btg2--12 to 18 inches; gray (5Y 6/1) silty clay loam; many fine prominent yellowish brown (10YR 5/8) mottles; moderate medium subangular blocky structure; friable, sticky, plastic; few fine and few coarse roots; many very fine tubular pores; common distinct clay films on faces of peds and in pores; extremely acid; gradual smooth boundary.

Btg3--18 to 38 inches; gray (5Y 5/1) clay loam; few fine distinct brownish yellow (10YR 6/8) mottles; moderate medium subangular blocky structure; firm, sticky, plastic; few fine roots; few very fine tubular pores; common distinct clay films on faces of peds and in pores; few quartz gravel; extremely acid; clear smooth boundary.

Btg4--38 to 46 inches; gray (5Y 6/1) clay loam; few fine prominent brownish yellow (10YR 6/8) mottles and few medium distinct yellowish red (5YR 4/6) mottles; weak prismatic structure parting to moderate medium subangular blocky; firm, sticky, plastic; few fine roots; common very fine tubular pores; many prominent gray (10YR 5/1) clay films on faces of peds and in pores; common quartz gravel; extremely acid; clear wavy boundary.

Bt5g--46 to 65 inches; light gray (5Y 7/1) silty clay; common medium prominent strong brown (7.5YR 5/8) mottles; strong medium prismatic structure parting to strong medium and fine subangular blocky structure; very firm, sticky, plastic; few fine roots; common very fine tubular pores; many prominent gray (5Y 6/1) clay films on faces of peds and in pores; few quartz gravel; extremely acid.

Table A: Particle-size distribution* for Bethera silt loam

| Depth | Sand | | | | | Total | Silt | Clay |
|---------------|----------------------------------|----|----|----|----|-------|------|------|
| | VC | C | M | F | VF | | | |
| <u>inches</u> | <u>g kg⁻¹ of soil</u> | | | | | | | |
| 0-3 | 5 | 20 | 42 | 61 | 40 | 168 | 626 | 206 |
| 3-7 | 6 | 21 | 48 | 76 | 51 | 202 | 532 | 266 |
| 7-12 | 12 | 24 | 52 | 81 | 70 | 239 | 455 | 306 |
| 12-18 | 3 | 9 | 22 | 35 | 26 | 95 | 519 | 386 |
| 18-38 | 13 | 30 | 57 | 76 | 54 | 230 | 390 | 380 |
| 38-46 | 17 | 36 | 74 | 98 | 72 | 297 | 377 | 326 |
| 46-65 | 4 | 7 | 20 | 61 | 65 | 157 | 407 | 436 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table D: Clay mineralogy for Bethera silt loam

| Depth | HIV* | Mica | Kaolinite | Quartz | Mont* | Gibbsite | Misc* |
|---------------|----------------------------------|------|-----------|--------|-------|----------|-------|
| <u>inches</u> | <u>g kg⁻¹ of clay</u> | | | | | | |
| 12-18 | 500 | 20 | 350 | 130 | 0 | 0 | 0 |

*HIV = hydroxy interlayered vermiculite. Mont = montmorillonite. Misc = rock fragments.

Bethera Series - Supplemental Profile 1

Pedon of Bethera loam, 0 to 2 percent slopes, about 200 feet west of Gatehouse Road, Area 33, Camp Peary, York County.

Ap--0 to 9 inches; olive gray (5Y 5/2) loam; moderate medium granular structure; friable, slightly sticky, slightly plastic; many fine roots; common fine tubular pores; moderately acid; gradual smooth boundary.

E--9 to 16 inches; dark grayish brown (2.5Y 4/2) loam; moderate medium granular and weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; common fine roots; common fine tubular pores; few faint clay films on faces of peds; slightly acid; abrupt smooth boundary.

Btg1--16 to 20 inches; light brownish gray (2.5Y 6/2) clay loam; moderate fine subangular blocky structure; friable, sticky, plastic; few fine roots; few fine and medium tubular pores; few faint clay films on faces of peds; moderately acid; abrupt smooth boundary.

Btg2--20 to 46 inches; gray (N 6/) clay; common fine prominent strong brown (7.5YR 5/6), yellowish brown (10YR 5/6), and light olive brown (2.5Y 5/4) mottles; strong fine angular and subangular blocky structure; firm, sticky, plastic; few fine roots in the upper part of this horizon; few fine tubular pores; common distinct clay films on faces of peds; very strongly acid; gradual wavy boundary.

Bg and Cg--46 to 56 inches; gray (N 6/) clay; few medium prominent yellowish brown (10YR 5/6) and strong brown (7.5YR 5/6) mottles; moderate coarse subangular and angular blocky structure; firm, sticky, plastic; few fine tubular pores; few faint clay films on faces of peds; very strongly acid; gradual wavy boundary.

Cg1--56 to 75 inches; gray (N 6/) stratified sandy loam and sandy clay loam; many medium distinct light olive brown (2.5Y 5/4) mottles; massive; friable, sticky, plastic; compact in place; few fine tubular pores; few thin clay lenses; very strongly acid; abrupt smooth boundary.

Cg2--75 to 82 inches; gray (N 5/) clay; common medium prominent light olive brown (2.5Y 5/4) and yellowish brown (10YR 5/6) mottles; massive; very firm, sticky, plastic; very strongly acid.

Table A: Particle-size distribution* for Bethera loam

| Depth | Sand | | | | | Total | Silt | Clay |
|---------------|----------------------------------|---|----|----|----|-------|------|------|
| | VC | C | M | F | VF | | | |
| <u>inches</u> | <u>g kg⁻¹ of soil</u> | | | | | | | |
| 16-36 | 2 | 4 | 24 | 82 | 32 | 144 | 432 | 424 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table B. Chemical properties for Bethera loam

| Depth | Exchangeable cations | | | | CEC* | BS** |
|---------------|--------------------------------------|------------------|----------------|----------------|------|----------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| <u>inches</u> | <u>cmol (+) kg⁻¹ soil</u> | | | | | <u>%</u> |
| 66 | 0.00 | 0.12 | 0.05 | 5.77 | 5.94 | 2.86 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.

**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for Bethera loam

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|------|--------------------------------------|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 66 | ND | 4.10 | 3.95 | 4.12 | 4.13 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.

**EBS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{ECEC}} \times 100$.

Table F. Chemical properties* for Bethera loam

| Depth | OM | pH | Ca ²⁺ | Mg ²⁺ | P | K ⁺ | Zn | Mn |
|---------------|----------|----|------------------|------------------|---|----------------|-----|-----|
| <u>inches</u> | <u>%</u> | | <u>ppm</u> | | | | | |
| 0-9 | - | - | 537 | 24 | 4 | 8 | 0.5 | 6.0 |
| 9-16 | - | - | 756 | 42 | 4 | 8 | 0.4 | 4.1 |
| 16-20 | - | - | 907 | 76 | 5 | 12 | 0.4 | 1.6 |
| 20-46 | - | - | 386 | 74 | 7 | 17 | 0.4 | 0.4 |
| 46-56 | - | - | 101 | 58 | 7 | 15 | 0.4 | 0.3 |
| 56-75 | - | - | 51 | 34 | 7 | 13 | 0.4 | 0.2 |
| 75-82 | - | - | 51 | 24 | 4 | 12 | 0.5 | 0.2 |

*Soil Testing and Plant Analysis Laboratory, Agronomy Department, Va Tech, Blacksburg, VA 24061.

Bohicket Series

Soils of the Bohicket series are very deep and very poorly drained. They formed in clayey fluvial sediments. They are along creeks and rivers on tidal marshes that are inundated twice daily by saline and brackish water. Slopes are less than 1 percent.

Typical pedon of Bohicket muck, frequently flooded, 0 to 1 percent slopes, about 3,600 feet southwest of mouth of Ware Creek at York River, 600 feet west of Ware Creek, 8,100 feet east of junction of VA-600 and VA-601, New Kent County.

Oa--0 to 9 inches; very dark grayish brown (10YR 3/2) muck (sapric material); massive; slightly sticky; many fine and medium fibrous roots; soil flows easily between fingers when squeezed; common fibers and pockets of organic (sapric) and mineral material; moderate sulfur odor; neutral; gradual smooth boundary.

Cg1--9 to 40 inches; very dark grayish brown (10YR 3/2) mucky silty clay loam; massive; sticky; few fine fibrous roots; soil flows easily between fingers when squeezed; common fibers and pockets of organic (sapric) material; moderate sulfur odor; moderately alkaline; gradual smooth boundary.

Cg2--40 to 57 inches; gray (5Y 5/1) silty clay; massive; sticky, soil flows easily between fingers when squeezed; few fibers and thin layers of organic (sapric) material, strong sulfur odor; moderately alkaline, gradual smooth boundary.

Cg3--57 to 80 inches; dark greenish gray (5GY 4/1) silty clay; massive, sticky; soil flows easily between fingers when squeezed; few fibers and thin layers of organic (sapric) material; strong sulfur odor; moderately alkaline.

Table A: Particle-size distribution* for Bohicket muck

| Depth | Sand | | | | | | Silt | Clay |
|---------------|----------------------------------|----|----|----|----|-------|------|------|
| | VC | C | M | F | VF | Total | | |
| <u>inches</u> | <u>g kg⁻¹ of soil</u> | | | | | | | |
| 9-40 | 17 | 44 | 44 | 50 | 32 | 187 | 445 | 368 |
| 40-57 | 2 | 17 | 14 | 10 | 4 | 47 | 434 | 519 |
| 57-80 | 1 | 6 | 6 | 6 | 3 | 22 | 402 | 576 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table G: Chemical and physical properties* for Bohicket muck

| Depth | n-value | Minerals Content | Organic Carbon | Field Moisture | 15 bar Water | Sulfur | pH1** | pH2*** |
|---------------|---------|------------------|----------------|----------------|--------------|--------|-------|--------|
| <u>inches</u> | | <u>percent</u> | | | | | | |
| 0-9 | - | 56 | 23.5 | - | 75.6 | 1.3 | 3.5 | 3.5 |
| 9-40 | - | 76 | 13.1 | - | 41.0 | 1.1 | 4.7 | 4.7 |
| 40-57 | - | 86 | 8.7 | - | 32.1 | 1.1 | 4.2 | 4.3 |
| 57-80 | - | 90 | 6.7 | - | 32.8 | 2.3 | 3.6 | 3.6 |

*By USDA, SCS, National Soil Survey Laboratory, Lincoln, Neb.

**1 - 1 Soil - water.

***1 - 2 Soil - 0.01 N CaCl₂.

Bohicket Series - Supplemental Profile 1

Pedon of Bohicket muck, about 900 feet south of the York River and mouth of Taskinas Creek and 150 feet east of Taskinas Creek main channel in the York River State Park, James City County.

Oa--0 to 6 inches; dark gray (5Y 4/1) muck (sapric material); massive; slightly sticky, many fine and medium fibrous roots; soils flows easily between fingers when squeezed; many pockets and lenses of clay loam mineral material; weak sulfur odor; neutral; gradual smooth boundary.

Cg1--6 to 16 inches; dark gray (5Y 4/1) clay; massive; sticky; common fine roots; soil flows easily between fingers when squeezed; common fibers and pockets and thin layers of organic (sapric) material; moderate sulfur odor; mildly alkaline; gradual smooth boundary.

Cg2--16 to 80 inches; dark gray (5Y 4/1) silt clay; massive; sticky; soil flows easily between fingers when squeezed; few fiber and thin layers of organic (sapric) material; moderate sulfur odor; neutral.

Table A: Particle-size distribution* for Bohicket muck

| Depth | Sand | | | | | | Silt | Clay |
|---------------|----------------------------------|-----|----|----|----|-------|------|------|
| | VC | C | M | F | VF | Total | | |
| <u>inches</u> | <u>g kg⁻¹ of soil</u> | | | | | | | |
| 0-6 | 70 | 114 | 74 | 45 | 41 | 344 | 326 | 330 |
| 6-16 | 84 | 12 | 24 | 20 | 0 | 140 | 349 | 511 |
| 16-80 | 0 | 1 | 4 | 10 | 30 | 45 | 468 | 487 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table F. Chemical properties* for Bohicket muck

| Depth | OM | pH | Ca ²⁺ | Mg ²⁺ | P | K ⁺ | Zn | Mn |
|---------------|----------|----|------------------|------------------|----|----------------|-----|------|
| <u>inches</u> | <u>%</u> | | <u>ppm</u> | | | | | |
| 0-6 | - | - | 240 | 60 | 8 | 79 | 5.1 | 5.7 |
| 6-16 | - | - | 402 | 60 | 9 | 79 | 0.1 | 14.0 |
| 16-27 | - | - | 318 | 60 | 11 | 79 | 0.1 | 7.2 |
| 27-76 | - | - | 300 | 60 | 13 | 79 | 0.1 | 7.1 |
| 76-80 | - | - | 354 | 60 | 15 | 79 | 0.1 | 16.1 |

*Soil Testing and Plant Analysis Laboratory, Agronomy Department, Va Tech, Blacksburg, VA 24061.

Table G: Chemical and physical properties* for Bohicket muck

| Depth | n-value | Minerals Content | Organic Carbon | Field Moisture | 15 bar Water | Sulfur | pH1** | pH2*** |
|---------------|---------|---------------------|-------------------|-------------------|-----------------|--------|-------|--------|
| <u>inches</u> | | <u>percent</u> | | | | | | |
| 0-6 | 4.6 | 65 | 15.5 | 566 | 46.7 | 1.3 | 6.7 | 6.5 |
| 6-16 | 2.7 | 79 | 9.9 | 286 | 39.9 | .9 | 7.7 | 7.6 |
| 16-80 | 2.4 | 88 | 7.1 | 216 | 32.6 | 1.9 | 7.1 | 7.1 |

*By USDA, SCS, National Soil Survey Laboratory, Lincoln, Neb.

**pH1 for depths 0-6 and 6-16 are 1 -10 Soil - water and depth 16-18 is 1 - 1 Soil - water.

***pH2 for depths 0-6 and 6-16 are 1 - 10 Soil - 0.01 N CaCl₂ and 1 - 2 Soil - 0.01 N CaCl₂.

Figure 3: Bohicket soils in Hill Marsh in New Kent County.



Bojac Series

Soils of the Bojac series are very deep and well drained. They formed in loamy fluvial sediments. They are on low-lying terraces adjacent to major streams. Slopes range from 0 to 2 percent.

Typical pedon of Bojac loamy sand, 0 to 2 percent slopes, about 3,500 south of mouth of Mill Creek, 4,000 feet northeast of junction of VA-636 and VA-30 (273), 6,000 feet southeast of VA-33 bridge at Eltham, 1,500 feet west of mouth of Ferry Creek, New Kent County.

Ap--0 to 10 inches; brown (10YR 4/3) loamy sand; weak fine granular structure; very friable; common fine roots; common fine and medium tubular pores; few fine flakes of mica; very strongly acid; clear smooth boundary.

E--10 to 18 inches; dark yellowish brown (10YR 4/6) loamy sand; moderate medium and fine granular structure; very friable; few fine roots; common fine and medium tubular pores; few fine flakes of mica; strongly acid; gradual smooth boundary.

Bt1--18 to 30 inches; brown (7.5YR 5/4) fine sandy loam; weak coarse subangular blocky structure; very friable, slightly sticky, slightly plastic; few fine roots; common fine and medium tubular pores; many distinct clay films and clay bridges on sand grains; few fine flakes of mica; moderately acid; gradual smooth boundary.

Bt2--30 to 42 inches; strong brown (7.5YR 5/6) fine sandy loam; weak medium and coarse subangular blocky structure; very friable, slightly sticky, slightly plastic; few fine roots; common fine and medium tubular pores; many distinct clay films and clay bridges on sand grains, common fine flakes of mica; strongly acid; gradual smooth boundary.

Bt3--42 to 52 inches; strong brown (7.5YR 5/6) fine sandy loam; weak coarse subangular blocky structure; very friable, slightly sticky, slightly plastic; few fine roots; common fine and medium tubular pores; many distinct clay films and clay bridges on sand grains, common fine flakes of mica; strongly acid; gradual wavy boundary.

C1--52 to 61 inches; mottled strong brown (7.5YR 5/6) and pale brown (10YR 6/3) sand; single grain; loose; common fine and medium tubular pores; common fine flakes of mica; 5 percent rounded quartz gravel; strongly acid; clear wavy boundary.

C2--61 to 70 inches; yellowish brown (10YR 5/6) sand; common medium faint pale brown (10YR 6/3) mottles; single grain; loose; common fine flakes of mica; common black grains of sand; 10 percent rounded quartz gravel; strongly acid.

Table A: Particle-size distribution* for Bojac loamy sand

| Depth | Sand | | | | | | Silt | Clay |
|---------------|----------------------------------|-----|-----|-----|-----|-------|------|------|
| | VC | C | M | F | VF | Total | | |
| <u>inches</u> | <u>g kg⁻¹ of soil</u> | | | | | | | |
| 0-10 | 16 | 60 | 232 | 396 | 105 | 809 | 134 | 57 |
| 10-18 | 13 | 46 | 206 | 393 | 115 | 773 | 158 | 69 |
| 18-30 | 7 | 35 | 178 | 384 | 107 | 711 | 176 | 113 |
| 30-42 | 2 | 25 | 193 | 361 | 133 | 714 | 103 | 183 |
| 42-52 | 17 | 54 | 155 | 368 | 177 | 771 | 107 | 122 |
| 52-61 | 57 | 165 | 359 | 266 | 77 | 924 | 34 | 42 |
| 61-70 | 117 | 207 | 418 | 220 | 19 | 981 | 13 | 6 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table B. Chemical properties for Bojac loamy sand

| Depth | Exchangeable cations | | | | CEC* | BS** |
|---------------|--------------------------------------|------------------|----------------|----------------|------|----------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| <u>inches</u> | <u>cmol (+) kg⁻¹ soil</u> | | | | | <u>%</u> |
| 0-10 | 0.21 | 0.10 | 0.14 | 5.04 | 5.49 | 8.20 |
| 10-18 | 0.75 | 0.30 | 0.19 | 2.52 | 3.76 | 32.98 |
| 18-30 | 1.42 | 0.60 | 0.16 | 3.78 | 5.96 | 36.58 |
| 30-42 | 3.08 | 0.52 | 0.07 | 5.46 | 9.13 | 40.20 |
| 42-52 | 1.67 | 0.38 | 0.03 | 4.83 | 6.91 | 30.10 |
| 52-61 | 0.52 | 0.22 | 0.01 | 2.52 | 3.27 | 22.94 |
| 61-70 | 0.18 | 0.07 | 0.01 | 1.68 | 1.94 | 13.40 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.

**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for Bojac loamy sand

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|------|--|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 0-10 | ND | 5.02 | 0.85 | 1.30 | 35.62 |
| 10-18 | ND | 5.54 | 0.05 | 1.29 | 96.90 |
| 18-30 | ND | 5.56 | 0.25 | 2.53 | 86.17 |
| 30-42 | ND | 5.42 | 0.35 | 4.02 | 91.29 |
| 42-52 | ND | 5.40 | 0.55 | 2.65 | 69.25 |
| 52-61 | ND | 5.35 | 0.25 | 1.00 | 75.00 |
| 61-70 | ND | 5.29 | 0.10 | 0.36 | 26.36 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.

**EBS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{ECEC}} \times 100$.

Table E: Sand mineralogy for Bojac loamy sand

| Depth | Quartz | Feldspar | Mica | Opaque Minerals* | Heavy Minerals* | Misc* |
|---------------|----------------------------------|----------|------|------------------|-----------------|-------|
| <u>inches</u> | <u>g kg⁻¹ of sand</u> | | | | | |
| 18-42 | 760 | 140 | 50 | Tr | 10 | 10 |

*Opaque Minerals are ilmenite, magnetite, hematite, etc. Heavy Minerals are translucent zircon, tourmaline, rutile, epidote, hornblende, etc. Misc = rock fragments.

Bojac Series - Supplemental Profile 1

Pedon of Bojac sandy loam, about 1300 feet northeast of mouth of Gordon creek and Nayses Bay and 700 feet east of Gordon Creek channel where it flows north to south, James City County.

A1--0 to 4 inches; very dark gray (10YR 3/1) sandy loam; weak fine granular structure; very friable, slightly sticky, nonplastic; few coarse and common medium and fine roots; common medium and fine tubular pores; extremely acid; clear smooth boundary.

E1--4 to 11 inches; brown (10YR 4/3) sandy loam; weak fine granular structure; very friable, slightly sticky, nonplastic; many medium and fine roots; common medium and fine tubular pores; extremely acid; clear smooth boundary.

E2--11 to 18 inches; dark yellowish brown (10YR 4/4) sandy loam; weak fine granular structure; friable, slightly sticky, nonplastic; few medium and fine roots; common medium and fine tubular pores; very strongly acid; clear smooth boundary.

Bt1--18 to 25 inches; yellowish brown (10YR 5/4) sandy loam; moderate fine granular structure; friable, slightly sticky, nonplastic; few fine and medium roots; common medium and fine tubular pores; very strongly acid; clear smooth boundary.

Bt2--25 to 31 inches; brown (7.5YR 5/4) sandy loam; weak medium and fine subangular blocky structure; friable, slightly sticky, nonplastic; few fine and medium roots; common medium and fine tubular pores; clay bridging between sand grains; very strongly acid; clear smooth boundary.

Bt3--31 to 43 inches; strong brown (7.5YR 5/6) sandy loam; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; few medium and fine roots; common medium and fine tubular pores; clay bridging between sand grains; very strongly acid; gradual smooth boundary.

Bt4--43 to 53 inches; brown (7.5YR 5/4) sandy loam; weak medium subangular blocky and moderate medium granular structure; very friable, slightly sticky, nonplastic; few fine roots; common medium and fine tubular pores; clay bridging between sand grains; common fine distinct light yellowish brown (10YR 6/4) sand grains; few flakes of mica; very strongly acid; gradual smooth boundary.

C--53 to 71 inches; yellowish brown (10YR 5/6) loamy sand; massive; few fine roots; common medium and fine tubular pores; common medium distinct pale brown (10YR 6/3) clean sand grains; few fine flakes of mica; very strongly acid.

Table A: Particle-size distribution* for Bojac sandy loam

| Depth | Sand | | | | | Total | Silt | Clay |
|---------------|----------------------------------|-----|-----|-----|----|-------|------|------|
| | VC | C | M | F | VF | | | |
| <u>inches</u> | <u>g kg⁻¹ of soil</u> | | | | | | | |
| 0-4 | 15 | 110 | 461 | 112 | 18 | 716 | 204 | 80 |
| 4-11 | 11 | 115 | 503 | 118 | 20 | 767 | 138 | 95 |
| 11-18 | 12 | 106 | 512 | 123 | 19 | 772 | 138 | 90 |
| 18-25 | 9 | 103 | 498 | 123 | 20 | 753 | 152 | 95 |
| 25-31 | 5 | 99 | 465 | 117 | 20 | 706 | 164 | 130 |
| 31-43 | 5 | 100 | 489 | 115 | 16 | 725 | 90 | 185 |
| 43-53 | 13 | 124 | 559 | 108 | 14 | 818 | 57 | 125 |
| 53-71 | 6 | 127 | 683 | 73 | 4 | 893 | 27 | 80 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table E: Sand mineralogy for Bojac sandy loam

| Depth | Quartz | Feldspar | Mica | Opaque Minerals* | Heavy Minerals* | Misc* |
|---------------|----------------------------------|----------|------|------------------|-----------------|-------|
| <u>inches</u> | <u>g kg⁻¹ of sand</u> | | | | | |
| 25-41 | 915 | 60 | 0 | 0 | 0 | 25 |

*Opaque Minerals are ilmenite, magnetite, hematite, etc. Heavy Minerals are translucent zircon, tourmaline, rutile, epidote, hornblende, etc. Misc = rock fragments.

Bojac Series - Supplemental Profile 2

Pedon of Bojac fine sandy loam, 2 to 6 percent slopes, 200 feet west of York River Road, Area 30, Camp Peary, York County.

Ap1--0 to 7 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak fine granular structure; very friable, nonsticky, nonplastic; many fine, medium, and coarse roots; common fine and medium tubular pores; very strongly acid; clear smooth boundary.

Ap2--7 to 12 inches; yellowish brown (10YR 5/4) fine sandy loam; weak fine granular structure; very friable, nonsticky, nonplastic; many fine, medium, and coarse roots; common fine and medium tubular pores; strongly acid; gradual smooth boundary.

E--12 to 23 inches; light yellowish brown (10YR 6/4) fine sandy loam; weak fine granular structure; very friable, nonsticky, nonplastic; common medium and coarse roots; many fine and medium tubular pores; very strongly acid; clear smooth boundary.

Bt1--23 to 31 inches; yellowish brown (10YR 5/4) fine sandy loam; common fine faint light yellowish brown (10YR 6/4) mottles; weak fine subangular blocky structure; friable, slightly sticky, nonplastic; few fine and medium roots; common fine and medium tubular pores; few faint clay films on faces of peds; very strongly acid; clear smooth boundary.

Bt2--31 to 47 inches; dark brown (7.5YR 4/4) sandy clay loam; weak medium subangular blocky structure; friable, sticky, plastic; few fine and medium roots; common fine and medium tubular pores; few faint clay films on faces of peds; very strongly acid; gradual smooth boundary.

Bt3--47 to 57 inches; strong brown (7.5YR 5/8) loamy fine sand; weak fine granular structure; very friable, slightly sticky, nonplastic; few fine roots; common fine and medium tubular pores; clay bridging between sand grains; very strongly acid; gradual smooth boundary.

C--57 to 81 inches; yellowish brown (10YR 5/8) stratified loamy sand and sand; many medium faint pale brown (10YR 6/3) mottles; single grain; very friable, nonsticky, nonplastic; few fine tubular pores; few fine flakes of mica; very strongly acid.

Table A: Particle-size distribution* for Bojac fine sandy loam

| Depth | Sand | | | | | Total | Silt | Clay |
|--------|----------------------------|----|-----|-----|-----|-------|------|------|
| | VC | C | M | F | VF | | | |
| inches | g kg ⁻¹ of soil | | | | | | | |
| 0-12 | 2 | 46 | 221 | 422 | 66 | 757 | 178 | 65 |
| 12-23 | 5 | 42 | 218 | 426 | 68 | 759 | 171 | 70 |
| 23-31 | 2 | 46 | 213 | 400 | 60 | 721 | 164 | 115 |
| 31-47 | 6 | 58 | 211 | 364 | 42 | 681 | 79 | 240 |
| 47-57 | 16 | 77 | 218 | 409 | 48 | 768 | 90 | 142 |
| 57-81 | 2 | 10 | 60 | 640 | 127 | 839 | 48 | 113 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table B. Chemical properties for Bojac fine sandy loam

| Depth | Exchangeable cations | | | | CEC* | BS** |
|---------------|--------------------------------------|------------------|----------------|----------------|------|----------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| <u>inches</u> | <u>cmol (+) kg⁻¹ soil</u> | | | | | <u>%</u> |
| 72 | 0.00 | 0.56 | 0.07 | 3.40 | 4.03 | 15.63 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.

**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for Bojac fine sandy loam

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|------|--------------------------------------|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 72 | ND | 3.94 | 2.45 | 4.24 | 28.07 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.

**EBS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{ECEC}} \times 100$.

Table F. Chemical properties* for Bojac fine sandy loam

| Depth | OM | pH | Ca ²⁺ | Mg ²⁺ | P | K ⁺ | Zn | Mn |
|---------------|----------|----|------------------|------------------|---|----------------|-----|-----|
| <u>inches</u> | <u>%</u> | | <u>ppm</u> | | | | | |
| 0-12 | - | - | 51 | 16 | 2 | 9 | 1.1 | 2.7 |
| 12-23 | - | - | 34 | 4 | 2 | 4 | 0.4 | 0.9 |
| 23-31 | - | - | 34 | 12 | 5 | 10 | 0.5 | 2.5 |
| 31-47 | - | - | 84 | 159 | 2 | 15 | 0.6 | 0.4 |
| 47-57 | - | - | 67 | 139 | 2 | 17 | 0.4 | 0.2 |
| 57-81 | - | - | 51 | 90 | 2 | 15 | 0.4 | 0.2 |

*Soil Testing and Plant Analysis Laboratory, Agronomy Department, Va Tech, Blacksburg, VA 24061.

Bojac Series - Supplemental Profile 3

Pedon of Bojac loamy fine sand, 0 to 5 percent slopes, about 200 feet southwest of Back Creek, 3300 feet south of C&O Railroad, on the east side of the road junction to cabin, James City County. (This soil was mapped as Conetoe loamy fine sand, but was included with soils of the Bojac series because of small acreage in James City County.)

A--0 to 3 inches; dark grayish brown (10YR 4/2) loamy fine sand; weak fine granular structure; very friable; many fine, medium, and coarse roots; many fine and medium pores; moderately acid; clear smooth boundary.

E1--3 to 17 inches; light yellowish brown (10YR 6/4) loamy fine sand; weak medium granular structure; very friable; common fine, medium, and coarse roots; many fine and medium pores; strongly acid; clear smooth boundary.

E2--17 to 25 inches; light yellowish brown (10YR 6/4) loamy fine sand; weak fine granular structure; very friable; few fine and medium roots; common fine and medium pores; strongly acid; clear smooth boundary.

Bt1--25 to 31 inches; yellowish brown (10YR 5/8) fine sandy loam; weak fine granular and subangular blocky structure; very friable, slightly sticky, nonplastic; few fine, medium, and coarse roots; common fine and medium pores; few clay bridgings between sand grains; very strongly acid; clear smooth boundary.

Bt2--31 to 41 inches; yellowish brown (10YR 5/6) fine sandy loam; weak fine subangular blocky and granular structure; very friable, slightly sticky, slightly plastic; few fine and medium roots; common fine and medium pores; many clay bridgings between sand grains; very strongly acid; gradual wavy boundary.

Bt3--41 to 45 inches; brownish yellow (10YR 6/6) loamy fine sand; weak fine granular structure; very friable; few fine and medium roots; many fine and medium pores; few fine flakes of mica; strongly acid; clear wavy boundary.

C and Bt--45 to 70 inches; very pale brown (10YR 7/3) sand and loamy sand; single grain; loose; many fine pores; few discontinuous yellowish brown (10YR 5/6) fine sandy loam lamellae up to 1/2 inch thick; few fine flakes of mica; strongly acid; gradual wavy boundary.

Table A: Particle-size distribution* for Bojac loamy fine sand

| Depth | Sand | | | | | | Silt | Clay |
|--------|----------------------------|----|-----|-----|-----|-------|------|------|
| | VC | C | M | F | VF | Total | | |
| inches | g kg ⁻¹ of soil | | | | | | | |
| 0-3 | 0 | 13 | 54 | 474 | 226 | 767 | 172 | 61 |
| 3-17 | 5 | 14 | 53 | 535 | 156 | 763 | 195 | 42 |
| 17-25 | 1 | 12 | 46 | 512 | 180 | 751 | 187 | 62 |
| 25-31 | 0 | 5 | 25 | 483 | 167 | 680 | 217 | 103 |
| 31-41 | 0 | 9 | 39 | 454 | 203 | 705 | 164 | 131 |
| 41-45 | 0 | 4 | 21 | 512 | 219 | 756 | 222 | 22 |
| 45-70 | 3 | 24 | 154 | 515 | 154 | 850 | 72 | 78 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table E: Sand mineralogy for Bojac loamy fine sand

| Depth | Quartz | Feldspar | Mica | Opaque Minerals* | Heavy Minerals* | Misc* |
|---------------|----------------------------------|----------|------|------------------|-----------------|-------|
| <u>inches</u> | <u>g kg⁻¹ of sand</u> | | | | | |
| 25-41 | 915 | 60 | 0 | 0 | 25 | 0 |

*Opaque Minerals are ilmenite, magnetite, hematite, etc. Heavy Minerals are translucent zircon, tourmaline, rutile, epidote, hornblende, etc. Misc = rock fragments.

Bojac Series - Supplemental Profile 4

Pedon of Bojac loamy fine sand, 0 to 4 percent slopes, about 2500 feet northwest of the junction of Diascund Creek and Mill Creek, 50 feet east of private road, and 900 feet east of Diascund Creek, James City County. (This soil was mapped as Catpoint loamy fine sand, but was included with soils of the Bojac series because of small acreage in James City County.)

Ap1--0 to 4 inches; black (10YR 2/1) loamy fine sand; weak coarse granular structure; very friable; many fine, medium, and coarse roots; many fine and medium pores; very strongly acid; clear smooth boundary.

Ap2--4 to 8 inches; brown (10YR 5/3) loamy fine sand; singular grain; loose; many fine, medium, and coarse roots; many fine and medium pores; strongly acid; clear smooth boundary.

Bw1--8 to 14 inches; yellowish brown (10YR 5/4) fine sand; single grain; common fine and few medium and coarse roots; many fine and medium pores; few fine flake of mica; common fine dark minerals; moderately acid; gradual smooth boundary.

Bw2--14 to 20 inches; light yellowish brown (10YR 6/4) fine sand; single grain; loose; common fine and medium roots; many fine and medium pores; few fine flakes of mica; common fine dark minerals; slightly acid; gradual smooth boundary.

E--20 to 32 inches; light yellowish brown (2.5Y 6/4) fine sand; single grain; loose; few fine and medium roots; many medium and fine pores; few fine flake of mica; common fine dark minerals; slightly acid; abrupt broken boundary.

E and Bt--32 to 44 inches; pale yellow (2.5Y 7/4) fine sand; single grain; loose; few fine and medium roots; many fine and medium pores; few yellowish brown (10YR 5/6) fine sandy loam lamellae up to 1/4 inch thick; few fine flakes of mica; common dark minerals; moderately acid; gradual smooth boundary.

C1--44 to 56 inches; light yellowish brown (2.5Y 6/4) fine sand; few medium prominent strong brown (7.5YR 5/8) mottles; single grain; loose; few yellowish brown (10YR 5/6) rounded loamy sand bodies; few fine flakes of mica; common dark minerals; strongly acid; gradual smooth boundary.

C2--56 to 83 inches; strong brown (7.5YR 5/8) and yellowish brown (10YR 5/6) stratified fine sand and coarse sand; single grain; loose; common fine dark minerals; strongly acid.

Table A: Particle-size distribution* for Bojac loamy fine sand

| Depth | Sand | | | | | | Silt | Clay |
|--------|----------------------------|----|-----|-----|-----|-------|------|------|
| | VC | C | M | F | VF | Total | | |
| inches | g kg ⁻¹ of soil | | | | | | | |
| 0-4 | 0 | 16 | 127 | 549 | 153 | 845 | 49 | 106 |
| 4-8 | 0 | 9 | 103 | 573 | 163 | 848 | 99 | 53 |
| 8-14 | 1 | 9 | 119 | 614 | 130 | 873 | 87 | 40 |
| 14-20 | 1 | 10 | 131 | 578 | 178 | 898 | 68 | 34 |
| 20-32 | 1 | 6 | 98 | 635 | 156 | 896 | 78 | 26 |
| 32-44 | 2 | 5 | 134 | 622 | 148 | 911 | 51 | 38 |
| 44-56 | 1 | 3 | 45 | 659 | 221 | 929 | 41 | 30 |
| 56-83 | 0 | 1 | 48 | 642 | 231 | 922 | 55 | 23 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table E: Sand mineralogy for Bojac loamy fine sand

| Depth | Quartz | Feldspar | Mica | Opaque Minerals* | Heavy Minerals* | Misc* |
|---------------|----------------------------------|----------|------|------------------|-----------------|-------|
| <u>inches</u> | <u>g kg⁻¹ of sand</u> | | | | | |
| 14-32 | 930 | 50 | 0 | 0 | 20 | 0 |

*Opaque Minerals are ilmenite, magnetite, hematite, etc. Heavy Minerals are translucent zircon, tourmaline, rutile, epidote, hornblende, etc. Misc = rock fragments.

Caroline Series

Soils of the Caroline series are very deep and well drained. They formed in clayey fluvial and marine sediments. They are on uplands. Slopes range from 2 to 10 percent.

Typical pedon of Caroline loam, 2 to 6 percent slopes, is located about 1,300 feet south of junction VA-618 and Interstate 64 overpass, and 100 feet west of VA-618, New Kent County.

A--0 to 3 inches; dark grayish brown (10YR 4/2) loam; moderate medium granular structure; very friable, slightly sticky, nonplastic; many fine and medium and few coarse roots; common fine and medium tubular pores; strongly acid; clear smooth boundary.

E--3 to 8 inches; yellowish brown (10YR 5/4) loam; moderate medium granular structure; very friable, slightly sticky, nonplastic; many fine and medium and common coarse roots; common fine and medium tubular pores; very strongly acid; clear smooth boundary.

BE--8 to 11 inches; yellowish brown (10YR 5/4) loam; moderate medium granular structure; very friable, sticky, slightly plastic; common fine and medium and few coarse roots; common fine and medium tubular pores; few faint clay films on faces of peds; very strongly acid; clear smooth boundary.

Bt1--11 to 14 inches; yellowish brown (10YR 5/8) loam; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; common fine and medium and few coarse roots; common distinct clay films on faces of peds; very strongly acid; clear smooth boundary.

Bt2--14 to 28 inches; yellowish red (5YR 5/8) clay loam; common medium distinct strong brown (7.5YR 5/8) mottles and common medium prominent yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable, sticky, plastic; common fine and few medium roots; common fine tubular pores; many distinct clay films on faces of peds; very strongly acid; gradual smooth boundary.

Bt3--28 to 52 inches; yellowish red (5YR 5/8) clay loam; common medium prominent yellowish brown (10YR 5/8) mottles; weak coarse platy structure parting to moderate medium subangular and angular blocky; firm, sticky, plastic; few medium roots; few fine tubular pores; common distinct clay films on faces of peds; strongly acid; gradual smooth boundary.

Bt4--52 to 64 inches; mottled yellowish red (5YR 5/8), yellowish brown (10YR 5/8), and light brownish gray (10YR 6/2) clay; weak coarse platy structure parting to moderate fine angular and subangular blocky; firm, sticky, plastic; few fine tubular pores; many distinct clay films on faces of peds; very strongly acid.

Table A: Particle-size distribution* for Caroline loam

| Depth | Sand | | | | | Total | Silt | Clay |
|---------------|----------------------------------|----|----|-----|-----|-------|------|------|
| | VC | C | M | F | VF | | | |
| <u>inches</u> | <u>g kg⁻¹ of soil</u> | | | | | | | |
| 0-3 | 3 | 25 | 53 | 226 | 172 | 479 | 424 | 97 |
| 3-8 | 6 | 18 | 47 | 206 | 199 | 476 | 461 | 63 |
| 8-11 | 4 | 15 | 40 | 176 | 186 | 421 | 474 | 105 |
| 11-14 | 7 | 14 | 36 | 144 | 175 | 376 | 454 | 170 |
| 14-28 | 2 | 8 | 19 | 81 | 145 | 255 | 356 | 389 |
| 28-52 | 3 | 6 | 13 | 80 | 199 | 301 | 357 | 342 |
| 52-64 | 1 | 5 | 13 | 58 | 172 | 249 | 336 | 415 |
| 64-100 | 5 | 4 | 4 | 22 | 176 | 211 | 356 | 433 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table B. Chemical properties for Caroline loam

| Depth | Exchangeable cations | | | | CEC* | BS** |
|---------------|--------------------------------------|------------------|----------------|----------------|-------|----------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| <u>inches</u> | <u>cmol (+) kg⁻¹ soil</u> | | | | | <u>%</u> |
| 0-3 | 0.25 | 0.10 | 0.19 | 16.38 | 16.92 | 3.19 |
| 3-8 | 0.01 | 0.01 | 0.15 | 7.14 | 7.31 | 2.33 |
| 8-11 | 0.02 | 0.01 | 0.09 | 5.25 | 5.37 | 2.23 |
| 11-14 | 0.02 | 0.01 | 0.07 | 7.14 | 7.24 | 1.38 |
| 14-28 | 0.02 | 0.73 | 0.13 | 14.70 | 15.58 | 5.65 |
| 28-52 | 0.02 | 0.19 | 0.07 | 12.81 | 13.09 | 2.14 |
| 52-64 | 0.01 | 0.10 | 0.09 | 14.91 | 15.11 | 1.32 |
| 64-100 | 0.02 | 0.03 | 0.08 | 14.91 | 15.04 | 0.86 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.

**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for Caroline loam

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|------|--|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 0-3 | ND | 5.23 | 3.15 | 3.69 | 14.63 |
| 3-8 | ND | 4.76 | 1.25 | 1.42 | 11.97 |
| 8-11 | ND | 4.66 | 1.45 | 1.57 | 7.64 |
| 11-14 | ND | 4.86 | 2.25 | 2.35 | 4.26 |
| 14-28 | ND | 5.00 | 4.95 | 5.83 | 15.05 |
| 28-52 | ND | 5.16 | 5.85 | 6.13 | 4.57 |
| 52-64 | ND | 4.70 | 7.15 | 7.35 | 2.72 |
| 64-100 | ND | 4.87 | 8.05 | 8.18 | 1.59 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.

**EBS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{ECEC}} \times 100$.

Table D: Clay mineralogy for Caroline loam

| Depth | HIV* | Mica | Kaolinite | Quartz | Mont* | Gibbsite | Misc* |
|---------------|----------------------------------|------|-----------|--------|-------|----------|-------|
| <u>inches</u> | <u>g kg⁻¹ of clay</u> | | | | | | |
| 14-52 | 230 | 50 | 500 | 50 | 170 | 0 | 0 |

*HIV = hydroxy interlayered vermiculite. Mont = montmorillonite. Misc = vermiculite/montmorillonite.

Caroline Series - Supplemental Profile 1

Pedon of Caroline fine sandy loam, 2 to 6 percent slopes, 2200 feet northwest of junction of VA-604 and VA-606 in the York River State Park, James City County.

A--0 to 4 inches; dark grayish brown (10YR 4/2) fine sandy loam; friable, slightly sticky, nonplastic; many fine, medium, and coarse roots; few fine tubular pores; 5 percent ironstone fragments up to 5 millimeters width; extremely acid; clear smooth boundary.

E--4 to 13 inches; light yellowish brown (10YR 6/4) fine sandy loam; moderate medium granular and weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; common fine and medium and few coarse roots; common fine and medium tubular pores; 10 percent ironstone fragments up to 8 millimeters width; very strongly acid; gradual smooth boundary.

Bt1--13 to 17 inches; strong brown (7.5YR 5/6) clay loam; few medium distinct light yellowish brown (10YR 6/4) mottles; weak medium and fine subangular blocky structure; friable, sticky, plastic; common fine and medium roots; common fine and few medium tubular pores; few faint clay films on faces of peds; 10 percent ironstones fragments up to 8 millimeters width; extremely acid; clear smooth boundary.

Bt2--17 to 31 inches; yellowish red (5YR 4/6) clay; few fine prominent yellowish brown (10YR 5/6) and red (2.5YR 4/8) mottles; moderate medium subangular blocky structure; friable, sticky, plastic; common fine roots; common fine tubular pores; common distinct clay films on faces of peds; 10 percent ironstone fragments up to 8 millimeters width; few fine flakes of mica; very strongly acid; gradual smooth boundary.

Bt3--31 to 41 inches; yellowish red (5YR 5/6) sandy clay; moderate medium subangular blocky structure; friable, sticky, plastic; few fine roots; few fine tubular pores; common distinct clay films on faces of peds; 10 percent ironstone fragments up to 8 millimeters width; few fine flakes of mica; very strongly acid; gradual wavy boundary.

Bt4--41 to 47 inches; yellowish red (5YR 4/6) sandy clay loam; weak medium subangular blocky structure; friable; slightly sticky, slightly plastic; compact in place; few fine roots; few fine tubular pores; few distinct clay films on faces of peds; 10 percent ironstone fragments up to 8 millimeters width; few fine flakes of mica; strongly acid; gradual wavy boundary.

C--47 to 72 inches; strong brown (7.5YR 5/6) stratified clay, clay loam, and fine sandy loam; few medium prominent yellowish red (5YR 5/6) and red (2.5YR 4/8) mottles; massive, friable, sticky, plastic; compact in place; few fine tubular pores; few fine flakes of mica; very strongly acid.

Table A: Particle-size distribution* for Caroline fine sandy loam

| Depth | Sand | | | | | | Silt | Clay |
|--------|----------------------------|---|----|-----|-----|-------|------|------|
| | VC | C | M | F | VF | Total | | |
| inches | g kg ⁻¹ of soil | | | | | | | |
| 0-4 | 6 | 8 | 39 | 347 | 151 | 551 | 364 | 85 |
| 4-13 | 3 | 6 | 30 | 318 | 169 | 526 | 354 | 120 |
| 13-17 | 6 | 6 | 23 | 265 | 144 | 444 | 314 | 242 |
| 17-31 | 13 | 7 | 20 | 199 | 92 | 331 | 127 | 542 |
| 31-41 | 2 | 7 | 43 | 337 | 72 | 461 | 94 | 445 |
| 41-72 | 5 | 8 | 52 | 531 | 65 | 661 | 104 | 235 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table B. Chemical properties for Caroline fine sandy loam

| Depth | Exchangeable cations | | | | CEC* | BS** |
|---------------|--------------------------------------|------------------|----------------|----------------|------|----------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| <u>inches</u> | <u>cmol (+) kg⁻¹ soil</u> | | | | | <u>%</u> |
| 63 | 0.00 | 0.22 | 0.04 | 7.00 | 7.26 | 3.58 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.

**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for Caroline fine sandy loam

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|------|--------------------------------------|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 63 | ND | 4.86 | 1.65 | 1.91 | 13.61 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.

**EBS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{ECEC}} \times 100$.

Table F. Chemical properties* for Caroline fine sandy loam

| Depth | OM | pH | Ca ²⁺ | Mg ²⁺ | P | K ⁺ | Zn | Mn |
|---------------|----------|----|------------------|------------------|---|----------------|-----|-----|
| <u>inches</u> | <u>%</u> | | <u>ppm</u> | | | | | |
| 0-4 | - | - | 96 | 14 | 3 | 34 | 1.4 | 3.0 |
| 4-13 | - | - | 72 | 7 | 3 | 18 | 0.3 | 3.2 |
| 13-17 | - | - | 72 | 23 | 6 | 18 | 0.4 | 0.8 |
| 17-31 | - | - | 60 | 120 | 4 | 61 | 0.2 | 0.2 |
| 31-41 | - | - | 48 | 35 | 3 | 20 | 0.1 | 0.1 |
| 41-47 | - | - | 48 | 27 | 2 | 17 | 0.1 | 0.1 |
| 47-72 | - | - | 60 | 27 | 2 | 8 | 0.2 | 0.1 |

*Soil Testing and Plant Analysis Laboratory, Agronomy Department, Va Tech, Blacksburg, VA 24061.

Caroline Series - Supplemental Profile 2

Pedon of Caroline fine sandy loam, 2 to 6 percent slopes, about 1000 feet south of Intersection of VA-646 and VA-604, 2600 feet north of Intersection of I-64 and VA-646, and 200 feet northeast of new subdivision road and VA-646, York County.

A--0 to 4 inches; brown (7.5YR 4/2) fine sandy loam; weak fine granular structure; friable, slightly sticky, slightly plastic; many fine, medium and coarse roots; few fine tubular pores; extremely acid; clear smooth boundary.

E--4 to 13 inches; light yellowish brown (10YR 6/4) fine sandy loam; weak fine granular structure; friable, slightly sticky, slightly plastic; common fine and medium roots; common fine and medium tubular pores; very strongly acid; clear smooth boundary.

Bt1--13 to 17 inches; mottled strong brown (7.5YR 5/6) and yellowish brown (10YR 5/4) fine sandy loam; weak medium subangular blocky structure; slightly sticky, slightly plastic; common fine and medium roots; few fine and common medium tubular pores; few faint clay films on faces of peds; extremely acid; abrupt smooth boundary.

Bt2--17 to 37 inches; red (2.5YR 4/6) clay; moderate medium subangular blocky structure; friable, sticky, plastic; common fine and medium roots; few fine tubular pores; common prominent clay films on faces of peds; few fine flakes of mica; very strongly acid; gradual smooth boundary.

Bt3--37 to 54 inches; red (2.5YR 4/6) clay loam; few medium prominent yellowish brown (10YR 5/8) mottles; moderate medium subangular blocky structure; friable; sticky, plastic; common fine roots; few fine tubular pores; common distinct clay films on faces of peds; few fine flakes of mica; few fine ironstone fragments up to 1/2 inch in diameter; very strongly acid; gradual smooth boundary.

Bt4--54 to 72 inches; red (2.5YR 4/6) clay; few medium prominent yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable, sticky, plastic; few fine roots; few fine tubular pores; common distinct clay films on faces of peds; few fine flakes of mica; very strongly acid.

Table A: Particle-size distribution* for Caroline fine sandy loam

| Depth | Sand | | | | | Total | Silt | Clay |
|--------|----------------------------|----|----|-----|-----|-------|------|------|
| | VC | C | M | F | VF | | | |
| inches | g kg ⁻¹ of soil | | | | | | | |
| 0-4 | 4 | 12 | 66 | 366 | 174 | 622 | 333 | 45 |
| 4-13 | 6 | 6 | 60 | 394 | 141 | 607 | 308 | 85 |
| 13-17 | 4 | 3 | 42 | 276 | 177 | 502 | 308 | 190 |
| 17-37 | 1 | 1 | 17 | 154 | 147 | 320 | 235 | 445 |
| 37-54 | 3 | 1 | 13 | 138 | 155 | 310 | 310 | 380 |
| 54-72 | 2 | 1 | 11 | 130 | 154 | 298 | 247 | 455 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table D: Clay mineralogy for Caroline fine sandy loam

| Depth | HIV* | Mica | Kaolinite | Quartz | Mont* | Gibbsite | Misc* |
|---------------|----------------------------------|------|-----------|--------|-------|----------|-------|
| <u>inches</u> | <u>g kg⁻¹ of clay</u> | | | | | | |
| 17-37 | 460 | 35 | 260 | 70 | 150 | 25 | 0 |

*HIV = hydroxy interlayered vermiculite. Mont = montmorillonite. Misc = vermiculite/montmorillonite.

Table E: Sand mineralogy for Caroline fine sandy loam

| Depth | Quartz | Feldspar | Mica | Opaque Minerals* | Heavy Minerals* | Misc* |
|---------------|----------------------------------|----------|------|------------------|-----------------|-------|
| <u>inches</u> | <u>g kg⁻¹ of sand</u> | | | | | |
| 17-37 | 975 | 10 | 0 | 0 | 15 | 0 |

*Opaque Minerals are ilmenite, magnetite, hematite, etc. Heavy Minerals are translucent zircon, tourmaline, rutile, epidote, hornblende, etc. Misc = rock fragments.

Table F. Chemical properties* for Caroline fine sandy loam

| Depth | OM | pH | Ca ²⁺ | Mg ²⁺ | P | K ⁺ | Zn | Mn |
|---------------|----------|----|------------------|------------------|----|----------------|-----|-----|
| <u>inches</u> | <u>%</u> | | <u>ppm</u> | | | | | |
| 0-4 | - | - | 84 | 19 | 13 | 28 | 1.8 | 2.1 |
| 4-13 | - | - | 96 | 3 | 1 | 11 | 0.5 | 2.2 |
| 13-17 | - | - | 84 | 3 | 4 | 17 | 0.5 | 0.8 |
| 17-37 | - | - | 72 | 120 | 2 | 18 | 0.2 | 0.2 |
| 37-54 | - | - | 72 | 53 | 8 | 23 | 0.2 | 0.1 |
| 54-72 | - | - | 60 | 44 | 5 | 18 | 0.2 | 0.1 |

*Soil Testing and Plant Analysis Laboratory, Agronomy Department, Va Tech, Blacksburg, VA 24061.

Caroline Series - Supplemental Profile 3

Pedon of Caroline fine sandy loam, 2 to 6 percent slopes, about 100 feet west of Buck Road, Area 14, Camp Perry, York County.

A--0 to 4 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak medium and fine granular structure; friable, slightly sticky, nonplastic; many fine, medium, and coarse roots; common fine tubular pores; moderately acid; clear smooth boundary.

E--4 to 10 inches; brown (10YR 5/3) fine sandy loam; weak medium and fine granular structure; friable, slightly sticky, nonplastic; many fine, medium, and coarse roots; common fine and medium tubular pores; moderately acid; clear smooth boundary.

Bt1--10 to 16 inches; yellowish brown (10YR 5/4) sandy clay loam; common medium distinct pale brown (10YR 6/3) mottles; weak medium subangular structure; friable, sticky, plastic; common fine and medium and few coarse roots; many fine and medium tubular pores; few faint clay films on faces of ped; 1 percent quartz gravel; strongly acid; clear smooth boundary.

Bt2--16 to 26 inches; strong brown (7.5YR 5/6) clay loam; common medium distinct yellowish brown (10YR 5/6) and few medium distinct light yellowish brown (10YR 6/4) mottles; moderate medium subangular blocky structure; friable, sticky, plastic; few fine, medium, and coarse roots; many fine and medium tubular pores; few faint clay films on faces of ped; 1 percent quartz gravel; strongly acid; gradual smooth boundary.

Bt3--26 to 42 inches; yellowish red (5YR 4/6) clay loam; common medium prominent yellowish brown (10YR 5/6) mottles; moderate coarse subangular blocky structure; firm, sticky, plastic; few fine roots; common fine and medium tubular pores; common faint clay films on faces of ped; 2 percent quartz gravel; strongly acid; gradual smooth boundary.

Bt4--42 to 54 inches; mottled yellowish red (5YR 4/6), yellowish brown (10YR 5/6), strong brown (7.5YR 5/6), and gray (5Y 6/1) sandy clay loam; moderate coarse subangular blocky structure; firm, sticky, plastic; few fine roots; common fine tubular pores; few faint clay films on faces of ped; 1 percent quartz gravel; very strongly acid; gradual smooth boundary.

C--54 to 72 inches; variegated gray (5Y 6/1), yellowish brown (10YR 5/6), strong brown (7.5YR 5/6), and yellowish red (5YR 4/6) sandy clay loam; massive; firm, sticky, plastic; few fine tubular pores; 1 percent quartz gravel; very strongly acid.

Table A: Particle-size distribution* for Caroline fine sandy loam

| Depth | Sand | | | | | | Silt | Clay |
|--------|----------------------------|-----|-----|-----|----|-------|------|------|
| | VC | C | M | F | VF | Total | | |
| inches | g kg ⁻¹ of soil | | | | | | | |
| 0-4 | 14 | 98 | 204 | 244 | 67 | 627 | 303 | 70 |
| 4-10 | 7 | 73 | 169 | 188 | 62 | 499 | 341 | 160 |
| 10-16 | 17 | 69 | 137 | 140 | 43 | 406 | 324 | 270 |
| 16-26 | 12 | 66 | 141 | 144 | 48 | 411 | 304 | 285 |
| 26-54 | 42 | 100 | 165 | 150 | 51 | 508 | 202 | 290 |
| 54-72 | 60 | 115 | 185 | 157 | 46 | 563 | 177 | 260 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table B. Chemical properties for Caroline fine sandy loam

| Depth | Exchangeable cations | | | | CEC* | BS** |
|---------------|--------------------------------------|------------------|----------------|----------------|------|----------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| <u>inches</u> | <u>cmol (+) kg⁻¹ soil</u> | | | | | <u>%</u> |
| 60 | 0.00 | 0.26 | 0.07 | 6.40 | 6.73 | 4.90 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.

**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for Caroline fine sandy loam

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|------|--------------------------------------|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 60 | ND | 4.28 | 3.55 | 3.88 | 8.51 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.

**EBS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{ECEC}} \times 100$.

Table D: Clay mineralogy for Caroline fine sandy loam

| Depth | HIV* | Mica | Kaolinite | Quartz | Mont* | Gibbsite | Misc* |
|---------------|----------------------------------|------|-----------|--------|-------|----------|-------|
| <u>inches</u> | <u>g kg⁻¹ of clay</u> | | | | | | |
| 17-37 | 460 | 35 | 260 | 70 | 150 | 25 | 0 |

*HIV = hydroxy interlayered vermiculite. Mont = montmorillonite. Misc = vermiculite/montmorillonite.

Table F. Chemical properties* for Caroline fine sandy loam

| Depth | OM | pH | Ca ²⁺ | Mg ²⁺ | P | K ⁺ | Zn | Mn |
|---------------|----------|----|------------------|------------------|---|----------------|-----|------|
| <u>inches</u> | <u>%</u> | | <u>ppm</u> | | | | | |
| 0-4 | - | - | 537 | 48 | 3 | 15 | 1.4 | 10.8 |
| 4-10 | - | - | 252 | 26 | 5 | 13 | 0.7 | 6.3 |
| 10-16 | - | - | 588 | 44 | 3 | 24 | 0.7 | 0.8 |
| 16-26 | - | - | 588 | 28 | 2 | 8 | 0.5 | 0.3 |
| 26-42 | - | - | 252 | 26 | 2 | 13 | 0.5 | 0.2 |
| 42-54 | - | - | 505 | 34 | 4 | 6 | 0.4 | 0.1 |
| 54-72 | - | - | 34 | 60 | 3 | 19 | 0.4 | 0.3 |

*Soil Testing and Plant Analysis Laboratory, Agronomy Department, Va Tech, Blacksburg, VA 24061.

Caroline Series - Supplemental Profile 4

Pedon of Caroline loam, 2 to 6 percent slopes, 4,000 feet north of intersection of VA-615 and VA-5 (Five Forks) and 1,000 feet west of VA-615, James City County.

Ap--0 to 7 inches; grayish brown (10YR 5/2) loam; moderate medium granular structure; friable, slightly sticky, slightly plastic; many fine roots; common fine tubular pores; strongly acid; abrupt smooth boundary.

Bt1--7 to 10 inches; yellowish brown (10YR 5/4) sandy clay loam; weak medium and fine subangular blocky structure; friable, sticky, plastic; common fine roots; common fine tubular pores; few faint clay films on faces of peds; very strongly acid; clear smooth boundary.

Bt2--10 to 21 inches; yellowish brown (10YR 5/6) sandy clay loam; moderate medium subangular blocky structure; friable, sticky, plastic; common fine roots; common fine tubular pores; common distinct clay films on faces of peds; very strongly acid; gradual smooth boundary.

Bt3--21 to 28 inches; yellowish brown (10YR 5/8) clay; few fine prominent pale brown (10YR 6/3) and brown (7.5YR 4/4) mottles; moderate medium subangular blocky structure; friable, sticky, plastic; few fine roots; few fine tubular pores; common distinct clay films on faces of peds; very strongly acid; gradual smooth boundary.

Bt4--28 to 38 inches; yellowish brown (10YR 5/8) clay; many medium prominent strong brown (7.5YR 5/8), red (2.5YR 4/8) and few fine faint pale brown (10YR 6/3) mottles; moderate medium subangular blocky structure; friable, sticky, plastic; few fine roots; few fine tubular pores; very strongly acid; gradual wavy boundary.

Bt5--38 to 48 inches; mottled yellowish brown (10YR 5/8) red (2.5YR 4/8) and gray (10YR 7/2) clay; weak medium subangular blocky structure; friable, sticky, plastic; few distinct clay films on faces of peds; strongly acid; gradual wavy boundary.

C--48 to 70 inches; mottled yellowish brown (10YR 5/8), red (2.5YR 4/8), pale brown (10YR 6/3), reddish brown (5YR 5/4) and gray (5YR 7/1) clay, stratified with clay loam; massive; friable, sticky, plastic; compact in place; very strongly acid.

Table A: Particle-size distribution* for Caroline loam

| Depth | Sand | | | | | Total | Silt | Clay |
|---------------|----------------------------------|---|----|-----|-----|-------|------|------|
| | VC | C | M | F | VF | | | |
| <u>inches</u> | <u>g kg⁻¹ of soil</u> | | | | | | | |
| 10-30 | 0 | 2 | 15 | 184 | 111 | 312 | 317 | 371 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Caroline Series - Supplemental Profile 5

Pedon of Caroline fine sandy loam, 2 to 6 percent slopes, Ford Colony subdivision, 2,000 feet south of VA-612, near end of golf course, James City County.

A1--0 to 2 inches; brown (7.5YR 4/2) fine sandy loam; weak fine granular structure; friable, slightly sticky, nonplastic; many fine, medium and coarse roots; few fine tubular pores; extremely acid; clear smooth boundary.

E--2 to 10 inches; strong brown (7.5YR 5/6) loam; weak fine granular structure; friable, slightly sticky, slightly plastic; common fine and medium roots; common fine and medium tubular pores; very strongly acid; clear smooth boundary.

Bt1--10 to 15 inches; strong brown (7.5YR 5/6) clay loam; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; common fine and medium roots; few fine and medium tubular pores; few faint clay films on faces of peds; extremely acid; clear smooth boundary.

Bt2--15 to 19 inches; red (2.5YR 4/6) clay; moderate medium subangular blocky structure; friable, sticky, plastic; common fine and medium roots; few fine tubular pores; common prominent clay films on faces of peds; very strongly acid; gradual smooth boundary.

Bt3--19 to 27 inches; red (2.5YR 4/8) clay; moderate medium subangular blocky structure; friable, sticky, plastic; common fine and medium roots; few fine tubular pores; common prominent clay films on faces of peds; very strongly acid; gradual smooth boundary.

Bt4--27 to 60 inches; red (2.5YR 4/8) clay; common medium prominent strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; friable, sticky, plastic; common fine roots; few fine tubular pores; common distinct clay films on faces of peds; very strongly acid.

Table A: Particle-size distribution* for Caroline fine sandy loam

| Depth | Sand | | | | | | Silt | Clay |
|---------------|----------------------------------|---|----|-----|-----|-------|------|------|
| | VC | C | M | F | VF | Total | | |
| <u>inches</u> | <u>g kg⁻¹ of soil</u> | | | | | | | |
| 10-30 | 1 | 1 | 20 | 192 | 136 | 350 | 233 | 417 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Caroline Series - Supplemental Profile 6

Pedon of Caroline fine sandy loam, 2 to 6 percent slopes, 100 feet south of VA-607, 1,000 feet east of interchange of VA-607 and Interstate 64, James City County. (This was mapped in Emporia-Caroline complex that was correlated as Emporia in final correlation.)

Ap--0 to 7 inches; reddish brown (5YR 4/3) fine sandy loam; friable, slightly sticky, slightly plastic; many fine roots; few fine tubular pores; 10 percent ironstone fragments 1/4 inch thick and up to 2 inches wide; extremely acid; clear smooth boundary.

Bt1--7 to 23 inches; yellowish red (5YR 4/6) clay; weak medium and fine subangular blocky structure; friable, sticky, plastic; common fine roots; common fine tubular pores; few fine faint clay films on faces of peds; extremely acid; gradual smooth boundary.

Bt2--23 to 35 inches; variegated yellowish red (5YR 5/6), yellowish brown (10YR 5/8) and strong brown (7.5YR 5/6) clay; moderate medium subangular blocky structure; friable, sticky, plastic; few fine roots; few fine tubular pores; common distinct clay films on faces of peds; very strongly acid; gradual smooth boundary.

Bt3--35 to 45 inches; variegated yellowish red (5YR 5/6), yellowish brown (10YR 5/8), strong brown (7.5YR 5/6) and gray (10YR 5/1) clay; moderate medium subangular blocky structure; friable, sticky, plastic; few fine roots; few fine tubular pores; common distinct clay films on faces of peds; very strongly acid; gradual wavy boundary.

C1--45 to 50 inches; yellowish red (5YR 5/6) and weak red (2.5YR 4/2) sandy clay loam; massive; friable, sticky, plastic; very strongly acid; gradual wavy boundary.

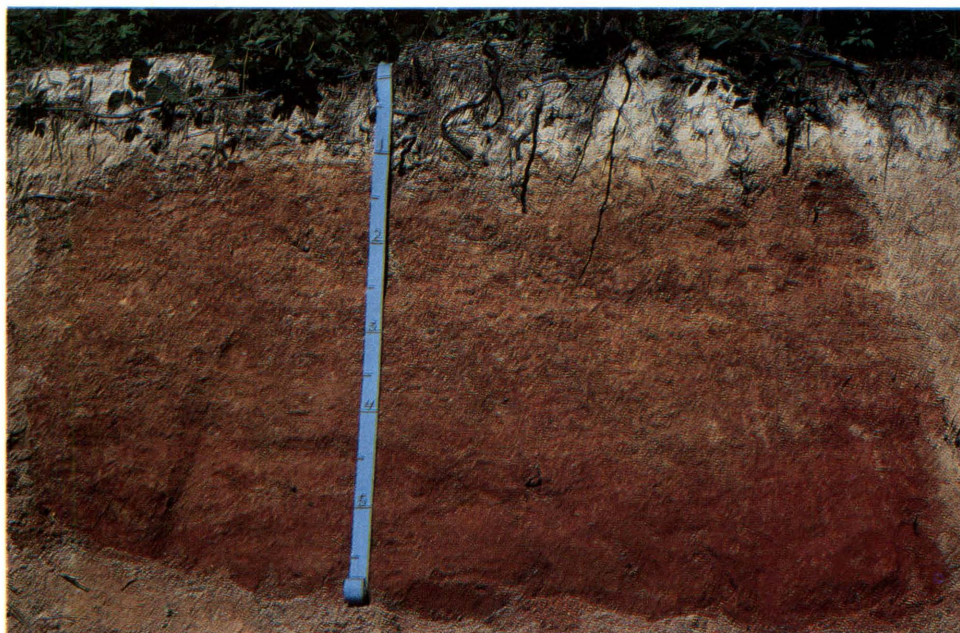
C2--50 to 75 inches; strong brown (7.5YR 5/6) sandy loam; with many medium distinct yellowish red (5YR 5/6) and yellowish brown (10YR 5/8) mottles; massive; sticky, slightly plastic; very strongly acid.

Table A: Particle-size distribution* for Bojac loamy fine sand

| Depth | Sand | | | | | Total | Silt | Clay |
|---------------|----------------------------------|---|---|-----|-----|-------|------|------|
| | VC | C | M | F | VF | | | |
| <u>inches</u> | <u>g kg⁻¹ of soil</u> | | | | | | | |
| 7-27 | 0 | 4 | 9 | 322 | 114 | 449 | 136 | 415 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Figure 4: Profile of a Caroline soil in James City County.



Catpoint Series

Soils of the Catpoint series are very deep and somewhat excessively drained. They formed in sandy fluvial and marine sediments. They are on low-lying stream terraces. Slope ranges from 0 to 4 percent.

Typical pedon of Catpoint fine sand, 0 to 4 percent slopes about 250 feet southwest of subdivision road junction of John Smith Trail and Colonial Trail in The Colonies subdivision, 1,400 feet north of Chickahominy River, New Kent County.

A--0 to 7 inches; dark grayish brown (10YR 4/2) fine sand; weak fine granular structure; very friable; many fine and medium roots and common coarse roots; many fine and medium pores; very strongly acid; clear smooth boundary.

E1--7 to 24 inches; yellowish brown (10YR 5/6) fine sand; weak coarse granular structure; very friable; common fine and medium roots and few coarse roots; many fine and medium pores; strongly acid; gradual smooth boundary.

E2--24 to 39 inches; brownish yellow (10YR 6/6) fine sand; few pale brown (10YR 6/3) mottles; single grain; loose; few fine and medium roots; many fine and medium pores; few fine flakes of mica; strongly acid; gradual smooth boundary.

E and Bt--39 to 72 inches; brownish yellow (10YR 6/6) and light yellowish brown (10YR 6/4) fine sand (E); single grain; loose; few fine and medium roots; few fine flakes of mica; yellowish brown (10YR 5/8) fine sandy loam lamellae (Bt) 6 to 25 mm thick, and totaling 55 to 100 mm thick; weak fine subangular blocky structure; very friable; many distinct clay films and clay bridges on sand grains; strongly acid.

Table A: Particle-size distribution* for Catpoint fine sand

| Depth | Sand | | | | | | Silt | Clay |
|---------------|----------------------------------|----|-----|-----|----|-------|------|------|
| | VC | C | M | F | VF | Total | | |
| <u>inches</u> | <u>g kg⁻¹ of soil</u> | | | | | | | |
| 0-7 | 5 | 21 | 157 | 621 | 79 | 883 | 76 | 41 |
| 7-24 | 1 | 10 | 116 | 675 | 99 | 901 | 67 | 32 |
| 24-39 | 1 | 9 | 108 | 703 | 96 | 917 | 57 | 26 |
| 39-72 | 1 | 11 | 156 | 707 | 66 | 941 | 17 | 42 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table B. Chemical properties for Catpoint fine sand

| Depth | Exchangeable cations | | | | CEC* | BS** |
|---------------|--------------------------------------|------------------|----------------|----------------|-------|----------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| <u>inches</u> | <u>cmol (+) kg⁻¹ soil</u> | | | | | <u>%</u> |
| 0-7 | 0.01 | 0.05 | 0.06 | 10.92 | 11.04 | 1.09 |
| 7-24 | 0.03 | 0.01 | 0.01 | 4.41 | 4.46 | 1.12 |
| 24-39 | 0.02 | 0.02 | 0.00 | 1.68 | 1.72 | 2.33 |
| 39-72 | 0.01 | 0.05 | 0.01 | 3.15 | 3.22 | 2.17 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.

**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for Catpoint fine sand

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|------|--------------------------------------|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 0-7 | ND | 4.75 | 1.65 | 1.77 | 6.78 |
| 7-24 | ND | 5.10 | 0.65 | 0.70 | 71.43 |
| 24-39 | ND | 5.20 | 0.55 | 0.59 | 6.78 |
| 39-72 | ND | 5.32 | 0.85 | 0.92 | 7.61 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.

**EBS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{ECEC}} \times 100$.

Table E: Sand mineralogy for Catpoint fine sand

| Depth | Quartz | Feldspar | Mica | Opaque Minerals* | Heavy Minerals* | Misc* |
|---------------|----------------------------------|----------|------|------------------|-----------------|-------|
| <u>inches</u> | <u>g kg⁻¹ of sand</u> | | | | | |
| 7-39 | 900 | 60 | 10 | 10 | Tr | 10 |

*Opaque Minerals are ilmenite, magnetite, hematite, etc. Heavy Minerals are translucent zircon, tourmaline, rutile, epidote, hornblende, etc. Misc = rock fragments.

Table F. Chemical properties* for Catpoint fine sand

| Depth | OM | pH | Ca ²⁺ | Mg ²⁺ | P | K ⁺ | Zn | Mn |
|---------------|----------|----|------------------|------------------|----|----------------|-----|-----|
| <u>inches</u> | <u>%</u> | | <u>ppm</u> | | | | | |
| 0-7 | - | - | 36 | 6 | 60 | 9 | 0.6 | 9.2 |
| 7-24 | - | - | 36 | 3 | 21 | 6 | 0.3 | 4.0 |
| 24-39 | - | - | 36 | 3 | 15 | 4 | 0.2 | 2.0 |
| 39-72 | - | - | 48 | 7 | 9 | 6 | 0.2 | 0.5 |

*Soil Testing and Plant Analysis Laboratory, Agronomy Department, Va Tech, Blacksburg, VA 24061.

Chickahominy Series

Soil of the Chickahominy series are deep and poorly drained. They formed in clayey fluvial sediments. Chickahominy soils are on low-lying flats and in depression along major river in the Coastal Plain. Slopes range from 0 to 2 percent. (This is the "Typical Pedon" for the Official Description of the Chickahominy Series.)

Pedon of Chickahominy silt loam, about 300 feet west of intersection of VA-5 and VA-613, 100 feet south of VA-5, James City County.

A--0 to 2 inches; dark grayish brown (2.5Y 4/2) silt loam; moderate medium and fine granular structure; friable, sticky, plastic; many fine, medium, and coarse roots; few fine tubular pores; extremely acid; abrupt smooth boundary.

E--2 to 7 inches; grayish brown (2.5Y 5/2) silt loam; common faint light olive brown (2.5Y 5/4) mottles and common faint distinct very dark grayish brown (10YR 3/2) mottles; moderate medium granular and weak fine subangular blocky structure; friable, sticky, plastic; many fine, medium, and coarse roots; common very fine tubular pores; few fine flake of mica; extremely acid; clear smooth boundary.

Btg1--7 to 13 inches; gray (N 6/) silty clay loam; common medium prominent yellowish brown (10YR 5/8) mottles; strong medium and fine subangular blocky structure; very firm, sticky, plastic; common fine, medium, and coarse roots; few very fine tubular pores; few distinct clay films on faces of peds; few fine flake of mica; extremely acid; gradual smooth boundary.

Btg2--13 to 33 inches; gray (N 6/) silty clay; common fine and medium prominent yellowish brown (10YR 5/8) mottles; weak medium prismatic structure parting to strong fine and medium angular blocky structure; very firm, sticky, plastic; common fine and medium roots along primary structure faces; few very fine tubular pores; common prominent clay films on faces of peds; few fine flakes of mica; very strongly acid; gradual smooth boundary.

Btg3--33 to 47 inches; gray (5Y 6/1) silty clay; common medium prominent yellowish brown (10YR 5/8) mottles; moderate coarse prismatic structure parting to strong medium and fine angular blocky structure; very firm, sticky, plastic; common fine and few medium roots along primary structure faces; common prominent clay films on faces of peds; few fine flakes of mica; extremely acid; gradual smooth boundary.

Btg4--47 to 61 inches; gray (5Y 5/1) silty clay; common medium prominent yellowish brown (10YR 5/8) mottles; strong medium and fine subangular and angular blocky structure; firm, sticky, plastic; few fine and medium roots; few distinct clay films on faces of peds; few fine flakes of mica; very strongly acid; gradual smooth boundary.

Btg5--61 to 85 inches; gray (5Y 6/1) clay loam; common medium prominent yellowish brown (10YR 5/8) mottles; strong medium and fine subangular and angular blocky structure; firm, sticky, plastic; few fine roots; few very fine tubular pores; few distinct clay films on faces of peds; few fine flakes of mica; very strongly acid.

Table A: Particle-size distribution* for Chickahominy silt loam

| Depth | Sand | | | | | Total | Silt | Clay |
|---------------|----------------------------------|---|----|-----|----|-------|------|------|
| | VC | C | M | F | VF | | | |
| <u>inches</u> | <u>g kg⁻¹ of soil</u> | | | | | | | |
| 0-2 | 2 | 7 | 13 | 36 | 52 | 110 | 721 | 169 |
| 2-7 | 0 | 4 | 5 | 47 | 53 | 109 | 674 | 217 |
| 7-13 | 0 | 2 | 5 | 19 | 58 | 84 | 634 | 282 |
| 13-33 | 0 | 1 | 2 | 12 | 58 | 73 | 425 | 502 |
| 33-47 | 0 | 2 | 1 | 39 | 31 | 73 | 408 | 519 |
| 47-61 | 0 | 1 | 0 | 83 | 56 | 140 | 410 | 450 |
| 61-85 | 1 | 1 | 14 | 214 | 56 | 286 | 382 | 332 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table B. Chemical properties for Chickahominy silt loam

| Depth | Exchangeable cations | | | | CEC* | BS** |
|---------------|--------------------------------------|------------------|----------------|----------------|-------|----------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| <u>inches</u> | <u>cmol (+) kg⁻¹ soil</u> | | | | | <u>%</u> |
| 0-2 | 0.77 | 0.38 | 0.31 | 18.80 | 20.26 | 7.20 |
| 2-7 | 0.07 | 0.15 | 0.11 | 10.40 | 10.73 | 3.08 |
| 7-13 | 0.09 | 0.27 | 0.15 | 14.20 | 14.71 | 3.47 |
| 13-33 | 0.06 | 1.13 | 0.14 | 18.20 | 19.53 | 6.81 |
| 33-47 | 0.04 | 2.10 | 0.14 | 19.20 | 21.48 | 10.61 |
| 47-61 | 0.06 | 2.40 | 0.11 | 17.00 | 19.57 | 13.13 |
| 61-85 | 0.05 | 2.30 | 0.11 | 14.80 | 17.26 | 14.25 |
| 57 | 0.00 | 1.60 | 0.29 | 18.00 | 19.89 | 9.50 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.

**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for Chickahominy silt loam

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|------|--|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 0-2 | 9.80 | 4.23 | 6.15 | 7.61 | 19.19 |
| 2-7 | 1.28 | 4.45 | 6.25 | 6.58 | 5.02 |
| 7-13 | 0.79 | 4.38 | 9.95 | 10.46 | 4.88 |
| 13-33 | 0.31 | 4.78 | 14.05 | 15.38 | 8.65 |
| 33-47 | 0.21 | 4.42 | 15.65 | 17.93 | 12.72 |
| 47-61 | 0.10 | 4.58 | 14.45 | 17.02 | 15.10 |
| 61-85 | 0.10 | 4.54 | 12.12 | 14.58 | 16.87 |
| 57 | 0.10 | 4.07 | 13.45 | 15.34 | 12.32 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.

**EBS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{EEC}} \times 100$.

Table F. Chemical properties* for Chickahominy silt loam

| Depth | OM | pH | Ca ²⁺ | Mg ²⁺ | P | K ⁺ | Zn | Mn |
|---------------|----------|----|------------------|------------------|----|----------------|-----|------|
| <u>inches</u> | <u>%</u> | | <u>ppm</u> | | | | | |
| 0-2 | - | - | 151 | 36 | 16 | 56 | 2.4 | 3.0 |
| 2-7 | - | - | 51 | 12 | 15 | 24 | 1.4 | 0.9 |
| 7-13 | - | - | 51 | 24 | 15 | 24 | 1.8 | 3.0 |
| 13-33 | - | - | 17 | 71 | 14 | 22 | 1.9 | 1.54 |
| 33-47 | - | - | 34 | 38 | 17 | 33 | 4.0 | 2.7 |
| 47-61 | - | - | 51 | 199 | 14 | 43 | 4.6 | 3.4 |
| 61-72 | - | - | 34 | 199 | 14 | 37 | 5.0 | 2.0 |

*Soil Testing and Plant Analysis Laboratory, Agronomy Department, Va Tech, Blacksburg, VA 24061.

Conetoe Series

Soils of the Conetoe series are very deep and well drained. They formed in fluvial sediments. Conetoe soils are on low-lying stream terraces. Slopes range from 0 to 4 percent.

Typical pedon of Conetoe loamy sand, 0 to 4 percent slopes, about 1,000 feet northwest of the junction of VA-614 and VA-608, 5,550 feet south of Pamunkey River, 300 feet northeast of VA-608, New Kent County.

A-0 to 5 inches; dark grayish brown (10YR 4/2) loamy sand; weak fine granular structure; very friable, nonsticky, nonplastic; common fine medium and coarse roots; common fine tubular pores; strongly acid; clear smooth boundary.

E1-5 to 10 inches; light yellowish brown (10YR 6/4) loamy sand; weak fine granular structure; very friable, nonsticky, nonplastic; common fine medium and few coarse roots; common fine and medium tubular pores; strongly acid; clear smooth boundary.

E2-10 to 25 inches; brownish yellow (10YR 6/6) loamy sand; few fine faint pale brown (10YR 6/3) sand stripping; single grain; loose, nonsticky, nonplastic; few fine and medium roots; common fine and medium tubular pores; strongly acid; clear smooth boundary.

Bt1--25 to 31 inches; yellowish brown (10YR 5/6) fine sandy loam; weak medium and fine granular structure; very friable, slightly sticky, nonplastic; few fine and medium roots; common fine and medium tubular pores; many distinct clay films and clay bridges on sand grains; strongly acid; clear smooth boundary.

Bt2--31 to 46 inches; yellowish brown (10YR 5/6) loamy sand; weak coarse subangular blocky structure; friable, slightly sticky, nonplastic; few fine and medium roots; few fine and medium tubular pores; many distinct clay films and clay bridges on sand grains; very strongly acid; gradual smooth boundary.

BC--46 to 55 inches; yellowish brown (10YR 5/6) sand; weak medium granular structure; very friable, nonsticky, nonplastic; few fine roots; few faint clay films and bridging on sand grains; few flakes of mica; strongly acid; gradual wavy boundary.

C--55 to 72 inches; yellowish brown (10YR 5/8) sand; common medium faint light yellowish brown (10YR 6/4) mottles; single grain; loose, nonsticky, nonplastic; few fine flakes of mica; common black grains of sand; strongly acid.

Table A: Particle-size distribution* for Conetoe loamy sand

| Depth | Sand | | | | | | Silt | Clay |
|--------|----------------------------|----|-----|-----|----|-------|------|------|
| | VC | C | M | F | VF | Total | | |
| inches | g kg ⁻¹ of soil | | | | | | | |
| 0-10 | 3 | 62 | 360 | 351 | 76 | 852 | 113 | 35 |
| 10-25 | 3 | 52 | 341 | 340 | 81 | 817 | 147 | 36 |
| 25-31 | 1 | 26 | 280 | 359 | 80 | 746 | 173 | 81 |
| 31-46 | 3 | 77 | 379 | 328 | 78 | 865 | 38 | 97 |
| 46-55 | 0 | 82 | 542 | 288 | 26 | 938 | 23 | 39 |
| 55-100 | 2 | 61 | 388 | 428 | 53 | 932 | 20 | 48 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table B. Chemical properties for Conetoe loamy sand

| Depth | Exchangeable cations | | | | CEC* | BS** |
|---------------|--|------------------|----------------|----------------|------|----------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| <u>inches</u> | <u>cmol (+) kg⁻¹ soil</u> | | | | | <u>%</u> |
| 0-10 | 0.13 | 0.06 | 0.06 | 4.20 | 4.45 | 5.62 |
| 10-25 | 0.06 | 0.04 | 0.03 | 2.73 | 2.86 | 4.55 |
| 25-31 | 0.99 | 0.41 | 0.07 | 3.15 | 4.62 | 31.82 |
| 31-46 | 0.59 | 0.48 | 0.05 | 4.83 | 5.95 | 18.82 |
| 46-55 | 0.04 | 0.44 | 0.01 | 2.52 | 3.01 | 16.28 |
| 55-100 | 0.02 | 0.62 | 0.03 | 2.94 | 3.61 | 18.56 |
| 72 | 0.06 | 0.66 | 0.01 | 2.31 | 3.04 | 24.01 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.

**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for Conetoe loamy sand

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|------|--|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 0-10 | ND | 5.10 | 0.95 | 1.2 | 20.83 |
| 10-25 | ND | 5.17 | 0.90 | 1.03 | 12.62 |
| 25-31 | ND | 5.30 | 0.85 | 2.32 | 63.36 |
| 31-46 | ND | 4.87 | 1.85 | 2.97 | 37.71 |
| 46-55 | ND | 5.27 | 0.75 | 1.24 | 39.52 |
| 55-100 | ND | 5.31 | 0.85 | 1.52 | 40.79 |
| 72 | ND | 5.22 | 0.75 | 1.48 | 49.32 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.

**EBS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{ECEC}} \times 100$.

Table E: Sand mineralogy for Conetoe loamy sand

| Depth | Quartz | Feldspar | Mica | Opaque Minerals* | Heavy Minerals* | Misc* |
|---------------|----------------------------------|----------|------|------------------|-----------------|-------|
| <u>inches</u> | <u>g kg⁻¹ of sand</u> | | | | | |
| 31-55 | 800 | 130 | 10 | 10 | 20 | 30 |

*Opaque Minerals are ilmenite, magnetite, hematite, etc. Heavy Minerals are translucent zircon, tourmaline, rutile, epidote, hornblende, etc. Misc = rock fragments.

Craven Series

Soils of the Craven series are very deep and moderately well drained. They formed in clayey fluvial and marine sediments. They are on uplands in the Coastal Plain. Slopes range from 2 to 10 percent.

Pedon of Craven fine sandy loam in an area of Craven-Uchee complex, 6 to 10 percent slopes, about 2700 feet east of Skimino Creek bridge on VA-602 and 750 feet east of pond on Skimino Girl Scout Camp, York County.

A-0 to 4 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak fine granular structure; friable, nonsticky, nonplastic; many fine and medium roots; very strongly acid; clear smooth boundary.

E-4 to 9 inches; pale olive (5Y 6/3) fine sandy loam; weak medium granular structure; friable, slightly sticky, nonplastic; many fine and medium roots; very strongly acid; abrupt smooth boundary.

Bt1--9 to 22 inches; yellowish brown (10YR 5/6) clay; strong fine subangular blocky structure; firm, sticky, plastic; common fine roots; common distinct clay films on faces of peds; extremely acid; clear smooth boundary.

Bt2--22 to 30 inches; yellowish brown (10YR 5/8) sandy clay loam; common medium prominent light gray (2.5Y 7/2) mottles; moderate medium subangular blocky structure; firm, sticky, plastic; few fine roots; common distinct clay films on faces of peds; extremely acid; clear smooth boundary.

Bt3--30 to 42 inches; yellowish brown (10YR 5/8) sandy clay loam; many fine prominent light gray (2.5Y 7/2) mottles; weak medium subangular blocky structure; friable, sticky, plastic; few fine roots; few faint clay films on faces of peds; extremely acid; clear smooth boundary.

C1--42 to 60 inches; brownish yellow (10YR 6/6) fine sandy loam; common medium prominent light gray (10YR 7/2) mottles; massive, very friable, nonsticky; nonplastic; extremely acid; clear smooth boundary.

C2--60 to 72 inches; light gray (2.5Y 7/2) loamy fine sand; few fine prominent brownish yellow (10YR 6/6) mottles; massive; very friable, nonsticky, nonplastic; extremely acid.

Table A: Particle-size distribution* for Craven fine sandy loam

| Depth | Sand | | | | | Total | Silt | Clay |
|--------|----------------------------|----|-----|-----|-----|-------|------|------|
| | VC | C | M | F | VF | | | |
| inches | g kg ⁻¹ of soil | | | | | | | |
| 0-4 | 7 | 18 | 88 | 294 | 207 | 614 | 297 | 89 |
| 4-9 | 5 | 15 | 78 | 278 | 210 | 586 | 260 | 154 |
| 9-22 | 2 | 5 | 26 | 104 | 110 | 247 | 319 | 434 |
| 22-30 | 5 | 2 | 24 | 234 | 211 | 476 | 225 | 299 |
| 30-42 | 0 | 2 | 37 | 239 | 243 | 521 | 255 | 224 |
| 42-60 | 7 | 29 | 160 | 502 | 115 | 813 | 63 | 124 |
| 60-72 | 7 | 13 | 203 | 527 | 127 | 877 | 54 | 69 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Craven Series - Supplemental Profile 1

Pedon of Craven fine sandy loam, 6 to 10 percent slopes, about 1000 feet west of York River State Park Road and 4000 feet southwest of the York River, James City County.

A--0 to 4 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak fine granular structure; friable, slightly sticky, slightly plastic; many fine, medium, and coarse roots; common fine and medium tubular pores; extremely acid; clear smooth boundary.

E--4 to 7 inches; yellowish brown (10YR 5/8) fine sandy loam; weak fine granular structure; friable, slightly sticky, slightly plastic; common fine and medium roots and few coarse roots; common fine and medium tubular pores; extremely acid; clear smooth boundary.

Bt1--7 to 17 inches; strong brown (7.5YR 5/6) sandy clay; few fine distinct pale brown (10YR 6/3) and yellowish brown (10YR 5/8) mottles; strong medium subangular blocky structure; firm, sticky, plastic; common fine and medium roots; common fine and medium tubular pores; common distinct clay films on faces of peds; extremely acid; clear wavy boundary.

Bt2--17 to 27 inches; mottled strong brown (7.5YR 5/6), gray (10YR 6/1), yellowish brown (10YR 5/8), and yellowish red (5YR 5/6) sandy clay loam; moderate coarse subangular blocky structure; friable, sticky, plastic; common fine roots; common fine tubular pores; common faint clay films on faces of peds; few fine flakes of mica; extremely acid; clear wavy boundary.

Bt and C--27 to 37 inches; mottled strong brown (7.5YR 5/6), yellowish red (5YR 5/6), and light gray (10YR 6/1) clay and sandy clay loam; massive and weak coarse subangular blocky structure; friable, sticky, plastic; few fine and medium roots; common fine and medium tubular pores; common faint clay films on vertical faces of peds; few fine flakes of mica; very strongly acid; clear wavy boundary.

C1--37 to 52 inches; yellowish brown (10YR 5/8) stratified sandy clay loam and fine sandy loam; common medium prominent red (2.5YR 5/8), yellowish red (5YR 5/8), and light gray (10YR 7/1) mottles; massive; friable, sticky, plastic; common fine and medium tubular pores; few clay lenses and films in vertical streaks; few fine flakes of mica; very strongly acid; gradual smooth boundary.

C2--52 to 60 inches; yellowish brown (10YR 5/8) fine sandy loam; few medium prominent strong brown (7.5YR 5/6) and common medium prominent light gray (10YR 7/1) mottles; massive; friable, slightly sticky, slightly plastic; common fine tubular pores; few fine flakes of mica; very strongly acid.

Table A: Particle-size distribution* for Craven fine sandy loam

| Depth | Sand | | | | | Total | Silt | Clay |
|---------------|----------------------------------|-----|-----|-----|-----|-------|------|------|
| | VC | C | M | F | VF | | | |
| <u>inches</u> | <u>g kg⁻¹ of soil</u> | | | | | | | |
| 0-4 | 6 | 81 | 216 | 253 | 105 | 661 | 254 | 85 |
| 4-7 | 7 | 79 | 218 | 248 | 104 | 656 | 209 | 135 |
| 7-17 | 10 | 78 | 202 | 150 | 26 | 466 | 94 | 440 |
| 17-27 | 15 | 91 | 231 | 178 | 33 | 548 | 107 | 345 |
| 17-37 | 15 | 85 | 224 | 157 | 38 | 519 | 101 | 380 |
| 37-52 | 23 | 126 | 301 | 191 | 47 | 688 | 82 | 230 |
| 52-60 | 30 | 136 | 363 | 204 | 35 | 768 | 49 | 183 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table B. Chemical properties for Craven fine sandy loam

| Depth | Exchangeable cations | | | | CEC* | BS** |
|---------------|--------------------------------------|------------------|----------------|----------------|------|----------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| <u>inches</u> | <u>cmol (+) kg⁻¹ soil</u> | | | | | <u>%</u> |
| 57 | 0.00 | 0.07 | 0.05 | 5.00 | 5.12 | 2.34 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.

**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for Craven fine sandy loam

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|------|--------------------------------------|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 57 | ND | 3.72 | 3.85 | 3.97 | 3.02 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.

**EBS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{ECEC}} \times 100$.

Table E: Sand mineralogy for Craven fine sandy loam

| Depth | Quartz | Feldspar | Mica | Opaque Minerals* | Heavy Minerals* | Misc* |
|---------------|----------------------------------|----------|------|------------------|-----------------|-------|
| <u>inches</u> | <u>g kg⁻¹ of sand</u> | | | | | |
| 7-27 | 940 | 40 | 0 | 0 | 20 | 0 |

*Opaque Minerals are ilmenite, magnetite, hematite, etc. Heavy Minerals are translucent zircon, tourmaline, rutile, epidote, hornblende, etc. Misc = rock fragments.

Craven Series - Supplemental Profile 2

Pedon of Craven fine sandy loam, 2 to 6 percent slopes, 500 feet east of C and O Railroad, 2,000 feet southeast of Norge Elementary School, in peach orchard, James City County.

Ap--0 to 7 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak fine granular structure; friable, nonsticky, nonplastic; many fine and medium roots; very strongly acid; clear smooth boundary.

Bt1--7 to 12 inches; yellowish brown (10YR 5/6) clay loam; moderate medium subangular blocky structure; friable, sticky, plastic; common fine roots; common faint clay films on faces of peds; extremely acid; clear smooth boundary.

Bt2--12 to 18 inches; yellowish brown (10YR 5/8) clay; strong fine subangular blocky structure; firm, sticky, plastic; common fine roots; common distinct clay films on faces of peds; extremely acid; clear smooth boundary.

Bt3--18 to 24 inches; yellowish brown (10YR 5/8) clay; many medium prominent yellowish red (5YR 5/8), common medium prominent gray (10YR 6/1) and few medium prominent weak red (2.5YR 5/2) mottles; strong fine subangular blocky structure; firm, sticky, plastic; common fine roots; common distinct clay films on faces of peds; extremely acid; clear smooth boundary.

Bt4--24 to 46 inches; yellowish brown (10YR 3/6) clay; many coarse prominent weak red (2.5YR 5/2) and gray (10YR 6/1) mottles; strong fine subangular blocky structure; firm, sticky, plastic; few fine roots; common distinct clay films on faces of peds; extremely acid; gradual wavy boundary.

2C--46 to 70 inches; stratified brown (7.5YR 4/4) and yellowish brown (10YR 5/8) sand and clay; strata 1/2 to 6 inches thick; massive clay and single grain sand; friable, sticky, plastic clay; loose sand; extremely acid.

Table A: Particle-size distribution* for Craven fine sandy loam

| Depth | Sand | | | | | | Silt | Clay |
|--------|----------------------------|----|----|-----|-----|-------|------|------|
| | VC | C | M | F | VF | Total | | |
| inches | g kg ⁻¹ of soil | | | | | | | |
| 7-27 | 5 | 13 | 57 | 192 | 135 | 402 | 279 | 319 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Dogue Series

Soils of the Dogue series are very deep and moderately well drained. They formed in fluvial and marine sediments. They are on stream terraces. Slopes range from 0 to 2 percent.

Typical pedon of Dogue fine sandy loam, 0 to 2 percent slopes, 8,000 feet northwest of mouth of Ware Creek, 5,000 feet east of the Mt. Olive Baptist Church and 4,000 feet southwest of Terrapin Point on York River, New Kent County.

A--0 to 3 inches; dark grayish brown (10YR 4/2) fine sandy loam; moderate medium granular structure; friable, slightly sticky, slightly plastic; common fine medium and coarse roots; common fine tubular pores; very strongly acid; clear smooth boundary.

E--3 to 9 inches; pale brown (10YR 6/3) fine sandy loam; moderate medium granular structure; friable, slightly sticky, slightly plastic; few fine medium and coarse roots; common fine and medium tubular pores; strongly acid; clear smooth boundary.

BE--9 to 13 inches; light olive brown (2.5Y 5/4) and light yellowish brown (2.5Y 6/4) loam; moderate medium subangular blocky structure; friable, sticky, plastic; few fine medium and coarse roots; common fine and medium tubular pores; few faint clay films on faces of peds; strongly acid; clear smooth boundary.

Bt1--13 to 24 inches; yellowish brown (10YR 5/4) clay; moderate medium and fine subangular blocky structure; firm, sticky, plastic; few fine and medium roots; common fine tubular pores; many distinct clay films on faces of peds; strongly acid; clear smooth boundary.

Bt2--24 to 33 inches; yellowish brown (10YR 5/4) clay; common medium prominent gray (10YR 6/1) mottles and few fine distinct strong brown (7.5YR 5/8) mottles; strong medium and fine subangular and angular blocky structure; firm, sticky, plastic; few fine roots; few fine tubular pores; many distinct clay films on faces of peds; strongly acid; clear smooth boundary.

Bt3--33 to 43 inches; mottled gray (5YR 6/1), yellowish brown (10YR 5/4), and yellowish red (5YR 4/6) clay; strong coarse and medium angular blocky structure; firm, sticky, plastic; few fine roots; few fine tubular pores; many distinct clay films on faces of peds; few fine flakes of mica; strongly acid; gradual smooth boundary.

BC--43 to 60 inches; mottled gray (5YR 6/1), strong brown (7.5YR 5/6), and yellowish red (5YR 4/6) sandy clay loam; massive; firm, sticky, plastic; few fine roots along vertical clay flows; few thick vertical clay flows; common fine flakes of mica; few grains of feldspar; strongly acid.

Table A: Particle-size distribution* for Dogue fine sandy loam

| Depth | Sand | | | | | | Silt | Clay |
|---------------|----------------------------------|----|-----|-----|----|-------|------|------|
| | VC | C | M | F | VF | Total | | |
| <u>inches</u> | <u>g kg⁻¹ of soil</u> | | | | | | | |
| 0-3 | 1 | 18 | 176 | 373 | 23 | 591 | 345 | 64 |
| 3-9 | 1 | 9 | 169 | 339 | 21 | 539 | 371 | 90 |
| 9-13 | 1 | 5 | 131 | 387 | 19 | 543 | 240 | 217 |
| 13-24 | 1 | 7 | 115 | 252 | 12 | 387 | 170 | 443 |
| 24-33 | 0 | 6 | 135 | 260 | 12 | 413 | 168 | 419 |
| 33-43 | 0 | 6 | 131 | 303 | 11 | 451 | 124 | 425 |
| 43-60 | 0 | 7 | 193 | 410 | 12 | 622 | 94 | 284 |
| 59 | 0 | 6 | 193 | 449 | 7 | 655 | 79 | 266 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table B. Chemical properties for Dogue fine sandy loam

| Depth | Exchangeable cations | | | | CEC* | BS** |
|---------------|--------------------------------------|------------------|----------------|----------------|-------|----------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| <u>inches</u> | <u>cmol (+) kg⁻¹ soil</u> | | | | | <u>%</u> |
| 0-3 | 0.01 | 0.01 | 0.09 | 9.66 | 9.77 | 1.13 |
| 3-9 | 0.02 | 0.01 | 0.07 | 5.04 | 5.14 | 1.95 |
| 9-13 | 0.18 | 0.19 | 0.18 | 9.87 | 10.42 | 5.28 |
| 13-24 | 0.94 | 0.94 | 0.28 | 17.22 | 19.38 | 11.15 |
| 24-33 | 0.92 | 0.96 | 0.26 | 17.85 | 19.99 | 10.71 |
| 33-43 | 0.57 | 0.85 | 0.26 | 18.06 | 19.74 | 8.51 |
| 43-60 | 0.11 | 0.57 | 0.22 | 14.49 | 15.39 | 5.85 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.

**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for Dogue fine sandy loam

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|------|--|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 0-3 | ND | 4.80 | 2.15 | 2.26 | 4.87 |
| 3-9 | ND | 5.42 | 1.25 | 1.35 | 7.41 |
| 9-13 | ND | 5.40 | 3.75 | 4.3 | 12.79 |
| 13-24 | ND | 5.41 | 7.65 | 9.81 | 22.01 |
| 24-33 | ND | 5.45 | 10.05 | 12.19 | 17.56 |
| 33-43 | ND | 5.18 | 11.25 | 12.93 | 12.99 |
| 43-60 | ND | 5.20 | 9.45 | 10.35 | 8.69 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.

**EBS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^+}{\text{ECEC}} \times 100$.

Table D: Clay mineralogy for Dogue fine sandy loam

| Depth | HIV* | Mica | Kaolinite | Quartz | Mont* | Gibbsite | Misc* |
|---------------|----------------------------------|------|-----------|--------|-------|----------|-------|
| <u>inches</u> | <u>g kg⁻¹ of clay</u> | | | | | | |
| 13-24 | 330 | 50 | 420 | 50 | 150 | 0 | 0 |

*HIV = hydroxy interlayered vermiculite. Mont = montmorillonite. Misc = vermiculite/montmorillonite.

Table F. Chemical properties* for Dogue fine sandy loam

| Depth | OM | pH | Ca ²⁺ | Mg ²⁺ | P | K ⁺ | Zn | Mn |
|---------------|----------|-----|------------------|------------------|---|----------------|-----|-----|
| <u>inches</u> | <u>%</u> | | <u>ppm</u> | | | | | |
| 0-3 | 2.0 | 4.3 | 24 | 5 | 4 | 20 | 0.8 | 3.8 |
| 3-9 | 0.9 | 4.7 | 36 | 5 | 4 | 17 | 0.6 | 2.9 |
| 9-13 | 0.7 | 4.7 | 72 | 36 | 3 | 39 | 0.3 | 0.6 |
| 13-24 | 0.7 | 4.9 | 132 | 71 | 3 | 37 | 0.4 | 0.3 |
| 24-33 | 0.5 | 4.6 | 132 | 71 | 3 | 47 | 0.4 | 0.2 |
| 33-43 | 0.5 | 4.5 | 96 | 59 | 3 | 40 | 0.4 | 0.1 |
| 43-60 | 0.5 | 4.5 | 48 | 49 | 3 | 34 | 0.4 | 0.1 |

*Soil Testing and Plant Analysis Laboratory, Agronomy Department, Va Tech, Blacksburg, VA 24061.

Dogue Series - Supplemental Profile 1

Soils of the Dogue series are deep and moderately well drained. They formed in clayey fluvial sediments. Dogue soils are on stream terraces along major rivers on the Coastal Plain. Slopes range from 0 to 3 percent.

Typical pedon of Dogue loam, about 2,800 feet southeast of the mouth of Taskinas Creek and 500 feet south of the York River in York River State Park, James City County:

Ap1--0 to 3 inches; dark grayish brown (10YR 4/2) loam; weak fine granular structure; friable, slightly sticky, slightly plastic; many fine, common medium and few coarse roots; common fine pores; neutral; clear smooth boundary.

Ap2--3 to 11 inches; dark grayish brown (10YR 4/2) loam; moderate fine granular and weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; common fine and medium and few coarse roots; many fine pores; slightly acid; clear smooth boundary.

Bt1--11 to 14 inches; yellowish brown (10YR 5/4) loam; moderate medium subangular blocky structure; friable, sticky, plastic; few fine and common roots; many fine pores; moderately acid; abrupt smooth boundary.

Bt2--14 to 26 inches; yellowish brown (10YR 5/4) clay; few fine faint pale brown (10YR 6/3) mottles; moderate medium subangular blocky structure; firm, sticky, plastic; common fine medium and coarse roots; common fine pores; common distinct clay films on faces of peds; strongly acid; gradual smooth boundary.

Bt3--26 to 36 inches; yellowish brown (10YR 5/4) clay; many fine faint yellowish brown (10YR 5/8) mottles and common prominent gray (10YR 6/1) mottles; moderate fine and medium subangular blocky structure; very firm, sticky, plastic; few fine roots; few fine pores; many prominent clay films on faces of peds; very strongly acid; gradual smooth boundary.

Bt4--36 to 43 inches; reddish yellow (7.5YR 6/8) clay; many medium prominent yellowish brown (10YR 5/6) mottles and many fine distinct gray (10YR 6/1) mottles; moderate medium and fine subangular and angular blocky structure; firm, sticky, plastic; few fine roots along vertical faces of peds; few fine pores; many prominent clay films on faces of peds; very strongly acid; gradual smooth boundary.

Bt5--43 to 52 inches; light brownish gray (10YR 6/2) sandy clay loam; many medium distinct reddish yellow (7.5YR 6/8) mottles, common fine faint yellowish brown (10YR 5/6) mottles, and few fine prominent yellowish red (5YR 5/6) mottles; moderate coarse subangular blocky structure; friable, sticky, plastic; few fine and medium roots; few fine pores; very strongly acid; gradual smooth boundary.

C--52 to 60 inches; mottled yellowish brown (10YR 5/6), strong brown (7.5YR 5/8), pale brown (10YR 6/3), and light brownish gray (10YR 6/2) sandy loam; massive; friable, sticky, slightly plastic; strongly acid.

Table A: Particle-size distribution* for Dogue loam

| Depth | Sand | | | | | Total | Silt | Clay |
|--------|----------------------------|----|-----|-----|----|-------|------|------|
| | VC | C | M | F | VF | | | |
| inches | g kg ⁻¹ of soil | | | | | | | |
| 3-11 | 4 | 25 | 233 | 228 | 1 | 491 | 394 | 115 |
| 11-14 | 3 | 27 | 209 | 214 | 34 | 487 | 366 | 147 |
| 14-26 | 2 | 20 | 162 | 157 | 21 | 362 | 228 | 410 |
| 26-36 | 4 | 19 | 148 | 153 | 9 | 333 | 196 | 471 |
| 36-43 | 5 | 26 | 135 | 180 | 36 | 382 | 130 | 488 |
| 43-52 | 3 | 48 | 366 | 254 | 9 | 680 | 46 | 274 |
| 52-60 | 2 | 71 | 417 | 298 | 8 | 796 | 16 | 188 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Dogue Series - Supplemental Profile 2

Supplemental pedon of Dogue loam, near Old Forge pond, 3,500 feet north of dam; Providence Forge, Southern States Research Farm, New Kent County.

Ap--0 to 8 inches; light olive brown (2.5YR 5/4) loam; moderate medium granular structure; friable, slightly sticky, slightly plastic; common fine and medium roots; common fine tubular pores; very strongly acid; clear smooth boundary.

Bt1--8 to 12 inches; yellowish brown (10YR 5/4) silty clay loam; moderate medium and fine subangular blocky structure; firm, sticky, plastic; few fine roots; common fine tubular pores; many distinct clay films on faces of peds; strongly acid; clear smooth boundary.

Bt2--12 to 27 inches; yellowish brown (10YR 5/4) silty clay; moderate medium and fine subangular blocky structure; firm, sticky, plastic; few fine and medium roots; common fine tubular pores; many distinct clay films on faces of peds; strongly acid; clear smooth boundary.

Bt3--27 to 32 inches; yellowish brown (10YR 5/4) silty clay loam; common medium distinct gray (10YR 6/1) mottles; strong medium and fine subangular and angular blocky structure; firm, sticky, plastic; few fine roots; few fine tubular pores; many distinct clay films on faces of peds; strongly acid; clear smooth boundary.

Bt4--32 to 41 inches; gray (10YR 6/1) sandy clay; many moderate distinct light olive brown (2.5YR 5/4) mottles; moderate medium subangular blocky structure; friable, sticky, plastic; few fine roots; few fine tubular pores; few fine flakes of mica; strongly acid; gradual smooth boundary.

Cg1--41 to 47 inches; gray (10YR 6/1) sandy clay loam; common medium distinct light olive brown (2.5YR 5/4) mottles; massive; firm, sticky, plastic; few fine tubular pores; few fine flakes of mica; strongly acid; clear wavy boundary.

C1--47 to 52 inches; light yellowish brown (10YR 6/4) stratified sand, loamy sand and sandy clay loam; massive; friable, slightly sticky, slightly plastic; few fine flakes of mica; strongly acid.

C2--52 to 60 inches; mottled yellowish brown (10YR 5/6), strong brown (7.5YR 5/8), pale brown (10YR 6/3), and light brownish gray (10YR 6/2) sandy loam; massive; friable, sticky, slightly plastic; strongly acid.

Table D: Clay mineralogy for Dogue loam

| Depth | HIV* | Mica | Kaolinite | Quartz | Mont* | Gibbsite | Misc* |
|--------|----------------------------|------|-----------|--------|-------|----------|-------|
| inches | g kg ⁻¹ of clay | | | | | | |
| 8-28 | 450 | 80 | 300 | 120 | 50 | Tr | 0 |

*HIV = hydroxy interlayered vermiculite. Mont = montmorillonite. Misc = vermiculite/montmorillonite.

Table F. Chemical properties* for Dogue loam

| Depth | OM | pH | Ca ²⁺ | Mg ²⁺ | P | K ⁺ | Zn | Mn |
|---------------|-----|-----|------------------|------------------|----|----------------|-----|-----|
| <u>inches</u> | % | | <u>ppm</u> | | | | | |
| 0-8 | 3.3 | 5.1 | 156 | 33 | 27 | 44 | 0.9 | 3.9 |
| 8-41 | 0.7 | 4.6 | 48 | 17 | 14 | 25 | 0.4 | 1.1 |
| 41-72 | 0.5 | 4.6 | 24 | 18 | 9 | 9 | 0.3 | 0.3 |

*Soil Testing and Plant Analysis Laboratory, Agronomy Department, Va Tech, Blacksburg, VA 24061.

Dogue Series - Supplemental Profile 3

Supplemental pedon of Dogue silt loam, 2 percent slopes, is located on the Spratley farm about 2500 feet north of the James River, 200 feet east of farm lane between farm house and silage pit, near National Parkway, James City County.

Ap--0 to 7 inches; yellowish brown (10YR 5/4) silt loam; moderate medium granular and weak medium subangular blocky structure; friable, sticky, plastic; common fine roots; few fine tubular pores; about 1 percent quartz coarse fragments up to 4 inches in diameter; few fine flakes of mica; moderately acid; abrupt smooth boundary.

Bt1--7 to 22 inches; strong brown (7.5YR 5/6) clay; moderate fine subangular blocky structure; friable, sticky, plastic; common fine roots; few fine tubular pores; thin continuous clay films on faces of peds; few fine prominent very dark grayish brown (10YR 3/2) highly weathered mineral concretions; about 1 percent quartz coarse fragments up to 4 inches in diameter; few fine flakes of mica; very strongly acid; gradual smooth boundary.

Bt2--22 to 31 inches; yellowish brown (10YR 5/6) clay loam; common medium distinct light brownish gray (10YR 6/2) and common medium distinct strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; friable, sticky, plastic; common fine roots; few fine tubular pores; common distinct clay films on faces of peds; few fine distinct very dark grayish brown (10YR 3/2) highly weathered mineral concretions; about 1 percent quartz coarse fragments up to 4 inches in diameter; common fine flakes of mica; strongly acid; gradual smooth boundary.

Bt3--31 to 42 inches; yellowish brown (10YR 5/6) loam; common medium distinct grayish brown (10YR 5/2) and common medium distinct strong brown (7.5YR 5/8) mottles; moderate medium and coarse subangular blocky and angular blocky structure; friable, sticky, plastic; few fine roots; few vesicular pores; few faint clay films on faces of peds; few fine distinct very dark grayish brown (10YR 3/2) highly weathered mineral concretions; about 1 percent quartz coarse fragments up to 4 inches in diameter; common fine flakes of mica; strongly acid; gradual smooth boundary.

Bt4--42 to 50 inches; yellowish brown (10YR 5/6) loam; common fine and medium prominent gray (5Y 6/1) and few medium distinct strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; friable, sticky, plastic; few very fine roots; few vesicular pores; few faint clay films on faces of peds; few fine distinct very dark grayish brown (10YR 3/2) highly weathered mineral concretions; about 1 percent quartz coarse fragments up to 4 inches in diameter; common fine flakes of mica; very strongly acid; gradual smooth boundary.

Bt5--50 to 60 inches; mottled yellowish brown (10YR 5/8), gray (5Y 6/1), and strong brown (7.5YR 5/8) silt loam; moderate and weak medium subangular blocky structure; friable, sticky, plastic; few fine roots; few vesicular pores; few faint clay films on faces of peds; few fine prominent very dark grayish brown (10YR 3/2) highly weathered mineral concretions; about 1 percent quartz coarse fragments up to 4 inches in diameter; common fine flakes of mica; strongly acid.

Table A: Particle-size distribution* for Dogue silt loam

| Depth | Sand | | | | | Total | Silt | Clay |
|---------------|----------------------------------|---|----|-----|-----|-------|------|------|
| | VC | C | M | F | VF | | | |
| <u>inches</u> | <u>g kg⁻¹ of soil</u> | | | | | | | |
| 0-7 | 1 | 7 | 37 | 33 | 100 | 178 | 572 | 250 |
| 7-22 | 1 | 2 | 18 | 80 | 81 | 182 | 393 | 425 |
| 22-31 | 0 | 1 | 25 | 131 | 117 | 274 | 346 | 380 |
| 31-42 | 0 | 1 | 45 | 272 | 118 | 436 | 309 | 255 |
| 42-50 | 0 | 1 | 13 | 148 | 114 | 276 | 489 | 235 |
| 50-60 | 0 | 1 | 10 | 79 | 124 | 214 | 526 | 260 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table B. Chemical properties for Dogue silt loam

| Depth | Exchangeable cations | | | | CEC* | BS** |
|---------------|--|------------------|----------------|----------------|-------|----------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| <u>inches</u> | <u>cmol (+) kg⁻¹ soil</u> | | | | | <u>%</u> |
| 57 | 0.61 | 2.30 | 0.08 | 9.32 | 12.31 | 24.29 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.

**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for Dogue silt loam

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|-----|------------------|--|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | | <u>cmol (+) kg⁻¹ soil</u> | <u>%</u> |
| 57 | ND | 5.2 | 4.20 | 7.19 | 41.59 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.

**EBS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{ECEC}} \times 100$.

Table D: Clay mineralogy for Dogue silt loam

| Depth | HIV* | Mica | Kaolinite | Quartz | Mont* | Gibbsite | Misc* |
|---------------|----------------------------------|------|-----------|--------|-------|----------|-------|
| <u>inches</u> | <u>g kg⁻¹ of clay</u> | | | | | | |
| 7-31 | 200 | 300 | 250 | 50 | 200 | 0 | 0 |

*HIV = hydroxy interlayered vermiculite. Mont = montmorillonite. Misc = vermiculite/montmorillonite.

Table E: Sand mineralogy for Dogue silt loam

| Depth | Quartz | Feldspar | Mica | Opaque Minerals* | Heavy Minerals* | Misc* |
|---------------|----------------------------------|----------|------|------------------|-----------------|-------|
| <u>inches</u> | <u>g kg⁻¹ of sand</u> | | | | | |
| 7-31 | 810 | 100 | 70 | 0 | 20 | 0 |

*Opaque Minerals are ilmenite, magnetite, hematite, etc. Heavy Minerals are translucent zircon, tourmaline, rutile, epidote, hornblende, etc. Misc = rock fragments.

Table F. Chemical properties* for Dogue silt loam

| Depth | OM | pH | Ca ²⁺ | Mg ²⁺ | P | K ⁺ | Zn | Mn |
|---------------|----------|------------|------------------|------------------|----|----------------|-----|-----|
| <u>inches</u> | <u>%</u> | <u>ppm</u> | | | | | | |
| 0-7 | 1.6 | 6.0 | 487 | 77 | 21 | 28 | 1.2 | 7.6 |
| 7-22 | 0.5 | 5.0 | 302 | 165 | 3 | 21 | 0.4 | 1.3 |
| 22-31 | 0.2 | 5.1 | 84 | 199 | 2 | 24 | 0.6 | 0.7 |
| 31-42 | 0.1 | 5.1 | 84 | 199 | 5 | 23 | 0.5 | 0.9 |
| 42-50 | 0.1 | 5.0 | 67 | 140 | 6 | 19 | 0.5 | 1.3 |
| 50-60 | 0.1 | 5.1 | 101 | 199 | 6 | 17 | 0.7 | 1.5 |

*Soil Testing and Plant Analysis Laboratory, Agronomy Department, Va Tech, Blacksburg, VA 24061.

Dogue Series - Supplemental Profile 4

Supplemental pedon of Dogue loam, 3 percent slopes, is located in an area 8,150 feet west of Powell Lake Road, Camp Peary, York County.

A1--0 to 4 inches; grayish brown (10YR 5/2) loam; moderate medium and fine granular structure; friable, slightly sticky, slightly plastic; many coarse, medium and fine roots; many fine and tubular pores; moderately acid; abrupt smooth boundary.

E--4 to 11 inches; light yellowish brown (10YR 6/4) loam; moderate medium granular structure; friable, slightly sticky, slightly plastic; common coarse, medium, and fine roots; many fine and medium tubular pores; strongly acid; clear smooth boundary.

Bt1--11 to 16 inches; yellowish brown (10YR 5/6) clay loam; common medium faint light yellowish brown (10YR 6/4) mottles; moderate medium subangular blocky structure; friable, sticky, plastic; common fine and medium roots; many fine and medium tubular pores; few faint clay films on faces of peds; very strongly acid; clear smooth boundary.

Bt2--16 to 26 inches; strong brown (7.5YR 5/6) clay; moderate medium and fine subangular blocky structure; firm, sticky, plastic; common fine and medium roots; common fine and medium tubular pores; few faint clay films on faces of peds; few fine flakes of mica; very strongly acid; clear smooth boundary.

Bt3--26 to 34 inches; yellowish brown (10YR 5/6) clay; common fine distinct gray (5Y 6/1) mottles; moderate medium subangular blocky structure; firm, sticky, plastic; few fine roots; common fine and medium tubular pores; common distinct clay films on faces of peds; few fine flakes of mica; few quartz coarse fragments up to 1/4 inch in diameter; very strongly acid; gradual smooth boundary.

Bt4--34 to 56 inches; mottled yellowish brown (10YR 5/8), strong brown (7.5YR 5/6), and light brownish gray (10YR 6/2) clay; moderate and coarse medium subangular blocky structure; firm, sticky, plastic; few fine roots; few fine tubular pores; common distinct clay films on faces of peds; few fine flakes of mica; very strongly acid; gradual boundary.

Btg--56 to 66 inches; gray (5Y 6/1) clay; common medium prominent yellowish brown (10YR 5/6), strong brown (7.5YR 5/6) and few fine prominent reddish brown (5Y 5/4) mottles; strong coarse and medium subangular and angular blocky structure; very firm, sticky, plastic; few fine and medium roots; few fine tubular pores; common distinct clay films on faces of peds; few fine flakes of mica; very strongly acid; abrupt smooth boundary.

2C--66 to 85 inches; brownish yellow (10YR 6/6) loamy sand; common medium faint very pale brown (10YR 7/4) mottles; single grain; compact in place; friable, nonsticky, nonplastic; few fine and medium tubular pores; very strongly acid.

Table B. Chemical properties for Dogue loam

| Depth | Exchangeable cations | | | | CEC* | BS** |
|--------|----------------------------------|------------------|----------------|----------------|-------|------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| inches | cmol (+) kg ⁻¹ soil | | | | | % |
| 61 | 0.08 | 1.10 | 0.36 | 18.40 | 19.94 | 7.72 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.

**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for Dogue loam

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|------|--|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 61 | ND | 4.02 | 13.65 | 15.19 | 10.12 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.

**EBS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{ECEC}} \times 100$.

Table F. Chemical properties* for Dogue loam

| Depth | OM | pH | Ca ²⁺ | Mg ²⁺ | P | K ⁺ | Zn | Mn |
|---------------|----------|-----|------------------|------------------|---|----------------|-----|------|
| <u>inches</u> | <u>%</u> | | <u>ppm</u> | | | | | |
| 0-4 | 2.5 | 5.7 | 784 | 94 | 3 | 32 | 1.6 | 10.1 |
| 4-11 | 0.8 | 5.1 | 118 | 22 | 2 | 12 | 0.7 | 2.7 |
| 11-16 | 0.3 | 4.8 | 151 | 30 | 2 | 13 | 0.6 | 0.6 |
| 16-26 | 0.2 | 4.8 | 521 | 86 | 2 | 15 | 0.3 | 0.3 |
| 26-34 | 0.2 | 4.6 | 386 | 84 | 2 | 205 | 0.4 | 0.1 |
| 34-56 | 0.2 | 4.5 | 84 | 140 | 2 | 71 | 0.6 | 0.2 |
| 56-66 | 0.5 | 4.5 | 51 | 151 | 5 | 53 | 0.6 | 0.1 |
| 66-85 | 0.1 | 4.7 | 34 | 52 | 7 | 13 | 0.5 | 0.1 |

*Soil Testing and Plant Analysis Laboratory, Agronomy Department, Va Tech, Blacksburg, VA 24061.

Dragston Series

Soils of the Dragston series are very deep and somewhat poorly drained. They formed in loamy fluvial sediments. They are on low-lying stream terraces in the Coastal Plain. Slopes range from 0 to 2 percent.

Supplemental pedon of Dragston loamy fine sand, about 600 feet south of VEPCO transmission line and 2,000 feet northeast of Chickahominy River, 150 feet southwest of woodline and 400 feet northeast of farm road in field near drainage ditch near small weeping willow bush, New Kent County.

Ap--0 to 9 inches; brown (10YR 4/3) loamy fine sand; weak fine granular structure; friable, slightly sticky, nonplastic; common fine and medium roots; common fine and medium tubular pores; strongly acid; clear smooth boundary.

BA--9 to 29 inches; mottled light brownish gray (10YR 6/2) pale brown (10YR 6/3), and yellowish brown (10YR 5/8) loamy sand; moderate medium granular structure; (compact in places) very friable, slightly sticky, nonplastic; few fine roots; few fine tubular pores; few fine flakes of mica; very strongly acid; clear smooth boundary.

C--29 to 57 inches; mottled brownish yellow (10YR 6/6) and light brownish gray (10YR 6/2) stratified sands and gravelly sands; single grained, loose; very strongly acid.

Table A: Particle-size distribution* for Dragston loamy fine sand

| Depth | Sand | | | | | | Silt | Clay |
|---------------|----------------------------------|-----|-----|-----|-----|-------|------|------|
| | VC | C | M | F | VF | Total | | |
| <u>inches</u> | <u>g kg⁻¹ of soil</u> | | | | | | | |
| 0-9 | 7 | 87 | 222 | 331 | 170 | 817 | 120 | 63 |
| 9-29 | 45 | 173 | 277 | 183 | 159 | 837 | 112 | 51 |
| 29-57 | 52 | 140 | 417 | 250 | 79 | 938 | 17 | 45 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table B. Chemical properties for Dragston loamy fine sand

| Depth | Exchangeable cations | | | | CEC* | BS** |
|---------------|--|------------------|----------------|----------------|------|----------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| <u>inches</u> | <u>cmol (+) kg⁻¹ soil</u> | | | | | <u>%</u> |
| 0-9 | 0.18 | 0.03 | 0.15 | 8.40 | 8.76 | 4.11 |
| 9-29 | 0.06 | 0.02 | 0.07 | 4.20 | 4.35 | 3.45 |
| 29-57 | 0.01 | 0.01 | 0.03 | 3.78 | 3.83 | 1.31 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.

**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for Dragston loamy fine sand

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|------|--------------------------------------|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 0-9 | ND | 5.10 | 1.85 | 2.21 | 16.29 |
| 9-29 | ND | 5.09 | 1.35 | 1.50 | 10.00 |
| 29-57 | ND | 4.98 | 1.65 | 1.70 | 2.94 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.

**EBS = $\frac{Ca^{2+} + Mg^{2+} + K^{+}}{ECEC} \times 100$.

Table E: Sand mineralogy for Dragston loamy fine sand

| Depth | Quartz | Feldspar | Mica | Opaque Minerals* | Heavy Minerals* | Misc* |
|---------------|----------------------------------|----------|------|------------------|-----------------|-------|
| <u>inches</u> | <u>g kg⁻¹ of sand</u> | | | | | |
| 9-29 | 890 | 80 | 0 | Tr | 10 | 20 |

*Opaque Minerals are ilmenite, magnetite, hematite, etc. Heavy Minerals are translucent zircon, tourmaline, rutile, epidote, hornblende, etc. Misc = rock fragments.

Dragston Series - Supplemental Profile 1

Soils of the Dragston series are deep and somewhat poorly drained. They formed in loamy fluvial sediments. Dragston soils are on low-lying stream terraces on the Coastal Plain. Slopes range from 0 to 2 percent.

Typical pedon of Dragston fine sandy loam, about 2,500 feet north of junction of VA-173 and VA-629 and 500 feet south of the York River, York County.

Ap--0 to 10 inches; olive gray (5Y 4/2) fine sandy loam; weak fine granular structure; friable, nonsticky, nonplastic; common fine and medium roots; common fine and medium tubular pores; moderately acid; abrupt smooth boundary.

E--10 to 17 inches; olive (5Y 4/2) fine sandy loam; common medium distinct light yellowish brown (2.5Y 6/4) mottles, few fine distinct olive yellow (2.5Y 6/6) mottles, and common medium prominent grayish brown (10YR 5/2) mottles; weak fine granular structure; friable, nonsticky, nonplastic; few fine and medium roots; common fine and medium tubular pores; strongly acid; clear smooth boundary.

Bt1--17 to 20 inches; olive (5Y 5/3) fine sandy loam; common distinct light olive brown (2.5Y 5/4) mottles; weak fine granular and subangular blocky structure; friable, slightly sticky, nonplastic; few fine roots; common fine and medium pores; common clay bridging between sand grains; few pebbles up to 1/4 inch in diameter; few concretions; few fine flakes of mica; strongly acid; clear wavy boundary.

Btg1--20 to 31 inches; dark grayish brown (2.5Y 4/2) fine sandy loam; few medium prominent yellowish brown (10YR 5/6) mottles; weak medium granular and subangular blocky structure; friable, slightly sticky, nonplastic; few fine and medium roots; few fine and medium pores; common clay bridging between sand grains; few pebbles up to 1/2 inch in diameter; few fine flakes of mica; moderately acid; gradual irregular boundary.

B and C--31 to 42 inches; about 60 percent olive brown (2.5Y 4/4) sandy loam (B); weak fine granular structure; friable, nonsticky, nonplastic; many fine and medium pores; about 40 percent pockets of light brownish gray (2.5Y 6/2) sand (C); single grain, loose; few fine roots; few pebbles up to 1/2 inch in diameter; few fine flakes of mica; slightly acid; diffuse irregular boundary.

2Cg1--42 to 47 inches; dark grayish brown (2.5Y 4/2) sandy loam; common medium prominent yellowish brown (10YR 5/6) mottles; massive; friable, nonsticky, nonplastic; few fine roots; few fine and medium pores; few pebbles up to 3/4 inch in diameter; few fine flakes of mica; slightly acid; gradual wavy boundary.

2C1--47 to 54 inches; yellowish brown (10YR 5/6) fine sandy loam; common medium prominent olive gray (5Y 5/2) mottles; massive; friable, slightly sticky, slightly plastic; few fine roots; common fine and medium pores; few pebbles up to 3/4 inch in diameter; iron stains on 15 percent of sand grains; few fine flakes of mica; very strongly acid; gradual wavy boundary.

2Cg2--54 to 72 inches; gray (5Y 6/1) loamy fine sand; common medium prominent yellowish brown (10YR 5/6) and strong brown (7.5YR 5/8) mottles; massive; very friable, nonsticky, nonplastic; few fine flakes of mica; very strongly acid.

Table A: Particle-size distribution* for Dragston fine sandy loam

| Depth | Sand | | | | | Total | Silt | Clay |
|---------------|----------------------------------|----|-----|-----|-----|-------|------|------|
| | VC | C | M | F | VF | | | |
| <u>inches</u> | <u>g kg⁻¹ of soil</u> | | | | | | | |
| 0-10 | 12 | 54 | 259 | 323 | 74 | 722 | 214 | 62 |
| 10-17 | 12 | 45 | 212 | 252 | 89 | 610 | 300 | 90 |
| 17-20 | 13 | 49 | 235 | 218 | 68 | 583 | 295 | 122 |
| 20-31 | 20 | 56 | 278 | 276 | 93 | 723 | 139 | 138 |
| 31-42 | 11 | 28 | 47 | 548 | 111 | 745 | 87 | 168 |
| 42-47 | 16 | 51 | 112 | 471 | 161 | 811 | 47 | 142 |
| 47-54 | 10 | 24 | 40 | 548 | 114 | 736 | 85 | 179 |
| 54-120 | 1 | 2 | 5 | 576 | 112 | 696 | 161 | 143 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table B. Chemical properties for Dragston fine sandy loam

| Depth | Exchangeable cations | | | | CEC* | BS** |
|---------------|--|------------------|----------------|----------------|------|----------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| <u>inches</u> | <u>cmol (+) kg⁻¹ soil</u> | | | | | <u>%</u> |
| 67 | 1.06 | 1.05 | 0.17 | 5.33 | 7.61 | 29.96 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.

**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for Dragston fine sandy loam

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|------|--|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 67 | ND | 4.60 | 2.39 | 4.67 | 48.82 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.

**EBS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{ECEC}} \times 100$.

Table E: Sand mineralogy for Dragston fine sandy loam

| Depth | Quartz | Feldspar | Mica | Opaque Minerals* | Heavy Minerals* | Misc* |
|---------------|----------------------------------|----------|------|------------------|-----------------|-------|
| <u>inches</u> | <u>g kg⁻¹ of sand</u> | | | | | |
| 20-31 | 835 | 130 | 15 | 0 | 20 | 0 |

*Opaque Minerals are ilmenite, magnetite, hematite, etc. Heavy Minerals are translucent zircon, tourmaline, rutile, epidote, hornblende, etc. Misc = rock fragments.

Emporia Series

Soils of the Emporia series are very deep and well drained. They formed in stratified loamy and clayey fluvial and marine sediments. They are on uplands. Slopes range from 2 to 10 percent.

Typical pedon of Emporia fine sandy loam, 2 to 6 percent slopes, about 1.5 miles north of intersection of US-60 and VA-615, 1,800 feet west of VA-615, 3,400 feet south of junction of VA-615 and VA-609, New Kent County.

A--0 to 2 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak fine granular structure; very friable, nonsticky, nonplastic; many fine and medium and common coarse roots; few quartz gravel; very strongly acid; clear smooth boundary.

E--2 to 12 inches; light yellowish brown (10YR 6/4) fine sandy loam; moderate medium granular structure; very friable, nonsticky, nonplastic; many fine and medium roots and common coarse roots; many fine and medium tubular pores; few quartz gravel; strongly acid; clear wavy boundary.

BE--12 to 16 inches; yellowish brownish (10YR 5/6) and light yellowish brown (10YR 6/4) loam; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; common fine and medium roots; common fine and medium tubular pores; few faint clay films on faces of peds; few quartz gravel; moderately acid; clear wavy boundary.

Bt1--16 to 30 inches; strong brown (7.5YR 5/6) loam; common medium distinct light yellowish brown (10YR 6/4) mottles; moderate medium subangular blocky structure; friable, sticky, slightly plastic; few fine and medium roots; few fine and medium tubular pores; common distinct clay films on faces of peds; few quartz gravel; moderately acid; gradual smooth boundary.

Bt2--30 to 40 inches; yellowish red (5YR 5/8) clay loam; common medium prominent red (2.5YR 4/6) mottles; few fine roots; few fine and medium tubular pores; common distinct clay films on faces of peds; few quartz gravel; moderately acid; gradual smooth boundary.

Bt3--40 to 50 inches; variegated red (2.5YR 4/8), yellowish red (5YR 5/8), yellowish brown (10YR 5/8), strong brown (7.5YR 5/8), and gray (10YR 6/1) sandy clay; moderate medium subangular blocky structure; friable, sticky, plastic; few fine tubular pores; many distinct clay films on faces of peds; few quartz gravel; moderately acid; gradual smooth boundary.

BC--50 to 56 inches; variegated red (2.5YR 4/8), yellowish red (5YR 5/8), yellowish brown (10YR 5/8), and gray (10YR 6/1) sandy clay loam; weak coarse angular blocky structure; firm, sticky, plastic; few fine roots; few fine tubular pores; few quartz gravel; moderately acid; gradual wavy boundary.

C--56 to 63 inches; variegated yellowish red (5YR 5/6), strong brown (7.5YR 5/8), yellowish brown (10YR 5/6), and gray (10YR 6/1) stratified sandy clay loam and sandy loam; massive; friable, sticky, plastic; few fine roots; few quartz gravel; moderately acid.

Table A: Particle-size distribution* for Emporia fine sandy loam

| Depth | Sand | | | | | Total | Silt | Clay |
|---------------|----------------------------------|----|-----|-----|-----|-------|------|------|
| | VC | C | M | F | VF | | | |
| <u>inches</u> | <u>g kg⁻¹ of soil</u> | | | | | | | |
| 0-2 | 51 | 83 | 196 | 216 | 90 | 636 | 308 | 56 |
| 2-12 | 11 | 59 | 156 | 243 | 110 | 579 | 345 | 76 |
| 12-16 | 10 | 57 | 142 | 198 | 92 | 499 | 336 | 165 |
| 16-30 | 20 | 52 | 134 | 183 | 90 | 479 | 285 | 236 |
| 30-40 | 16 | 52 | 138 | 166 | 59 | 431 | 210 | 359 |
| 40-50 | 5 | 43 | 181 | 183 | 59 | 471 | 169 | 360 |
| 50-56 | 5 | 62 | 286 | 241 | 40 | 634 | 94 | 272 |
| 56-63 | 13 | 81 | 307 | 231 | 38 | 670 | 89 | 241 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table B. Chemical properties for Emporia fine sandy loam

| Depth | Exchangeable cations | | | | CEC* | BS** |
|---------------|--|------------------|----------------|----------------|-------|----------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| <u>inches</u> | <u>cmol (+) kg⁻¹ soil</u> | | | | | <u>%</u> |
| 0-2 | 5.24 | 0.65 | 0.35 | 10.71 | 16.95 | 36.81 |
| 2-12 | 0.01 | 0.03 | 0.09 | 3.36 | 3.49 | 3.72 |
| 12-16 | 0.01 | 0.06 | 0.12 | 5.88 | 6.07 | 3.13 |
| 16-30 | 1.01 | 0.71 | 0.18 | 7.35 | 9.25 | 20.54 |
| 30-40 | 0.62 | 0.85 | 0.20 | 13.23 | 14.90 | 11.21 |
| 40-50 | 0.35 | 0.73 | 0.20 | 12.81 | 14.09 | 9.08 |
| 50-56 | 0.01 | 0.53 | 0.24 | 9.87 | 10.65 | 7.32 |
| 56-63 | 0.02 | 0.35 | 0.19 | 11.34 | 11.90 | 4.71 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.

**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for Emporia fine sandy loam

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|------|--|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 0-2 | ND | 4.90 | 0.05 | 6.29 | 99.21 |
| 2-12 | ND | 5.10 | 0.85 | 0.98 | 13.27 |
| 12-16 | ND | 5.80 | 2.25 | 2.44 | 7.79 |
| 16-30 | ND | 5.95 | 1.85 | 3.75 | 50.67 |
| 30-40 | ND | 5.98 | 5.30 | 6.97 | 23.96 |
| 40-50 | ND | 5.73 | 6.55 | 7.83 | 16.35 |
| 50-56 | ND | 5.75 | 5.55 | 6.33 | 12.32 |
| 56-63 | ND | 5.65 | 5.15 | 5.71 | 9.81 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.

**EBS = $\frac{Ca^{2+} + Mg^{2+} + K^{+}}{ECEC} \times 100$.

Table D: Clay mineralogy for Emporia fine sandy loam

| Depth | HIV* | Mica | Kaolinite | Quartz | Mont* | Gibbsite | Misc* |
|---------------|----------------------------------|------|-----------|--------|-------|----------|-------|
| <u>inches</u> | <u>g kg⁻¹ of clay</u> | | | | | | |
| 12-30 | 990 | Tr | 0 | Tr | Tr | 0 | |

*HIV = hydroxy interlayered vermiculite. Mont = montmorillonite. Misc = vermiculite/montmorillonite.

Table F. Chemical properties* for Emporia fine sandy loam

| Depth | OM | pH | Ca ²⁺ | Mg ²⁺ | P | K ⁺ | Zn | Mn |
|---------------|----------|-----|------------------|------------------|----|----------------|-----|------|
| <u>inches</u> | <u>%</u> | | <u>ppm</u> | | | | | |
| 0-2 | 5.0 | 5.5 | 672 | 49 | 17 | 51 | 3.4 | 16.1 |
| 2-12 | 0.9 | 4.6 | 48 | 5 | 4 | 22 | 0.5 | 0.8 |
| 12-16 | 0.7 | 4.6 | 48 | 9 | 3 | 22 | 0.5 | 0.8 |
| 16-30 | 0.5 | 5.2 | 216 | 85 | 3 | 29 | 0.2 | 0.5 |
| 30-40 | 0.5 | 4.8 | 120 | 68 | 3 | 31 | 0.3 | 0.1 |
| 40-50 | 0.5 | 4.9 | 84 | 56 | 3 | 37 | 0.3 | 0.2 |
| 50-56 | 0.5 | 5.1 | 60 | 53 | 3 | 45 | 0.2 | 0.1 |
| 56-63 | 0.5 | 5.2 | 48 | 37 | 3 | 39 | 0.2 | 0.3 |

*Soil Testing and Plant Analysis Laboratory, Agronomy Department, Va Tech, Blacksburg, VA 24061.

Emporia Series - Supplemental Profile 1

Supplemental pedon of Emporia fine sandy loam, 2 to 6 percent slopes, about 2,000 feet south of junction of VA-638 and VA-619 on VA-638; 300 feet southeast of VA-638 on logging road and 50 feet west of logging road, New Kent County.

A--0 to 3 inches; dark grayish brown (10YR 4/2) loam; moderate fine and medium granular structure; friable, slightly sticky, nonplastic; many fine and medium common coarse roots; common fine and medium tubular pores; extremely acid; clear smooth boundary.

E--3 to 8 inches; light yellowish brown (10YR 6/4) loam; moderate fine and medium granular structure; friable, sticky, slightly plastic; many fine and medium and few coarse roots; common fine and medium tubular pores; very strongly acid; clear smooth boundary.

BA--8 to 14 inches; light olive brown (2.5YR 5/4) loam; weak fine subangular and moderate medium granular structure; friable, sticky, plastic; many fine and medium and common coarse roots; common fine and medium tubular pores; few faint clay films on faces of ped; very strongly acid; clear smooth boundary.

Bt1--14 to 28 inches; yellowish brown (10YR 5/8) clay loam; moderate medium and fine subangular blocky structure; friable, sticky, plastic; common fine and medium and a few coarse roots; few fine tubular pores; common faint clay films on faces of ped; very strongly acid; clear smooth boundary.

Bt2--28 to 52 inches; yellowish brown (10YR 5/8) silty clay loam, common medium distinct strong brown (7.5YR 5/8), common medium faint light yellowish brown (10YR 6/4) mottles; weak coarse platy parting to moderate medium angular and subangular blocky structure; friable, sticky, plastic; few fine roots; few fine tubular pores; common faint clay films on faces of ped; strongly acid; clear smooth boundary.

Bt3--52 to 74 inches; mottled yellowish brown (10YR 5/8), strong brown (7.5YR 5/8), yellowish red (5YR 5/8), and light gray (10YR 7/1) clay loam; moderate medium and fine angular and subangular blocky structure; firm, sticky, plastic; few fine roots; few fine tubular pores; common distinct clay films on faces of ped; strongly acid; gradual smooth boundary.

Bt--74 to 102 inches; mottled yellowish brown (10YR 5/6), light gray (10YR 7/1), strong brown (7.5YR 5/8), yellowish red (5YR 5/8), and red (2.5YR 4/8) clay; firm, sticky, plastic; strongly acid.

Table A: Particle-size distribution* for Emporia loam

| Depth | Sand | | | | | Total | Silt | Clay |
|--------|----------------------------|----|----|-----|-----|-------|------|------|
| | VC | C | M | F | VF | | | |
| inches | g kg ⁻¹ of soil | | | | | | | |
| 0-3 | 25 | 13 | 50 | 157 | 115 | 360 | 531 | 109 |
| 3-8 | 3 | 7 | 27 | 182 | 161 | 380 | 494 | 126 |
| 8-14 | 5 | 6 | 22 | 158 | 144 | 335 | 492 | 173 |
| 14-28 | 0 | 5 | 19 | 134 | 136 | 294 | 439 | 267 |
| 28-52 | 1 | 4 | 21 | 139 | 133 | 298 | 382 | 320 |
| 52-74 | 1 | 2 | 17 | 148 | 127 | 295 | 395 | 310 |
| 74-102 | 1 | 5 | 27 | 226 | 130 | 389 | 336 | 275 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table B. Chemical properties for Emporia loam

| Depth | Exchangeable cations | | | | CEC* | BS** |
|---------------|--------------------------------------|------------------|----------------|----------------|-------|----------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| <u>inches</u> | <u>cmol (+) kg⁻¹ soil</u> | | | | | <u>%</u> |
| 0-3 | 0.03 | 0.09 | 0.18 | 17.22 | 17.52 | 1.71 |
| 3-8 | 0.01 | 0.01 | 0.07 | 8.19 | 8.28 | 1.09 |
| 8-14 | 0.01 | 0.01 | 0.07 | 8.19 | 8.28 | 1.09 |
| 14-28 | 0.01 | 0.21 | 0.09 | 13.02 | 13.33 | 2.33 |
| 28-52 | 0.01 | 0.49 | 0.08 | 12.18 | 12.76 | 4.55 |
| 52-74 | 0.01 | 0.26 | 0.06 | 13.86 | 14.19 | 2.33 |
| 74-102 | 0.01 | 0.17 | 0.06 | 14.28 | 14.52 | 1.65 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for Emporia loam

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|------|--------------------------------------|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 0-3 | ND | 4.30 | 4.25 | 4.55 | 6.59 |
| 3-8 | ND | 4.82 | 1.85 | 1.94 | 4.64 |
| 8-14 | ND | 4.75 | 2.55 | 2.64 | 3.41 |
| 14-28 | ND | 4.90 | 4.15 | 4.46 | 6.95 |
| 28-52 | ND | 5.25 | 4.09 | 4.63 | 12.53 |
| 52-74 | ND | 5.20 | 5.35 | 5.68 | 5.81 |
| 74-102 | ND | 5.22 | 6.65 | 6.89 | 3.48 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.**EBS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{ECEC}} \times 100$.

Table D: Clay mineralogy for Emporia loam

| Depth | HIV* | Mica | Kaolinite | Quartz | Mont* | Gibbsite | Misc* |
|---------------|----------------------------------|------|-----------|--------|-------|----------|-------|
| <u>inches</u> | <u>g kg⁻¹ of clay</u> | | | | | | |
| 14-52 | 990 | Tr | Tr | 0 | Tr | 0 | 0 |

*HIV = hydroxy interlayered vermiculite. Mont = montmorillonite. Misc = vermiculite/montmorillonite.

Emporia Series - Supplemental Profile 2

Soils of the Emporia series are deep and well drained. They formed in stratified loamy and clayey fluvial and marine sediments. Emporia soils are on uplands on the Coastal Plain. Slopes range from 2 to 50 percent.

Supplemental pedon of Emporia fine sandy loam, 2 to 6 percent slopes, about 5,500 feet southwest of mouth of Carters Creek at the York River, 1,300 feet south of Carters Creek on Camp Peary, York County.

A1--0 to 4 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak fine granular structure; friable, slightly sticky, nonplastic; many fine and medium and coarse roots; common fine and medium tubular pores; very strongly acid; clear smooth boundary.

E--4 to 13 inches; pale brown (10YR 6/3) loam; weak fine and medium granular structure; friable, slightly sticky, nonplastic; common fine medium and coarse roots; many fine and medium tubular pores; very strongly acid; gradual smooth boundary.

Bt1--13 to 19 inches; yellowish brown (10YR 5/6) loam; common medium faint light yellowish brown (10YR 6/4) mottles; weak medium subangular blocky structure; friable, sticky, plastic; common medium and fine roots; many fine and medium tubular pores; few faint clay films on faces of peds; very strongly acid; clear smooth boundary.

Bt2--19 to 30 inches; yellowish brown (10YR 5/6) loam; common medium distinct strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; friable, sticky, plastic; few fine roots; few fine and medium tubular pores; common faint clay films on faces of peds; very strongly acid; clear smooth boundary.

Bt3--30 to 37 inches; yellowish brown (10YR 5/8) loam; common medium distinct strong brown (7.5YR 5/8) and pale brown (10YR 6/3) mottles; weak medium subangular blocky structure; friable, sticky, plastic; few fine roots; common fine and medium tubular pores; common faint clay films on faces of peds; very strongly acid; clear smooth boundary.

Bt4--37 to 51 inches; yellowish brown (10YR 5/8) sandy clay loam; common medium distinct strong brown (7.5YR 5/8), and light brownish gray (10YR 6/2) mottles; weak medium and coarse subangular blocky structure; firm, sticky, plastic; few fine roots; common fine and medium tubular pores; strongly acid; clear smooth boundary.

Bt5--51 to 58 inches; mottled light brownish gray (10YR 6/2), yellowish brown (10YR 5/8), and strong brown (7.5YR 5/8) sandy clay loam; weak coarse subangular blocky structure; firm, sticky, plastic; common fine tubular pores; few faint clay films on faces of peds; very strongly acid; gradual smooth boundary.

C--58 to 75 inches; variegated gray (5YR 6/1), strong brown (7.5YR 5/8), yellowish brown (10YR 5/6), and yellowish red (5YR 5/6) sandy clay loam; massive; firm, sticky, plastic; very strongly acid.

Table A: Particle-size distribution* for Emporia fine sandy loam

| Depth | Sand | | | | | | Silt | Clay |
|---------------|----------------------------------|----|-----|-----|-----|-------|------|------|
| | VC | C | M | F | VF | Total | | |
| <u>inches</u> | <u>g kg⁻¹ of soil</u> | | | | | | | |
| 0-4 | 10 | 42 | 127 | 235 | 113 | 527 | 368 | 105 |
| 4-13 | 3 | 32 | 112 | 222 | 102 | 471 | 399 | 130 |
| 13-19 | 4 | 36 | 106 | 206 | 97 | 449 | 368 | 183 |
| 19-30 | 6 | 35 | 102 | 196 | 96 | 435 | 297 | 268 |
| 30-37 | 10 | 37 | 107 | 210 | 103 | 467 | 290 | 243 |
| 37-51 | 17 | 37 | 106 | 205 | 106 | 471 | 249 | 280 |
| 51-58 | 17 | 46 | 116 | 226 | 114 | 519 | 203 | 278 |
| 58-75 | 8 | 49 | 129 | 252 | 122 | 560 | 192 | 248 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table B. Chemical properties for Emporia fine sandy loam

| Depth | Exchangeable cations | | | | CEC* | BS** |
|---------------|--------------------------------------|------------------|----------------|----------------|------|----------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| <u>inches</u> | <u>cmol (+) kg⁻¹ soil</u> | | | | | <u>%</u> |
| 63 | 0.00 | 0.21 | 0.08 | 9.00 | 9.29 | 3.12 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.

**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for Emporia fine sandy loam

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|------|--------------------------------------|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 63 | ND | 3.96 | 6.25 | 6.54 | 4.43 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.

**EBS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{ECEC}} \times 100$.

Table F. Chemical properties* for Emporia fine sandy loam

| Depth | OM | pH | Ca ²⁺ | Mg ²⁺ | P | K ⁺ | Zn | Mn |
|---------------|----------|-----|------------------|------------------|---|----------------|-----|-----|
| <u>inches</u> | <u>%</u> | | <u>ppm</u> | | | | | |
| 0-4 | 2.6 | 4.6 | 34 | 10 | 2 | 13 | 0.7 | 0.7 |
| 4-13 | 0.5 | 5.0 | 34 | 6 | 2 | 8 | 0.6 | 1.8 |
| 13-19 | 0.3 | 4.7 | 34 | 6 | 2 | 12 | 0.5 | 1.2 |
| 19-30 | 0.2 | 4.9 | 51 | 120 | 3 | 23 | 0.5 | 0.4 |
| 30-37 | 0.1 | 4.9 | 34 | 126 | 2 | 26 | 0.5 | 0.2 |
| 37-51 | 0.1 | 5.1 | 34 | 62 | 2 | 21 | 0.5 | 0.2 |
| 51-58 | 0.1 | 5.0 | 17 | 40 | 2 | 21 | 0.5 | 0.2 |
| 58-75 | 0.1 | 4.8 | 17 | 30 | 1 | 19 | 0.4 | 0.1 |

*Soil Testing and Plant Analysis Laboratory, Agronomy Department, Va Tech, Blacksburg, VA 24061.

Emporia Series - Supplemental Profile 3

Supplemental pedon of Emporia fine sandy loam, 2 to 6 percent slopes, located about 1/4 mile northeast of park entrance, 160 feet south of park road, New Quarter Park, York County.

A1--0 to 4 inches; brown (10YR 4/3) fine sandy loam; common medium distinct very dark grayish brown (10YR 3/2) mottles; weak fine granular structure; friable, nonsticky, nonplastic; common fine, medium and few coarse roots; many fine pores; very strongly acid; clear smooth boundary.

E--4 to 14 inches; yellowish brown (10YR 5/4) fine sandy loam; common fine faint yellowish brown (10YR 5/8) mottles; weak fine and medium granular structure; very friable, slightly sticky, slightly plastic; common fine and medium and few coarse roots; many fine and medium pores; very strongly acid; clear smooth boundary.

Bt1--14 to 17 inches; yellowish brown (10YR 5/4) fine sandy loam; few faint yellowish brown (10YR 4/6) mottles; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; few fine and medium roots; many fine pores; few clay bridgings between sand grains; very strongly acid; clear smooth boundary.

Bt2--17 to 26 inches; strong brown (7.5YR 5/6) sandy clay loam; weak medium subangular blocky structure; friable, sticky, plastic; few fine and medium roots; many fine pores; common distinct clay films on faces of peds; very strongly acid; clear smooth boundary.

Bt3--26 to 33 inches; mottled yellowish brown (10YR 5/6), strong brown (7.5YR 5/8), and pale brown (10YR 6/3) sandy clay loam; weak medium and coarse subangular blocky structure; friable, sticky, plastic; few fine roots; many fine pores; common distinct clay films on faces of peds; very strongly acid; gradual smooth boundary.

Bt4--33 to 41 inches; mottled yellowish brown (10YR 5/6), strong brown (7.5YR 5/6), and pale brown (10YR 6/3) sandy clay loam; weak coarse and medium subangular blocky structure; firm in place, friable when displaced, slightly sticky, plastic; few fine and medium roots; common faint clay films on faces of peds; very strongly acid; clear smooth boundary.

Bt5--41 to 44 inches; mottled yellowish brown (10YR 5/6), strong brown (7.5YR 5/6), and pale brown (10YR 6/3) sandy clay loam; moderate medium subangular blocky structure; friable, sticky, plastic; few fine roots; common fine pores; common distinct clay films on faces of peds; very strongly acid; clear smooth boundary.

Bt6--44 to 64 inches; mottled yellowish brown (10YR 5/6), strong brown (7.5YR 5/6), pale brown (10YR 6/3), red (2.5YR 5/6), yellowish red (5YR 5/8), and gray (10YR 6/1) sandy clay loam; moderate medium angular and subangular blocky structure; firm, sticky, plastic; few fine roots; very few fine pores; common distinct clay films on faces of peds; very strongly acid.

Table A: Particle-size distribution* for Emporia fine sandy loam

| Depth | Sand | | | | | Total | Silt | Clay |
|---------------|----------------------------------|---|----|-----|-----|-------|------|------|
| | VC | C | M | F | VF | | | |
| <u>inches</u> | <u>g kg⁻¹ of soil</u> | | | | | | | |
| 4-14 | 2 | 3 | 51 | 333 | 122 | 511 | 355 | 134 |
| 14-17 | 0 | 7 | 52 | 313 | 52 | 424 | 433 | 143 |
| 17-26 | 1 | 9 | 48 | 307 | 105 | 470 | 318 | 212 |
| 26-33 | 4 | 7 | 48 | 343 | 98 | 500 | 291 | 209 |
| 33-41 | 1 | 5 | 48 | 372 | 113 | 539 | 245 | 216 |
| 41-44 | 2 | 4 | 39 | 369 | 79 | 493 | 187 | 320 |
| 44-64 | 3 | 3 | 38 | 346 | 77 | 467 | 206 | 327 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table B. Chemical properties for Emporia fine sandy loam

| Depth | Exchangeable cations | | | | CEC* | BS** |
|---------------|--------------------------------------|------------------|----------------|----------------|-------|----------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| <u>inches</u> | <u>cmol (+) kg⁻¹ soil</u> | | | | | <u>%</u> |
| 4-14 | 0.50 | 0.16 | 0.06 | 2.83 | 3.55 | 20.28 |
| 14-17 | 1.30 | 0.34 | 0.10 | 3.27 | 5.01 | 34.73 |
| 17-26 | 3.10 | 0.40 | 0.13 | 3.92 | 7.55 | 48.08 |
| 26-33 | 3.40 | 0.44 | 0.11 | 3.60 | 7.55 | 52.32 |
| 33-41 | 3.50 | 0.58 | 0.14 | 3.05 | 7.27 | 58.05 |
| 41-44 | 5.20 | 0.98 | 0.18 | 4.36 | 10.72 | 59.33 |
| 44-64 | 6.00 | 1.16 | 0.17 | 4.03 | 11.36 | 64.52 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.

**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for Emporia fine sandy loam

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|-----|--|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 4-14 | ND | 4.8 | 0.64 | 1.36 | 52.94 |
| 14-17 | ND | 5.0 | 0.46 | 2.20 | 79.09 |
| 17-26 | ND | 5.1 | 0.37 | 4.00 | 90.75 |
| 26-33 | ND | 5.6 | 0.18 | 4.13 | 95.16 |
| 33-41 | ND | 5.6 | 0 | 4.22 | 100 |
| 41-44 | ND | 5.4 | 0.09 | 6.45 | 98.60 |
| 44-64 | ND | 5.2 | 0.09 | 7.42 | 98.79 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.

**EBS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{ECEC}} \times 100$.

Table E: Sand mineralogy for Emporia fine sandy loam

| Depth | Quartz | Feldspar | Mica | Opaque Minerals* | Heavy Minerals* | Misc* |
|---------------|----------------------------------|----------|------|------------------|-----------------|-------|
| <u>inches</u> | <u>g kg⁻¹ of sand</u> | | | | | |
| 14-33 | 940 | 10 | 10 | 30 | 10 | 0 |

*Opaque Minerals are ilmenite, magnetite, hematite, etc. Heavy Minerals are translucent zircon, tourmaline, rutile, epidote, hornblende, etc. Misc = rock fragments.

Emporia Series - Supplemental Profile 4

Supplemental pedon of Emporia fine sandy loam, 2 to 6 percent slopes, near junction of VA-602 and VA-607 in cultivated field, James City County.

Ap--0 to 6 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak fine granular structure; friable, slightly sticky, slightly plastic; many fine roots; common fine tubular pores; very strongly acid; clear smooth boundary.

E--6 to 9 inches; light yellowish brown (10YR 6/4) fine sandy loam; weak fine granular structure; friable, slightly sticky; nonplastic; common fine roots; common fine tubular pores; very strongly acid; clear smooth boundary.

AB--9 to 12 inches; mixed yellowish brown (10YR 5/6) and light yellowish brown (2.5Y 6/4) fine sandy loam; weak fine and medium granular structure; friable, slightly sticky, slightly plastic; common fine roots; common fine tubular pores; very strongly acid; clear smooth boundary.

Bt1--12 to 28 inches; yellowish brown (10YR 5/6) sandy clay loam; weak medium subangular blocky structure; friable, sticky, plastic; common fine roots; many fine tubular pores; few faint clay films on faces of peds; very strongly acid; clear smooth boundary.

Bt2--28 to 35 inches; yellowish brown (10YR 5/8) sandy clay loam; few medium distinct light yellowish brown (2.5Y 6/4) mottles; moderate medium and coarse subangular blocky structure; friable, sticky, plastic; few fine roots; common fine tubular pores; common faint clay films on faces of peds; very strongly acid; clear smooth boundary.

Bt3--35 to 43 inches; yellowish brown (10YR 5/8) sandy clay loam; common medium distinct strong brown (7.5YR 5/8) and light yellowish brown (2.5Y 6/4) mottles; weak medium subangular blocky structure; friable, sticky, plastic; few fine roots; common fine tubular pores; common faint clay films on few faces of peds; very strongly acid; clear smooth boundary.

Bt4--43 to 57 inches; brownish yellow (10YR 6/8) sandy clay loam; few fine prominent strong brown (7.5YR 5/8) and common medium faint yellow (10YR 7/6) and light gray (10YR 7/1) mottles; weak medium subangular blocky structure; firm, sticky, plastic; few faint clay films on faces of peds; very strongly acid; gradual smooth boundary.

C--57 to 75 inches; brownish yellow (10YR 6/8) sandy clay loam; common medium distinct gray (10YR 6/1), yellowish brown (10YR 5/8) and strong brown (7.5YR 5/8) mottles; massive, firm, sticky, plastic; very strongly acid.

Table A: Particle-size distribution* for Emporia fine sandy loam

| Depth | Sand | | | | | Total | Silt | Clay |
|--------|----------------------------|---|----|-----|-----|-------|------|------|
| | VC | C | M | F | VF | | | |
| inches | g kg ⁻¹ of soil | | | | | | | |
| 12-32 | 0 | 2 | 16 | 455 | 129 | 602 | 162 | 236 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Emporia Series - Supplemental Profile 5

Supplemental pedon of Emporia fine sandy loam, 2 to 6 percent slopes, Main Post area, near Brown's Lake, military personnel gardening area, Fort Eustis, Newport News.

Ap--0 to 9 inches; brown (10YR 5/3) fine sandy loam; weak fine granular structure; friable, slightly sticky, nonplastic; common fine roots; common fine and medium tubular pores; slightly acid; abrupt smooth boundary.

E--9 to 15 inches; pale brown (10YR 6/3) fine sandy loam; weak medium granular structure; friable, slightly sticky, nonplastic; common fine roots; common fine and medium tubular pores; slightly acid; clear smooth boundary.

Bt1--15 to 28 inches; yellowish brown (10YR 5/4) sandy clay loam; weak medium subangular blocky structure; friable, sticky, plastic; common fine roots; common medium tubular pores; few faint clay films on faces of peds; slightly acid; clear smooth boundary.

Bt2--28 to 42 inches; mottled yellowish brown (10YR 5/8) strong brown (7.5YR 5/8) and pale brown (10YR 6/3) sandy clay loam; moderate medium subangular blocky structure; friable, sticky, plastic; few fine roots; common fine and medium tubular pores; slightly acid; clear smooth boundary.

Bt3--42 to 50 inches; mottled yellowish brown (10YR 5/8), strong brown (7.5YR 5/8) and light brownish gray (10YR 6/2) sandy clay loam; weak medium subangular blocky structure; friable, sticky, plastic; slightly acid; clear wavy boundary.

BC--50 to 60 inches; mottled light brownish gray (10YR 6/2), yellowish brown (10YR 5/8) and strong brown (7.5YR 5/8) sandy clay loam; weak medium subangular blocky structure; friable, sticky, plastic; slightly acid.

Table A: Particle-size distribution* for Emporia fine sandy loam

| Depth | Sand | | | | | Total | Silt | Clay |
|---------------|----------------------------------|---|---|---|----|-------|------|------|
| | VC | C | M | F | VF | | | |
| <u>inches</u> | <u>g kg⁻¹ of soil</u> | | | | | | | |
| 0-9 | - | - | - | - | - | 595 | 291 | 114 |
| 9-15 | - | - | - | - | - | 583 | 270 | 147 |
| 15-28 | - | - | - | - | - | 620 | 172 | 208 |
| 28-42 | - | - | - | - | - | 659 | 98 | 243 |
| 42-50 | - | - | - | - | - | 624 | 122 | 254 |
| 50-60 | - | - | - | - | - | 538 | 227 | 235 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table B. Chemical properties for Emporia fine sandy loam

| Depth | Exchangeable cations | | | | CEC* | BS** |
|---------------|--------------------------------------|------------------|----------------|----------------|------|----------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| <u>inches</u> | <u>cmol (+) kg⁻¹ soil</u> | | | | | <u>%</u> |
| 0-9 | 3.34 | 0.95 | 0.27 | 1.74 | 6.30 | 72.38 |
| 9-15 | 2.01 | 0.53 | 0.18 | 1.35 | 4.07 | 66.83 |
| 15-28 | 3.16 | 0.92 | 0.25 | 1.93 | 6.26 | 69.17 |
| 28-42 | 4.28 | 0.58 | 0.12 | 2.90 | 7.88 | 63.20 |
| 42-50 | 4.90 | 0.43 | 0.09 | 2.32 | 7.74 | 70.03 |
| 50-60 | 5.61 | 0.40 | 0.13 | 1.93 | 8.07 | 76.08 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.

**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for Emporia fine sandy loam

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|------|--------------------------------------|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 0-9 | 1.24 | 6.20 | 0.05 | 4.61 | 98.92 |
| 9-15 | 0.0 | 6.40 | 0.05 | 2.77 | 98.19 |
| 15-28 | 0.0 | 6.40 | 0.0 | 4.33 | 100 |
| 28-42 | 0.0 | 6.20 | 0.05 | 5.03 | 99.01 |
| 42-50 | 0.0 | 6.25 | 0.05 | 5.47 | 99.09 |
| 50-60 | 0.0 | 6.15 | 0.05 | 6.19 | 99.19 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.

**EBS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{ECEC}} \times 100$.

Table D: Clay mineralogy for Emporia fine sandy loam

| Depth | HIV* | Mica | Kaolinite | Quartz | Mont* | Gibbsite | Misc* |
|---------------|----------------------------------|------|-----------|--------|-------|----------|-------|
| <u>inches</u> | <u>g kg⁻¹ of clay</u> | | | | | | |
| 15-28 | 250 | 290 | 400 | Tr | Tr | Tr | 60 |

*HIV = hydroxy interlayered vermiculite. Mont = montmorillonite. Misc = vermiculite/montmorillonite.

Emporia Series - Supplemental Profile 6

Supplemental pedon of Emporia fine sandy loam, 2 to 6 percent slopes, Main Post area, proposed warehouse site, edge of parking lot, Fort Eustis, Newport News.

Ap--0 to 14 inches; brown (10YR 4/3) fine sandy loam; weak fine granular structure; friable, slightly sticky, nonplastic; many fine roots; common fine tubular pores; moderately acid; clear smooth boundary.

Bt1--14 to 24 inches; yellowish brown (10YR 5/6) loam; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; common fine roots; common fine tubular pores; few faint clay films on faces of peds; moderately acid; gradual smooth boundary.

Bt2--24 to 36 inches; yellowish brown (10YR 5/6) sandy clay loam; common medium faint pale brown (10YR 6/3) mottles; moderate medium subangular blocky structure; friable, sticky, plastic; few fine roots; common fine tubular pores; common faint clay films on faces of peds; moderately acid; clear smooth boundary.

BC--36 to 54 inches; yellowish brown (10YR 5/6) sandy clay loam; weak medium subangular blocky structure; friable, sticky, plastic; moderately acid; clear smooth boundary.

Table A: Particle-size distribution* for Emporia fine sandy loam

| Depth | Sand | | | | | Total | Silt | Clay |
|--------|----------------------------|---|---|---|----|-------|------|------|
| | VC | C | M | F | VF | | | |
| inches | g kg ⁻¹ of soil | | | | | | | |
| 0-14 | - | - | - | - | - | 580 | 266 | 154 |
| 14-24 | - | - | - | - | - | 493 | 304 | 203 |
| 24-36 | - | - | - | - | - | 525 | 226 | 249 |
| 36-54 | - | - | - | - | - | 632 | 98 | 270 |
| 54-60 | - | - | - | - | - | 728 | 102 | 170 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table B. Chemical properties for Emporia fine sandy loam

| Depth | Exchangeable cations | | | | CEC* | BS** |
|--------|--------------------------------|------------------|----------------|----------------|------|-------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| inches | cmol (+) kg ⁻¹ soil | | | | | % |
| 0-14 | 2.41 | 0.23 | 0.05 | 2.90 | 5.59 | 48.12 |
| 14-24 | 2.71 | 0.24 | 0.06 | 3.86 | 6.87 | 43.81 |
| 24-36 | 3.89 | 0.38 | 0.07 | 3.86 | 8.20 | 52.93 |
| 36-54 | 4.76 | 0.81 | 0.11 | 3.86 | 9.54 | 59.54 |
| 54-60 | 3.15 | 0.70 | 0.11 | 3.67 | 7.63 | 51.90 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.

**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for Emporia fine sandy loam

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|------|--------------------------------------|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 0-14 | 0.77 | 5.95 | 0.05 | 2.74 | 98.18 |
| 14-24 | 0.0 | 6.00 | 0.05 | 3.06 | 98.37 |
| 24-36 | 0.0 | 5.90 | 0.05 | 4.39 | 98.86 |
| 36-54 | 0.0 | 5.80 | 0.05 | 5.73 | 99.13 |
| 54-60 | 0.0 | 5.92 | 0.05 | 4.00 | 98.75 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.

**EBS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{ECEC}} \times 100$.

Table D: Clay mineralogy for Emporia fine sandy loam

| Depth | HIV* | Mica | Kaolinite | Quartz | Verm* | Gibbsite | Misc* |
|---------------|----------------------------------|------|-----------|--------|-------|----------|-------|
| <u>inches</u> | <u>g kg⁻¹ of clay</u> | | | | | | |
| 14-24 | 150 | 70 | 270 | 80 | 380 | Tr | 50 |

*HIV = hydroxy interlayered vermiculite. Verm = vermiculite. Misc = vermiculite/montmorillonite.

Figure 5: A road bank along Highway VA-627 in New Kent County showing the stratified sediments in which the Emporia soils developed.



Figure 6: A profile of an Emporia soil in New Kent County.

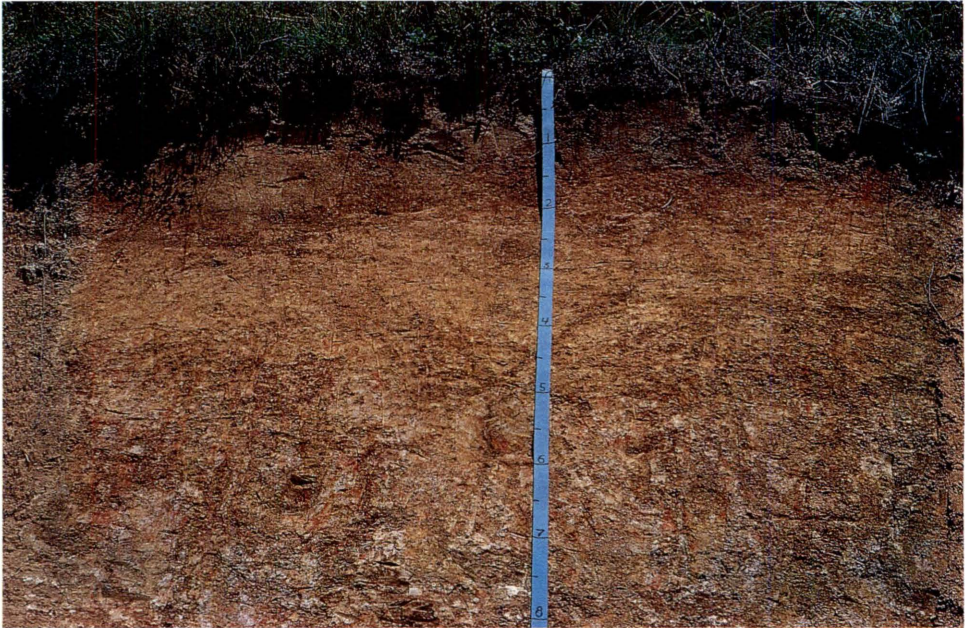


Figure 7: The Wrenn Building on the campus of the College of William and Mary has been used continuously since its construction in 1695. The foundation of this building is on Emporia soils.



Izagora Series

Soils of the Izagora series are deep and moderately well drained. They formed in loamy and clayey fluvial and marine sediments. They are on uplands on the Coastal Plain. Slopes range from 0 to 3 percent.

Typical pedon of Izagora loam, about 3,250 feet west-southwest of the junction of US-17 and the Chesapeake and Ohio Railroad, 200 feet north of railroad, York County.

A--0 to 4 inches; very dark gray (10YR 3/1) loam; weak fine granular structure; friable, slightly sticky, nonplastic; many fine medium and coarse roots; common fine and medium tubular pores; extremely acid; clear wavy boundary.

E--4 to 13 inches; light yellowish brown (2.5Y 6/4) loam; weak fine granular structure; friable, slightly sticky, nonplastic; few fine coarse and common medium roots; common fine and medium tubular pores; krotovina up to 1/2 inch in diameter filled with A1 material; strongly acid; clear smooth boundary.

Bt1--13 to 17 inches; light olive brown (2.5Y 5/4) loam; weak fine subangular blocky and moderate medium granular structure; friable, sticky, plastic; few fine and medium roots; common fine and medium tubular pores; few faint clay films on faces of peds; very strongly acid; clear smooth boundary.

Bt2--17 to 27 inches; light olive brown (2.5Y 5/6) loam; weak medium subangular blocky structure; friable, sticky, plastic; few fine and medium roots; few fine tubular pores; few faint clay films on faces of peds; very strongly acid; gradual wavy boundary.

Bt3--27 to 36 inches; mottled yellowish brown (10YR 5/8), light olive brown (2.5Y 5/4), gray (5Y 6/1), and strong brown (7.5YR 5/6) clay loam; moderate fine subangular blocky structure; friable, sticky, plastic; few fine roots; few fine vesicular pores; vertical streaks 1/4 to 1/2 inch wide of gray (5Y 6/1) sandy clay loam; very strongly acid; gradual smooth boundary.

Btg1--36 to 44 inches; gray (5Y 6/1) clay loam; many coarse prominent yellowish brown (10YR 5/8) mottles and common fine prominent strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; firm, sticky, plastic; few fine roots; few fine vesicular pores; common distinct clay films on faces of peds; vertical streaks of gray (5Y 6/1) loam; very strongly acid; gradual smooth boundary.

Btg2--44 to 68 inches; gray (N 6/0) clay loam; common medium prominent yellowish brown (10YR 5/6) mottles; moderate coarse subangular blocky structure; firm, sticky, plastic; few fine roots; few fine vesicular pores; common distinct clay films on faces of peds; vertical streaks of gray (N 6/0) loam; very strongly acid; gradual smooth boundary.

Btg3--68 to 78 inches; gray (N 6/0) clay; common medium prominent yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; firm, sticky, plastic; few faint clay films on faces of peds; very strongly acid.

Table A: Particle-size distribution* for Izagora loam

| Depth | Sand | | | | | Total | Silt | Clay |
|---------------|----------------------------------|----|-----|-----|-----|-------|------|------|
| | VC | C | M | F | VF | | | |
| <u>inches</u> | <u>g kg⁻¹ of soil</u> | | | | | | | |
| 0-4 | 2 | 23 | 123 | 262 | 73 | 483 | 430 | 87 |
| 4-13 | 3 | 16 | 92 | 237 | 90 | 438 | 455 | 107 |
| 13-17 | 1 | 18 | 85 | 192 | 104 | 400 | 454 | 146 |
| 17-27 | 3 | 15 | 90 | 194 | 85 | 387 | 434 | 179 |
| 27-36 | 2 | 16 | 83 | 210 | 101 | 412 | 401 | 187 |
| 36-44 | 2 | 16 | 83 | 200 | 84 | 385 | 379 | 236 |
| 44-68 | 4 | 16 | 72 | 213 | 83 | 388 | 343 | 269 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table B. Chemical properties for Izagora loam

| Depth | Exchangeable cations | | | | CEC* | BS** |
|---------------|--------------------------------------|------------------|----------------|----------------|------|----------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| <u>inches</u> | <u>cmol (+) kg⁻¹ soil</u> | | | | | <u>%</u> |
| 63 | 0.03 | 0.42 | 0.05 | 8.43 | 8.93 | 5.60 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.

**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for Izagora loam

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|-----|--------------------------------------|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 63 | ND | 4.9 | 4.97 | 5.47 | 9.14 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.

**EBS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{ECEC}} \times 100$.

Table E: Sand mineralogy for Izagora loam

| Depth | Quartz | Feldspar | Mica | Opaque Minerals* | Heavy Minerals* | Misc* |
|---------------|----------------------------------|----------|------|------------------|-----------------|-------|
| <u>inches</u> | <u>g kg⁻¹ of sand</u> | | | | | |
| 13-33 | 980 | 0 | 0 | 0 | 10 | 10 |

*Opaque Minerals are ilmenite, magnetite, hematite, etc. Heavy Minerals are translucent zircon, tourmaline, rutile, epidote, hornblende, etc. Misc = rock fragments.

Johnston Series

Soils of the Johnston series are very deep and very poorly drained. They formed in loamy fluvial sediments. They are on flood plains. Slopes range from 0 to 2 percent.

Typical pedon of Johnston mucky loam, 0 to 2 percent slopes, about 600 feet southeast of junction of VA-628 and Diascund Creek, New Kent County.

A--0 to 24 inches; black (10YR 2/1) mucky loam; weak medium granular structure; very friable, slightly sticky, slightly plastic; many fine and medium roots; very strongly acid; gradual wavy boundary.

Cg1--24 to 30 inches; dark gray (10YR 4/1) sandy loam; massive; friable, slightly sticky, slightly plastic; few fine roots; very strongly acid; clear smooth boundary.

Cg2--30 to 64 inches; dark grayish brown (10YR 4/2) loamy sand; massive; very friable, slightly sticky, nonplastic; few fine roots; strongly acid.

Table F. Chemical properties* for Johnston mucky loam

| Depth | OM | pH | Ca ²⁺ | Mg ²⁺ | P | K ⁺ | Zn | Mn |
|---------------|----------|-----|------------------|------------------|---|----------------|-----|-----|
| <u>inches</u> | <u>%</u> | | <u>ppm</u> | | | | | |
| 0-24 | 5.5 | 4.5 | 108 | 17 | 2 | 8 | 1.0 | 2.8 |
| 24-30 | 2.0 | 4.7 | 84 | 14 | 1 | 3 | 0.3 | 0.4 |
| 30-64 | 1.3 | 5.1 | 132 | 23 | 5 | 6 | 0.2 | 0.5 |

*Soil Testing and Plant Analysis Laboratory, Agronomy Department, Va Tech, Blacksburg, VA 24061.

Johnston Series - Supplemental Profile 1

Supplemental pedon of Johnston silt loam in an area of Johnson complex, on Long Hill Swamp flood plain, about 4,500 feet south of bridge on VA-612, James City County.

A--0 to 8 inches; black (5Y 2/1) silt loam; weak medium granular structure; friable, sticky, plastic; many fine and medium roots; very strongly acid; clear smooth boundary.

Bg--8 to 34 inches; black (10YR 2/1) silty clay loam; common fine prominent strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; friable, sticky, plastic; few fine roots; 13 percent organic matter; strongly acid; clear smooth boundary.

Cg1--34 to 49 inches; black (5Y 2/1) sandy clay loam; few fine prominent light olive brown (2.5Y 5/4) mottles; massive; friable, sticky, plastic; 3 percent organic matter; strongly acid; gradual wavy boundary.

Cg2--49 to 60 inches; gray (5Y 5/1) fine sandy loam; massive friable, slightly sticky slightly plastic; 1 percent organic matter; moderately acid.

Table A: Particle-size distribution* for Johnston silt loam

| Depth | Sand | | | | | Total | Silt | Clay |
|--------|----------------------------|----|-----|-----|----|-------|------|------|
| | VC | C | M | F | VF | | | |
| inches | g kg ⁻¹ of soil | | | | | | | |
| 0-8 | 5 | 33 | 54 | 102 | 27 | 221 | 557 | 222 |
| 8-34 | 6 | 21 | 34 | 73 | 26 | 160 | 511 | 329 |
| 34-49 | 3 | 10 | 116 | 341 | 59 | 529 | 247 | 224 |
| 49-60 | 11 | 30 | 196 | 518 | 51 | 806 | 62 | 132 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Kempsville Series

Soils of the Kempsville series are very deep and well drained. They formed in loamy fluvial and marine sediments. Kempsville soils are on uplands. Slopes range from 2 to 10 percent.

Typical pedon of Kempsville fine sandy loam, in an area of Kempsville-Emporia complex, 2 to 6 percent slopes, 4,000 feet south of junction of VA-603 and VA-627, 100 feet west of VA-627 and 30 feet north of field boundary, 900 feet south of crossing of Virginia Power transmission line and VA-627, New Kent County.

Ap--0 to 11 inches; brown (10YR 5/3) fine sandy loam; weak fine granular structure; friable, nonsticky, nonplastic; few fine roots; common fine and few medium tubular pores; strongly acid; abrupt smooth boundary.

BA--11 to 17 inches; yellowish brown (10YR 5/6) fine sandy loam; common medium faint light yellowish brown (10YR 6/4) mottles; weak medium subangular blocky structure; friable, sticky, slightly plastic; few fine roots; common fine and medium tubular pores; few faint clay films and clay bridges on sand grains; moderately acid; clear smooth boundary.

Bt1--17 to 30 inches; strong brown (7.5YR 5/6) sandy clay loam; common coarse distinct light yellowish brown (10YR 6/4) mottles; moderate medium subangular blocky structure; friable, sticky, plastic; few fine roots; few fine and few coarse tubular pores; common distinct clay films on faces of peds; very strongly acid; gradual smooth boundary.

Bt2--30 to 39 inches; yellowish brown (10YR 5/8) fine sandy loam; common fine and medium distinct pale brown (10YR 6/3) mottles; weak medium subangular blocky structure; very friable, slightly sticky, nonplastic; few fine roots; common fine and medium tubular pores; few distinct clay films on faces of peds and clay bridging between sand grains; very strongly acid; clear irregular boundary.

Bt3--39 to 53 inches; approximately 60 percent yellowish brown (10YR 5/8) and 40 percent pale brown (10YR 6/3) fine sandy loam; weak coarse subangular blocky structure; yellowish brown portion is friable, slightly sticky, and slightly plastic; pale brown portion is firm and slightly compact in place; common fine vesicular pores in pale brown portion; common fine tubular pores in yellowish brown portion; many distinct clay films and bridges on sand grains in yellowish brown portion and common clean grains of sand in pale brown portion; very strongly acid; gradual irregular boundary.

Bt4--53 to 84 inches; yellowish red (5YR 5/8) sandy clay loam; weak medium subangular blocky structure; friable, sticky, plastic, few fine and medium tubular pores; few distinct clay films on faces of peds; strongly acid; gradual wavy boundary.

C--84 to 90 inches; stratified yellowish red (5YR 5/8) sandy clay loam and strong brown (7.5YR 5/6) sandy loam; massive, friable, slightly sticky, slightly plastic; very strongly acid.

Table F. Chemical properties* for Kempsville fine sandy loam

| Depth | OM | pH | Ca ²⁺ | Mg ²⁺ | P | K ⁺ | Zn | Mn |
|---------------|----------|-----|------------------|------------------|---|----------------|-----|-----|
| <u>inches</u> | <u>%</u> | | <u>ppm</u> | | | | | |
| 0-11 | ND | 4.8 | 48 | 7 | 3 | 17 | 0.9 | 8.7 |
| 11-17 | ND | 4.9 | 36 | 5 | 3 | 12 | 0.3 | 4.2 |
| 17-30 | ND | 5.1 | 84 | 23 | 3 | 22 | 0.2 | 3.4 |
| 30-39 | ND | 5.0 | 132 | 75 | 3 | 26 | 0.3 | 1.2 |
| 39-53 | ND | 5.2 | 168 | 81 | 3 | 20 | 0.3 | 0.4 |
| 53-89 | ND | 5.1 | 108 | 96 | 3 | 26 | 0.2 | 0.4 |

*Soil Testing and Plant Analysis Laboratory, Agronomy Department, Va Tech, Blacksburg, VA 24061.

Kempsville Series - Supplemental Profile 1

Supplemental pedon of Kempsville fine sandy loam, 2 to 6 percent slopes, about 500 feet southwest of VA-600 and 200 feet north of field boundary, and 2,000 feet northwest of dam of Richardson's pond, New Kent County.

A1--0 to 5 inches; dark grayish brown (10YR 4/2) sandy loam; weak medium granular structure; friable, slightly sticky, slightly plastic; many fine and medium roots and common coarse roots; common fine tubular pores; few quartz gravel; strongly acid; clear smooth boundary.

E--5 to 14 inches; light yellowish brown (10YR 6/4) sandy loam; weak medium granular structure; friable, slightly sticky, slightly plastic; many fine and medium roots and few coarse roots; many fine tubular pores; few quartz gravel; strongly acid; gradual smooth boundary.

Bt1--14 to 19 inches; mottled yellowish brown (10YR 5/6) and light yellowish brown (10YR 6/4) sandy loam; weak fine and medium subangular blocky structure; friable, slightly sticky, slightly plastic; common fine and medium roots; many fine tubular pores; few faint clay films on faces of peds; few quartz gravel; strongly acid; gradual smooth boundary.

Bt2--19 to 32 inches; strong brown (7.5YR 5/6) sandy loam; common fine distinct light yellowish brown (10YR 6/4) mottles; weak medium and fine subangular blocky structure; friable, sticky, plastic; common fine and medium roots; common fine and medium tubular pores; common faint clay films on faces of peds; few quartz gravel and ironstone fragments; strongly acid; gradual wavy boundary.

Bt3--32 to 43 inches; strong brown (7.5YR 5/6) sandy loam, many medium pale brown (10YR 6/3) and light yellowish brown (10YR 6/4) mottles; massive parting to weak coarse subangular blocky structure; friable, slightly sticky, slightly plastic; compact in place; few medium roots; common fine and medium tubular and vesicular pores; few faint clay films on faces of peds; few fine flakes of mica; few quartz gravel and ironstone fragments up to 15 mm in diameter; moderately acid; abrupt irregular boundary.

Bt4--43 to 60 inches; yellowish red (5YR 5/8) sandy clay loam, common medium prominent yellowish brown (10YR 6/4) and common fine distinct strong brown (7.5YR 5/8) mottles; weak coarse angular blocky structure; friable, sticky, plastic, few common roots; few fine tubular pores; few faint clay films on faces of peds; few fine flakes of mica; few quartz gravel and ironstone fragments less than 15 mm in diameter; strongly acid; gradual smooth boundary.

Bt5--60 to 66 inches; mottled yellowish red (5YR 5/6), yellowish brown (10YR 5/8), red (2.5YR 4/6), and light yellowish brown (10YR 6/4) sandy clay loam; moderate medium subangular blocky structure; friable, sticky, plastic; few medium roots; common fine and medium tubular pores; common faint clay films on faces of peds; few fine flakes of mica; few quartz gravel; strongly acid; gradual smooth boundary.

Bt6--66 to 69 inches; variegated red (2.5YR 4/6), yellowish brown (10YR 5/6), yellowish red (5YR 5/8), and light brownish gray (10YR 6/2) clay; moderate medium subangular blocky structure; firm, sticky, plastic; few medium roots; few fine tubular pores; common prominent clay films on faces of peds; few fine flakes of mica; few quartz gravel; strongly acid; clear smooth boundary.

BC--69 to 76 inches; red (2.5YR 4/6) sandy loam; common coarse prominent yellowish brown (10YR 5/6) mottles in the upper part (B) and yellowish red (5YR 5/8) sandy clay loam, common coarse prominent yellowish brown (10YR 5/6) mottles in the lower part of the horizon (C); massive parting to weak medium subangular blocky structure; friable, sticky, plastic; few medium roots; few fine and medium tubular pores and few fine vesicular pores; few distinct clay films on faces of peds; few fine flakes of mica; few quartz and feldspar fragments; strongly acid.

Table A: Particle-size distribution* for Kempsville fine sandy loam

| Depth | Sand | | | | | Total | Silt | Clay |
|---------------|----------------------------------|----|-----|-----|-----|-------|------|------|
| | VC | C | M | F | VF | | | |
| <u>inches</u> | <u>g kg⁻¹ of soil</u> | | | | | | | |
| 0-5 | 23 | 35 | 238 | 78 | 78 | 669 | 265 | 66 |
| 5-14 | 2 | 27 | 246 | 73 | 73 | 656 | 272 | 72 |
| 14-19 | 2 | 19 | 211 | 82 | 82 | 605 | 287 | 108 |
| 19-25 | 1 | 22 | 188 | 70 | 70 | 561 | 263 | 176 |
| 25-32 | 1 | 25 | 223 | 79 | 79 | 623 | 203 | 174 |
| 32-43 | 17 | 35 | 235 | 81 | 81 | 686 | 162 | 152 |
| 43-52 | 13 | 25 | 215 | 74 | 74 | 614 | 136 | 250 |
| 52-60 | 5 | 20 | 184 | 98 | 98 | 589 | 146 | 265 |
| 60-66 | 4 | 13 | 115 | 100 | 100 | 546 | 136 | 318 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table B. Chemical properties for Kempsville fine sandy loam

| Depth | Exchangeable cations | | | | CEC* | BS** |
|---------------|--|------------------|----------------|----------------|-------|----------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| <u>inches</u> | <u>cmol (+) kg⁻¹ soil</u> | | | | | <u>%</u> |
| 0-5 | 0.24 | 0.10 | 0.08 | 7.35 | 7.77 | 5.41 |
| 5-14 | 0.03 | 0.04 | 0.07 | 3.78 | 3.92 | 3.57 |
| 14-19 | 0.14 | 0.15 | 0.08 | 3.99 | 4.36 | 8.49 |
| 19-25 | 0.33 | 0.42 | 0.11 | 6.30 | 7.16 | 12.01 |
| 25-32 | 0.60 | 0.75 | 0.11 | 7.14 | 8.60 | 16.98 |
| 32-43 | 0.76 | 0.61 | 0.07 | 5.88 | 7.32 | 19.67 |
| 43-52 | 0.64 | 1.02 | 0.12 | 7.98 | 9.76 | 18.24 |
| 52-60 | 0.32 | 0.89 | 0.15 | 8.19 | 9.55 | 14.24 |
| 60-66 | 0.38 | 0.75 | 0.14 | 8.82 | 10.09 | 12.59 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.

**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for Kempsville fine sandy loam

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|------|--|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 0-5 | 2.57 | 5.05 | 7.35 | 1.77 | 23.73 |
| 5-14 | 0.46 | 5.36 | 3.78 | 0.69 | 20.29 |
| 14-19 | 0.35 | 5.36 | 3.99 | 1.12 | 33.04 |
| 19-25 | 0.28 | 5.24 | 6.30 | 2.51 | 34.26 |
| 25-32 | 0.17 | 5.20 | 7.14 | 2.91 | 50.17 |
| 32-43 | 0.10 | 5.68 | 0.55 | 1.99 | 72.36 |
| 43-52 | 0.14 | 5.48 | 1.25 | 3.03 | 58.75 |
| 52-60 | 0.08 | 5.47 | 1.95 | 3.21 | 42.37 |
| 60-66 | 0.08 | 5.56 | 2.95 | 4.22 | 30.09 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.

$$**EBS = \frac{Ca^{2+} + Mg^{2+} + K^{+}}{ECEC} \times 100.$$

Table E: Sand mineralogy for Kempsville fine sandy loam

| Depth | Quartz | Feldspar | Mica | Opaque Minerals* | Heavy Minerals* | Misc* |
|---------------|----------------------------------|----------|------|------------------|-----------------|-------|
| <u>inches</u> | <u>g kg⁻¹ of sand</u> | | | | | |
| 14-25 | 930 | 20 | 0 | 40 | Tr | 0 |

*Opaque Minerals are ilmenite, magnetite, hematite, etc. Heavy Minerals are translucent zircon, tourmaline, rutile, epidote, hornblende, etc. Misc = rock fragments.

Kempsville Series - Supplemental Profile 2

Soils of the Kempsville series are deep and well drained. They formed in loamy fluvial and marine sediments. Kempsville soils are on uplands in the Coastal Plain. Slopes range from 2 to 6 percent. (This is the "Typical Pedon" for the official description of the Kempsville series.)

Typical pedon of Kempsville fine sandy loam, about 3 miles northwest of Williamsburg, 0.5 mile east of junction of US-60 and VA-645, 100 feet south of VA-645, York County.

A1--0 to 4 inches; dark grayish brown (2.5Y 4/2) fine sandy loam; weak fine granular structure; very friable; many medium and common coarse roots; common fine and medium tubular pores; very strongly acid; clear smooth boundary.

E--4 to 14 inches; light yellowish brown (10YR 6/4) sandy loam; weak fine and medium granular structure; very friable; common coarse medium and fine roots; common fine and medium tubular pores; very strongly acid; gradual smooth boundary.

Bt1--14 to 20 inches; yellowish brown (10YR 5/6) fine sandy loam; few medium faint light yellowish brown (10YR 6/4) mottles; weak fine and medium subangular blocky and weak fine angular blocky structure; friable; few coarse medium and fine roots; common fine and medium pores; few faint clay films on faces of peds and common clay bridging between grains of sand; very strongly acid; clear smooth boundary.

Bt2--20 to 32 inches; strong brown (7.5YR 5/6) sandy clay loam; few medium distinct light yellowish brown (10YR 6/4) mottles; weak medium subangular blocky structure; friable; few coarse fine and medium roots with the coarse roots mainly in the upper part of the horizon; few fine and medium pores; common faint clay films on faces of peds; very strongly acid; clear smooth boundary.

Bt3--32 to 40 inches; mottled strong brown (7.5YR 5/6), light yellowish brown (10YR 6/4), and pale brown (10YR 6/3) fine sandy loam; weak coarse and medium subangular blocky structure; strong brown portion is friable, light yellowish brown and pale brown portion is firm and slightly compact in place; few fine roots; few fine and medium vesicular pores; few faint clay films on faces of peds; strongly acid; clear wavy boundary.

Bt4--40 to 55 inches; yellowish brown (10YR 5/6) sandy clay loam; common medium faint pale brown (10YR 6/3) and strong brown (7.5YR 5/6) mottles; weak coarse and medium subangular blocky structure; friable; slightly compact in place; few fine and very fine roots; few fine vesicular pores; few faint clay films on faces of peds and common clay bridging between sand grains; strongly acid; clear wavy boundary.

C--55 to 68 inches; yellowish brown (10YR 5/6) fine sandy loam; common medium distinct strong brown (7.5YR 5/6) and light yellowish brown (10YR 6/4) mottles and many coarse prominent gray (5Y 6/1) mottles; massive; friable; few fine roots; few fine vesicular pores; strongly acid.

Table A: Particle-size distribution* for Kempsville fine sandy loam

| Depth | Sand | | | | | Total | Silt | Clay |
|---------------|----------------------------------|----|-----|-----|-----|-------|------|------|
| | VC | C | M | F | VF | | | |
| <u>inches</u> | <u>g kg⁻¹ of soil</u> | | | | | | | |
| 0-4 | ND | 28 | 106 | 343 | 154 | 631 | 287 | 82 |
| 4-14 | 1 | 13 | 87 | 335 | 182 | 618 | 300 | 82 |
| 14-20 | 1 | 11 | 74 | 302 | 166 | 554 | 307 | 139 |
| 20-32 | 1 | 11 | 73 | 269 | 187 | 541 | 230 | 229 |
| 32-40 | 3 | 14 | 103 | 325 | 212 | 657 | 175 | 168 |
| 40-55 | 1 | 12 | 93 | 351 | 207 | 664 | 131 | 205 |
| 55-68 | ND | 14 | 98 | 383 | 217 | 712 | 146 | 142 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table B. Chemical properties for Kempsville fine sandy loam

| Depth | Exchangeable cations | | | | CEC* | BS** |
|---------------|--------------------------------------|------------------|----------------|----------------|------|----------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| <u>inches</u> | <u>cmol (+) kg⁻¹ soil</u> | | | | | <u>%</u> |
| 0-4 | 0.51 | 0.27 | 0.12 | 4.73 | 5.63 | 15.99 |
| 4-14 | 0 | 0.04 | 0.02 | 0.81 | 0.87 | 6.90 |
| 14-20 | 0.32 | 0.36 | 0.07 | 2.43 | 3.18 | 23.58 |
| 20-32 | 0.32 | 0.98 | 0.08 | 4.73 | 6.11 | 22.59 |
| 32-40 | 0.63 | 1.00 | 0.03 | 3.11 | 4.77 | 34.80 |
| 40-55 | 0.63 | 1.11 | 0.05 | 2.16 | 3.95 | 45.32 |
| 55-68 | 0 | 0.38 | 0.03 | 2.70 | 3.11 | 13.18 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.

**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for Kempsville fine sandy loam

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|------|--------------------------------------|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 0-4 | 2.26 | 4.80 | 0.90 | 1.80 | 50.00 |
| 4-14 | 0.32 | 4.70 | 0.80 | 0.86 | 6.98 |
| 14-20 | 0.14 | 5.00 | 0.90 | 1.65 | 45.45 |
| 20-32 | 0.14 | 4.90 | 1.20 | 2.58 | 53.49 |
| 32-40 | 0 | 5.40 | 0.80 | 2.46 | 67.48 |
| 40-55 | 0.11 | 5.30 | 1.60 | 3.39 | 52.80 |
| 55-68 | 0.11 | 5.20 | 1.70 | 2.11 | 19.43 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.

**EBS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^+}{\text{ECEC}} \times 100$.

Table E: Sand mineralogy for Kempsville fine sandy loam

| Depth | Quartz | Feldspar | Mica | Opaque Minerals* | Heavy Minerals* | Misc* |
|---------------|----------------------------------|----------|------|------------------|-----------------|-------|
| <u>inches</u> | <u>g kg⁻¹ of sand</u> | | | | | |
| 14-40 | 970 | 10 | 0 | 0 | 20 | 0 |

*Opaque Minerals are ilmenite, magnetite, hematite, etc. Heavy Minerals are translucent zircon, tourmaline, rutile, epidote, hornblende, etc. Misc = rock fragments.

Kenansville Series

Soils of the Kenansville series are deep and well drained. They formed in loamy marine and fluvial sediments. Kenansville soils are on upland ridges on the Coastal Plain. Slopes range from 2 to 6 percent.

Typical pedon of Kenansville loamy fine sand, 2 to 6 percent slopes, 0.5 mile north of Norge, 1,100 feet southwest of the junction of VA-602 and VA-607, James City County.

A1--0 to 2 inches; dark grayish brown (10YR 4/2) loamy fine sand; weak fine granular structure; very friable, nonsticky, nonplastic; common fine medium and few coarse roots; many medium and fine tubular pores; very strongly acid; clear smooth boundary.

E--2 to 25 inches; light yellowish brown (10YR 6/4) loamy fine sand; weak fine granular structure; very friable, nonsticky, nonplastic; few fine medium and coarse roots; common medium and fine tubular pores; strongly acid; clear smooth boundary.

Bt1--25 to 28 inches; yellowish brown (10YR 5/6) fine sandy loam; weak medium and fine granular structure; friable, slightly sticky, slightly plastic; few fine and medium roots; common fine and medium tubular pores; few sand grains bridged with clay; strongly acid; clear broken boundary.

Bt2--28 to 40 inches; strong brown (7.5YR 5/6) fine sandy loam; weak medium subangular blocky and granular structure; friable, slightly sticky, slightly plastic; few fine and medium roots; few medium and common fine tubular pores; few thin patchy clay films on faces of peds; strongly acid; clear smooth boundary.

Bt3--40 to 43 inches; strong brown (7.5YR 5/8) fine sandy loam; weak fine granular structure; very friable, slightly sticky, nonplastic; few fine roots; common fine and medium tubular pores; few sand grains coated and bridged with clay; strongly acid; clear smooth boundary.

C and Bt--43 to 78 inches; yellowish brown (10YR 5/8) loamy fine sand (C); massive; few fine and medium roots; common fine and medium tubular pores; white (10YR 8/2) sand grains in dendritic pattern of few root channels; 3 to 5 percent yellowish brown (10YR 5/4) fine sandy loam (Bt) lamellae 1/8 to 1/2 inch thick; clay bridging between sand grains; very strongly acid.

Table A: Particle-size distribution* for Kenansville loamy fine sand

| Depth | Sand | | | | | Total | Silt | Clay |
|--------|----------------------------|----|-----|-----|-----|-------|------|------|
| | VC | C | M | F | VF | | | |
| inches | g kg ⁻¹ of soil | | | | | | | |
| 0-2 | 8 | 18 | 116 | 492 | 160 | 794 | 200 | 6 |
| 2-25 | 0 | 3 | 65 | 514 | 213 | 795 | 195 | 10 |
| 25-28 | 0 | 3 | 60 | 479 | 176 | 718 | 196 | 86 |
| 28-40 | 0 | 2 | 63 | 507 | 146 | 718 | 123 | 159 |
| 40-43 | 2 | 3 | 65 | 567 | 183 | 820 | 61 | 119 |
| 43-78 | 4 | 12 | 93 | 497 | 121 | 727 | 223 | 50 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table B. Chemical properties for Kenansville loamy fine sand

| Depth | Exchangeable cations | | | | CEC* | BS** |
|---------------|--------------------------------------|------------------|----------------|----------------|------|----------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| <u>inches</u> | <u>cmol (+) kg⁻¹ soil</u> | | | | | <u>%</u> |
| 0-2 | 0.16 | 0.10 | 0.15 | 6.28 | 6.69 | 6.13 |
| 2-25 | 0.02 | 0.01 | 0.02 | 2.04 | 2.09 | 2.39 |
| 25-28 | 0.22 | 0.27 | 0.08 | 3.94 | 4.51 | 12.64 |
| 28-40 | 0.31 | 0.90 | 0.12 | 4.96 | 6.29 | 21.14 |
| 40-43 | 0.23 | 0.77 | 0.09 | 2.77 | 3.86 | 28.24 |
| 43-78 | 0.11 | 0.47 | 0.05 | 3.07 | 3.70 | 17.03 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for Kenansville loamy fine sand

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|-----|--------------------------------------|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 0-2 | 3.62 | 4.6 | 1.18 | 1.59 | 25.79 |
| 2-25 | 0.26 | 5.3 | 0.46 | 0.51 | 9.80 |
| 25-28 | 0.13 | 5.2 | 1.27 | 1.84 | 30.98 |
| 28-40 | 0.07 | 5.2 | 1.46 | 2.8 | 47.86 |
| 40-43 | 0.04 | 5.3 | 0.91 | 2.0 | 54.50 |
| 43-78 | 0.01 | 5.4 | 0.55 | 1.18 | 53.39 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.**EBS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{ECEC}} \times 100$.

Table E: Sand mineralogy for Kenansville loamy fine sand

| Depth | Quartz | Feldspar | Mica | Opaque Minerals* | Heavy Minerals* | Misc* |
|---------------|----------------------------------|----------|------|------------------|-----------------|-----------|
| <u>inches</u> | <u>g kg⁻¹ of sand</u> | | | | | |
| 25-43 | 950 | 30 | 0 | 0 | 10 | 10 sp .li |

*Opaque Minerals are ilmenite, magnetite, hematite, etc. Heavy Minerals are translucent zircon, tourmaline, rutile, epidote, hornblende, etc. Misc = rock fragments.

Lanexa Series

Soils of the Lanexa series are deep and very poorly drained. They formed in herbaceous organic materials over clayey fluvial sediments. They are in fresh to slightly brackish water marshes, creeks, and rivers and are inundated daily by fresh water and by slightly brackish water during periods of drought. Slopes are less than 1 percent.

Typical pedon of Lanexa mucky silty clay, frequently flooded, 0 to 1 percent slopes, 3,500 feet northwest of Charles City, New Kent and James City County line junction in Chickahominy River, 700 feet south of junction of John Smith and Colonial Trail in The Colonies subdivision, 100 feet north of tidal marsh channel, 2,000 feet northwest of mouth of Diascund Creek, New Kent County.

A--0 to 15 inches; very dark grayish brown (10YR 3/2) mucky silty clay; massive; sticky, slightly plastic; soil flows easily between fingers when squeezed and leaves a small residue and few fine fibrous roots; many fine live roots; moderate sulfur odor; extremely acid; clear smooth boundary.

Oa--15 to 40 inches; very dark grayish brown (2.5Y 3/2) muck (sapric material); about 5 percent fibers rubbed; massive; slightly sticky, slightly plastic; flows easily between fingers when squeezed; weak sulfur odor; common fine roots and fibers; common lenses and pockets of clay loam; very strongly acid; clear smooth boundary.

2Cg--40 to 80 inches; very dark grayish brown (2.5Y 3/2) mucky silty clay; massive; sticky, slightly plastic; flows easily between fingers when squeezed leaving a small residue and few fine fibrous roots; common pockets of sapric and hemic material; extremely acid.

Table A: Particle-size distribution* for Lanexa mucky silty clay

| Depth | Sand | | | | | Total | Silt | Clay |
|---------------|----------------------------------|----|----|----|----|-------|------|------|
| | VC | C | M | F | VF | | | |
| <u>inches</u> | <u>g kg⁻¹ of soil</u> | | | | | | | |
| 0-15 | ND | 7 | 9 | 10 | 5 | 31 | 553 | 416 |
| 15-40 | 9 | 91 | 61 | 46 | 30 | 237 | 458 | 305 |
| 40-80 | 1 | 5 | 8 | 11 | 9 | 34 | 503 | 463 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table G: Chemical and physical properties* for Lanexa mucky silty clay

| Depth | n-value | Minerals Content | Organic Carbon | Field Moisture | 15 bar Water | Sulfur | pH1** | pH2*** |
|---------------|----------------|------------------|----------------|----------------|--------------|--------|-------|--------|
| <u>inches</u> | <u>percent</u> | | | | | | | |
| 0-15 | 2.5 | 83 | 17 | 242 | 28.2 | 0.6 | 4.2 | 4.3 |
| 15-40 | 3.5 | 62 | 38 | 480 | 51.9 | 0.4 | 5.0 | 5.2 |
| 40-80 | 2.1 | 80 | 20 | 225 | 30.5 | - | 4.0 | 4.1 |

*By USDA, SCS, National Soil Survey Laboratory, Lincoln, NE.

**1 - 2 Soil - 0.01 N CaCl₂.

***1 - 1 Soil - water.

Figure 8: Lanexa soils support arrow arum and bald cypress along the Chickahominy River in New Kent County.



Levy Series

Soils of the Levy series are deep and very poorly drained. They formed in clayey fluvial sediments. Levy soils are along creeks and rivers on tidal marshes that are inundated twice daily by brackish or fresh water. Slopes are less than 1 percent.

Levy soils are commonly near Johnson, Nimmo, and Seabrook soils. Johnson, Nimmo, and Seabrook soils are not in tidal marshes. Also, Levy soils are more poorly drained than Nimmo or Seabrook soils.

Typical pedon of Levy silty clay, about 1.5 miles southwest of junction of VA-633 and VA-611 and 0.25 mile east of end of VA-633, James City County.

A1-0 to 18 inches; dark olive gray (5Y 3/2) silty clay; massive sticky; many fine roots; flows easily between fingers when squeezed, leaving residue of roots and fibers; about 15 percent organic (sapric) material; very strongly acid; clear smooth boundary.

Cg1--18 to 30 inches; very dark gray (5Y 3/1) silty clay; massive; sticky; flows easily between fingers when squeezed; common fine roots and fibers; about 18 percent organic (sapric) material; strongly acid; clear smooth boundary.

Cg2--30 to 80 inches; very dark gray (10YR 3/1) silty clay; massive; sticky; flows easily between fingers when squeezed; common fine fibers and pockets of organic (sapric) material; very strongly acid.

Table A: Particle-size distribution* for Levy silty clay

| Depth | Sand | | | | | Total | Silt | Clay |
|---------------|----------------------------------|----|----|----|----|-------|------|------|
| | VC | C | M | F | VF | | | |
| <u>inches</u> | <u>g kg⁻¹ of soil</u> | | | | | | | |
| 0-18 | 28 | 10 | 14 | 16 | 28 | 96 | 416 | 488 |
| 18-30 | 7 | 7 | 15 | 32 | 66 | 127 | 434 | 439 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table G: Chemical and physical properties* for Levy silty clay

| Depth | n-value | Minerals Content | Organic Carbon | Field Moisture | 15 bar Water | Sulfur | pH1** | pH2*** |
|---------------|----------------|------------------|----------------|----------------|--------------|--------|-------|--------|
| <u>inches</u> | <u>percent</u> | | | | | | | |
| 0-18 | 3.1 | 83 | 9.2 | 30.5 | 29.7 | 0.1 | 5.0 | 4.5 |
| 18-30 | 3.1 | 75 | 10.6 | 31.5 | 30.1 | 1.7 | 5.2 | 4.8 |

*By USDA, SCS, National Soil Survey Laboratory, Lincoln, NE.

**1 - 10 Soil - water.

***1 - 10 Soil - 0.01 N CaCl₂.

Figure 9: A meandering tidal stream with oxbows in Levy soils along the Chickahominy River in New Kent County.



Figure 10: Levy soils on a tidal stream on Jamestown Island in James City County. Vegetation is dominantly arrow arum and wild rice.



Figure 11: Levy soils along College Creek in James City County. Vegetation is dominantly arrow arum.



Mattan Series

Soils of the Mattan series are very deep and very poorly drained. They are formed in organic materials over loamy fluvial sediments. They are along fresh water creeks and rivers in back water swamps that are ponded and/or flooded daily. These waters become brackish along the streams during long drought periods. Slopes are less than 1 percent.

Typical pedon Mattan muck, frequently flooded, 0 to 1 percent slopes, is located about 0.75 miles south of the Pamunkey River, in the drainage divide of Mattan and Macon Creeks, 2500 feet north of VA-608 and VA-609 junction, New Kent County.

Oa1--0 to 14 inches; gray (5Y 5/1) muck; massive; sticky; few fine live roots; flows easily between the fingers when squeezed, leaving small residue of roots and fibric material of tree limbs, logs, and stumps; few dead roots and fibers; strongly acid; gradual smooth boundary.

Oa2--14 to 40 inches; very dark grayish brown (10YR 3/2) muck; black (10YR 2/1) rubbed; very dark gray (10YR 3/1) dry; approximately 20 percent fibers; 10 percent other materials after rubbing of tree limbs, roots, stumps, and logs; field estimate 30 percent mineral material; strongly acid; gradual wavy boundary.

Cg1--40 to 48 inches; very dark grayish brown (10YR 3/2) mucky loamy sand; massive; sticky; flows easily between fingers when squeezed; common fine dead roots, fibers, and fibric materials; neutral; gradual smooth boundary.

Cg2--40 to 60 inches; dark gray (5Y 4/1) mucky sandy clay loam; massive; sticky; flows easily between the fingers when squeezed; neutral; gradual smooth boundary.

Cg3--60 to 80 inches; greenish gray (5G 6/1) sandy clay loam, common medium prominent light olive brown (2.5Y 5/6) mottles; massive; sticky, plastic; neutral.

Table A: Particle-size distribution* for Mattan muck

| Depth | Sand | | | | | | Silt | Clay |
|--------|----------------------------|-----|-----|-----|-----|-------|------|------|
| | VC | C | M | F | VF | Total | | |
| inches | g kg ⁻¹ of soil | | | | | | | |
| 0-14 | 14 | 132 | 75 | 60 | 29 | 310 | 346 | 344 |
| 14-40 | 144 | 181 | 163 | 150 | 117 | 755 | 216 | 29 |
| 40-48 | 11 | 99 | 399 | 170 | 153 | 832 | 106 | 62 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table G: Chemical and physical properties* for Mattan muck

| Depth | n-value | Minerals Content | Organic Carbon | Field Moisture | 15 bar Water | Sulfur | pH1** | pH2*** |
|---------------|---------|---------------------|-------------------|-------------------|-----------------|--------|-------|--------|
| <u>inches</u> | | <u>percent</u> | | | | | | |
| 0-14 | 2.4 | 67 | 33 | 310 | 44.2 | 0.2 | 4.4 | 4.9 |
| 14-40 | 5.5 | 46 | 54 | 386 | 50.6 | Tr | 4.7 | 5.1 |
| 40-48 | 1.2 | - | - | 33 | 4.4 | - | 4.6 | 5.0 |

*By USDA, SCS, National Soil Survey Laboratory, Lincoln, NE.

**1 - 2 Soil - 0.01 N CaCl₂.

***1 - 1 Soil - water.

Mattan Series - Supplemental Profile 1

Supplemental pedon of Mattan mucky clay, about 200 feet north east of small island, 2,100 feet east of Pamunkey River, Cousiac Marsh, New Kent County.

A1--0 to 15 inches; dark gray (5Y 4/1) mucky clay; massive; sticky; many fine live roots; flows easily between fingers when squeezed; leaving residue of roots and fibric materials; few dead roots and fibers; moderately acid; gradual smooth boundary.

Cg1--15 to 50 inches; very dark grayish brown (10YR 3/2) mucky loamy sand; massive; sticky; flows easily between fingers when squeezed; few dead roots and fibers; moderately acid; clear smooth boundary.

Cg2--50 to 80 inches; very dark grayish brown (10YR 3/2) mucky loamy sand; massive; sticky; flows easily between fingers when squeezed; common fine fibers and and pockets of organic (sapric) material; moderately acid.

Table A: Particle-size distribution* for Mattan mucky clay

| Depth | Sand | | | | | | Silt | Clay |
|---------------|----------------------------------|-----|-----|-----|----|-------|------|------|
| | VC | C | M | F | VF | Total | | |
| <u>inches</u> | <u>g kg⁻¹ of soil</u> | | | | | | | |
| 0-15 | 76 | 51 | 35 | 29 | 15 | 206 | 329 | 465 |
| 15-50 | 243 | 230 | 144 | 114 | 61 | 792 | 145 | 63 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table G: Chemical and physical properties* for Mattan mucky clay

| Depth | n-value | Minerals Content | Organic Carbon | Field Moisture | 15 bar Water | Sulfur | pH1** | pH2*** |
|---------------|----------------|------------------|----------------|----------------|--------------|--------|-------|--------|
| <u>inches</u> | <u>percent</u> | | | | | | | |
| 0-15 | 2.5 | 61 | 39 | 373 | 54.3 | 0.5 | 5.0 | 4.9 |
| 15-50 | 4.8 | 52 | 48 | 487 | 57.0 | 0.5 | 4.7 | 4.7 |

*By USDA, SCS, National Soil Survey Laboratory, Lincoln, NE.

**1 - 1 Soil - water.

***1 - 2 Soil - 0.01 n CaCl₂.

Munden Series

Soils of the Munden series are deep and well drained. They formed in loamy fluvial sediments. They are on stream terraces in the Coastal Plain. Slopes range from 0 to 2 percent.

Pedon of Munden sandy loam, 2,700 feet south of Pamunkey River and 2,700 feet north of intersection of VA-608 and Southern Railroad and 200 feet east of farm lane, New Kent County.

Ap--0 to 13 inches; brown (10YR 4/3) sandy loam; weak fine granular structure; friable, slightly sticky, nonplastic; common fine roots; common fine and medium tubular pores; very strongly acid; clear smooth boundary.

E--13 to 18 inches; light yellowish brown (10YR 6/4) loamy sand; weak fine granular structure; very friable, slightly sticky, nonplastic; few fine roots; common fine pores; few fine flakes of mica; strongly acid; gradual smooth boundary.

Bt1--18 to 32 inches; pale brown (10YR 6/3) loamy sand; common coarse faint brownish yellow (10YR 6/6) mottles; moderate medium and fine granular structure; very friable, slightly sticky, nonplastic; common fine and medium and few coarse tubular pores; few clay bridgings between sand grains; few fine flakes of mica; strongly acid; clear smooth boundary.

Bt2--32 to 39 inches; pale brown (10YR 6/3) sandy loam; common medium faint yellowish brown (10YR 5/8) mottles; weak medium and fine subangular blocky structure; friable, sticky, slightly plastic; common medium and fine tubular pores; few faint clay films on faces of ped; few fine flakes of mica; strongly acid; clear smooth boundary.

Btg--39 to 51 inches; gray (10YR 6/1) sandy loam; common medium distinct yellowish brown (10YR 5/8) mottles; weak medium subangular blocky structure; friable, sticky, slightly plastic; common fine and medium tubular pores; few faint clay films on faces of ped; few fine flakes of mica; strongly acid; abrupt wavy boundary.

2C--51 to 110 inches; stratified brown (7.5YR 5/4), strong brown (7.5YR 5/6), reddish brown (5YR 5/4), and pale brown (10YR 6/3) sand and gravelly sand; single grain; loose, nonsticky, nonplastic; porous; few fine flakes of mica; few fine feldspathic sand grain; 15 to 25 percent gravel up to 25mm; strongly acid.

Table A: Particle-size distribution* for Munden sandy loam

| Depth | Sand | | | | | Total | Silt | Clay |
|---------------|----------------------------------|-----|-----|-----|-----|-------|------|------|
| | VC | C | M | F | VF | | | |
| <u>inches</u> | <u>g kg⁻¹ of soil</u> | | | | | | | |
| 0-13 | 30 | 74 | 160 | 277 | 101 | 642 | 262 | 96 |
| 13-18 | 65 | 111 | 218 | 301 | 89 | 784 | 173 | 43 |
| 18-32 | 62 | 111 | 188 | 283 | 116 | 760 | 205 | 35 |
| 32-39 | 73 | 105 | 168 | 218 | 105 | 669 | 206 | 125 |
| 39-51 | 97 | 161 | 247 | 169 | 49 | 723 | 142 | 135 |
| 51-70 | 231 | 352 | 310 | 56 | 2 | 951 | 9 | 40 |
| 70 | 157 | 256 | 414 | 80 | 2 | 909 | 19 | 72 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table B. Chemical properties for Munden sandy loam

| Depth | Exchangeable cations | | | | CEC* | BS** |
|---------------|--|------------------|----------------|----------------|------|----------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| <u>inches</u> | <u>cmol (+) kg⁻¹ soil</u> | | | | | <u>%</u> |
| 0-13 | 0.79 | 0.23 | 0.18 | 7.56 | 8.76 | 13.70 |
| 13-18 | 0.10 | 0.04 | 0.07 | 1.89 | 2.10 | 10.00 |
| 18-32 | 0.18 | 0.19 | 0.05 | 2.31 | 2.73 | 15.38 |
| 32-39 | 1.20 | 0.75 | 0.15 | 3.57 | 5.67 | 37.04 |
| 39-51 | 1.81 | 0.62 | 0.29 | 4.62 | 7.34 | 37.06 |
| 51-70 | 0.61 | 0.20 | 0.07 | 2.52 | 3.40 | 25.88 |
| 70 | 1.17 | 0.48 | 0.10 | 3.99 | 5.74 | 30.49 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for Munden sandy loam

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|------|--|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 0-13 | ND | 4.98 | 0.65 | 1.85 | 66.67 |
| 13-18 | ND | 5.16 | 0.45 | 0.66 | 31.82 |
| 18-32 | ND | 5.37 | 0.35 | 0.77 | 54.55 |
| 32-39 | ND | 5.26 | 0.45 | 2.55 | 82.35 |
| 39-51 | ND | 5.28 | 1.25 | 3.97 | 68.51 |
| 51-70 | ND | 5.05 | 0.15 | 1.03 | 85.44 |
| 70 | ND | 5.30 | 0.35 | 2.10 | 83.33 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.**EBS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{ECEC}} \times 100$.

Munden Series - Supplemental Profile 1

Pedon of Munden loamy fine sand, about 8,000 feet south of dam along Beaverdam Pond, 1,300 feet southwest of York River on Camp Peary, York County:

A1--0 to 6 inches; dark grayish brown (10YR 4/2) loamy fine sand; weak fine granular structure; very friable, nonsticky, nonplastic; many fine medium and coarse roots; common fine and medium tubular pores; very strongly acid; clear smooth boundary.

E--6 to 11 inches; brown (10YR 5/3) loamy fine sand; very friable, nonsticky, nonplastic; many fine medium and coarse roots; common fine and medium tubular pores; strongly acid; clear smooth boundary.

EB--11 to 24 inches; pale olive (5Y 6/3) fine sandy loam; very friable, nonsticky, nonplastic; few fine medium and coarse roots; many fine and medium tubular pores; strongly acid; clear smooth boundary.

Bt1--24 to 32 inches; light yellowish brown (10YR 5/4) fine sandy loam; common medium distinct light gray (2.5Y 7/2) mottles and clean sand grains; weak medium and fine subangular blocky structure; friable, slightly sticky, slightly plastic; few fine medium and coarse roots; many fine and medium tubular pores; few faint clay films on faces of peds; few fine flakes of mica; strongly acid; gradual smooth boundary.

Bt2--32 to 42 inches; yellowish brown (10YR 5/6) fine sandy loam; common medium distinct strong brown (7.5YR 5/6) and light gray (2.5Y 7/2) mottles; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; few coarse roots; common fine tubular pores; few fine flakes of mica; very strongly acid; gradual wavy boundary.

Bt3--42 to 48 inches; light olive brown (2.5Y 5/4) fine sandy loam; common fine faint yellowish brown (10YR 5/6) and light yellowish brown (10YR 6/4) mottles; weak medium subangular blocky structure; very friable, slightly sticky, nonplastic; common fine tubular pores; few clay bridging between sand grains; few fine flakes of mica; very strongly acid; gradual wavy boundary.

C1--48 to 65 inches; light olive brown (2.5Y 5/4) fine sandy loam; massive; nonsticky, nonplastic; common fine tubular pores; few fine flakes of mica; very strongly acid; gradual wavy boundary.

C2--65 to 80 inches; light olive brown (2.5Y 5/6) sandy loam; common fine distinct yellowish brown (10YR 5/8) and strong brown (7.5YR 5/6) mottles and common medium distinct gray (5Y 6/1) mottles; massive, nonsticky, nonplastic; common fine and medium tubular pores; common fine flakes of mica; very strongly acid.

Table A: Particle-size distribution* for Munden loamy fine sand

| Depth | Sand | | | | | Total | Silt | Clay |
|---------------|----------------------------------|----|-----|-----|-----|-------|------|------|
| | VC | C | M | F | VF | | | |
| <u>inches</u> | <u>g kg⁻¹ of soil</u> | | | | | | | |
| 0-11 | 2 | 20 | 146 | 573 | 47 | 788 | 154 | 58 |
| 11-24 | 2 | 20 | 142 | 534 | 43 | 741 | 181 | 78 |
| 24-32 | 5 | 17 | 139 | 485 | 25 | 671 | 176 | 153 |
| 32-42 | 9 | 25 | 116 | 573 | 24 | 747 | 45 | 208 |
| 42-49 | 3 | 9 | 42 | 705 | 33 | 792 | 20 | 188 |
| 49-65 | 2 | 3 | 17 | 736 | 57 | 815 | 32 | 153 |
| 65-80 | 1 | 1 | 10 | 664 | 100 | 776 | 56 | 168 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table B. Chemical properties for Munden loamy fine sand

| Depth | Exchangeable cations | | | | CEC* | BS** |
|---------------|--------------------------------------|------------------|----------------|----------------|------|----------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| <u>inches</u> | <u>cmol (+) kg⁻¹ soil</u> | | | | | <u>%</u> |
| 74 | 0.15 | 0.85 | 0.14 | 4.60 | 5.74 | 19.86 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.

**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for Munden loamy fine sand

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|------|--------------------------------------|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 74 | ND | 4.06 | 3.05 | 4.19 | 27.21 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.

**EBS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{ECEC}} \times 100$.

Table F. Chemical properties* for Munden loamy fine sand

| Depth | OM | pH | Ca ²⁺ | Mg ²⁺ | P | K ⁺ | Zn | Mn |
|---------------|----------|------|------------------|------------------|------|----------------|------|------|
| <u>inches</u> | <u>%</u> | | <u>ppm</u> | | | | | |
| 0-11 | 2.60 | 4.20 | 50.50 | 10 | 2 | 11.50 | 1.30 | 1.40 |
| 11-24 | 0.20 | 5.30 | 17 | 2 | 3 | 7.50 | 0.60 | 1.80 |
| 24-32 | 0.20 | 5.40 | 184.5 | 61.50 | 3 | 20.50 | 0.50 | 2.20 |
| 32-42 | 0.20 | 5.30 | 252 | 83.50 | 3.50 | 26 | 0.50 | 0.40 |
| 42-49 | 0.10 | 5.0 | 184.5 | 83.50 | 2 | 26 | 0.50 | 0.30 |
| 49-65 | 0.10 | 5.0 | 84.50 | 67.50 | 4.50 | 22.50 | 0.40 | 0.20 |
| 65-80 | 0.10 | 5.0 | 67 | 133.5 | 1 | 28 | 0.40 | 0.30 |

*Soil Testing and Plant Analysis Laboratory, Agronomy Department, Va Tech, Blacksburg, VA 24061.

Nawney Series

Soils of the Nawney series are very deep and very poorly drained. They formed in loamy fluvial sediments. They are on narrow to broad flood plains and basins. Slopes range from 0 to 2 percent.

Typical pedon of Nawney silt loam, 0 to 2 percent slopes, ponded about 2,000 feet south of intersection of US-60 and VA-618; 500 feet west of VA-618 and 1,500 feet north of the Chickahominy River, New Kent County.

A1--0 to 4 inches; dark gray (5Y 4/1) silt loam; moderate medium granular structure; very friable, sticky, plastic; many fine, medium, and coarse roots; few fine flakes of mica; very strongly acid; gradual smooth boundary.

A2--4 to 7 inches; dark grayish brown (2.5Y 4/2) silt loam; common fine distinct dark yellowish brown (10YR 4/4) mottles; moderate medium granular structure; very friable, sticky, plastic; common fine and medium roots; common fine tubular pores; few fine flakes of mica; very strongly acid; gradual smooth boundary.

Cg1--7 to 17 inches; gray (5Y 5/1) clay loam; many medium prominent strong brown (7.5YR 5/8) mottles; massive; friable, sticky, plastic; common fine and medium roots; common fine tubular pores; few fine flakes of mica; very strongly acid; gradual smooth boundary.

Cg2--17 to 36 inches; greenish gray (5BG 5/1) silty clay loam; many medium prominent strong brown (7.5YR 5/6) mottles; massive; friable, sticky, plastic; few fine medium, and coarse roots; few fine tubular pores; few fine flakes of mica; few fine black mineral stains; strongly acid; gradual smooth boundary.

Cg3--36 to 41 inches; greenish gray (5GY 5/1) clay loam; common fine prominent dark yellowish brown (10YR 4/4) mottles; massive; friable, sticky, plastic; few fine medium and coarse roots; few fine tubular pores; few fine flakes of mica; strongly acid; clear wavy boundary.

Cg4--41 to 65 inches; dark greenish gray (5BG 4/1) stratified sand to silty clay loam; massive; friable, slightly sticky, slightly plastic, few fine roots; few fine flakes of mica; few fine black mineral stains; slightly acid.

Table B. Chemical properties for Nawney silt loam

| Depth | Exchangeable cations | | | | CEC* | BS** |
|---------------|--------------------------------------|------------------|----------------|----------------|------|----------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| <u>inches</u> | <u>cmol (+) kg⁻¹ soil</u> | | | | | <u>%</u> |
| 8-28 | 0.09 | 0.13 | 0.06 | 9.40 | 9.68 | 2.89 |
| 59 | 0.14 | 0.08 | 0.03 | 4.20 | 4.45 | 5.62 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.

**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for Nawney silt loam

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|------|--------------------------------------|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 8-28 | ND | 3.82 | 5.45 | 5.73 | 4.89 |
| 59 | ND | 4.03 | 1.65 | 1.19 | 13.16 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.

**EBS = $\frac{Ca^{2+} + Mg^{2+} + K^{+}}{ECEC} \times 100$.

Table F. Chemical properties* for Nawney silt loam

| Depth | OM | pH | Ca ²⁺ | Mg ²⁺ | P | K ⁺ | Zn | Mn |
|---------------|----------|-----|------------------|------------------|----|----------------|-----|------|
| <u>inches</u> | <u>%</u> | | <u>ppm</u> | | | | | |
| 0-4 | 4.8 | 4.5 | 528 | 101 | 8 | 51 | 2.8 | 16.1 |
| 4-7 | 4.2 | 4.6 | 552 | 102 | 7 | 51 | 2.2 | 16.1 |
| 7-17 | 1.2 | 4.7 | 636 | 120 | 7 | 39 | 1.0 | 16.1 |
| 17-36 | 0.6 | 5.3 | 972 | 120 | 7 | 45 | 0.6 | 16.1 |
| 36-41 | 0.9 | 6.1 | 1032 | 120 | 20 | 55 | 0.6 | 16.1 |
| 41-65 | 0.7 | 6.4 | 840 | 120 | 23 | 64 | 0.7 | 16.1 |

*Soil Testing and Plant Analysis Laboratory, Agronomy Department, Va Tech, Blacksburg, VA 24061.

Newflat Series

Soils of the Newflat series are deep and somewhat poorly drained. They formed in clayey fluvial sediments. Newflat soils are on stream terraces and low-lying flats along major rivers on the Central Plain. Slopes range from 0 to 2 percent.

Typical pedon of Newflat silt loam, about 700 feet northwest of intersection of VA-5 and VA-613, James City County.

A1--0 to 2 inches; dark grayish brown (10YR 4/2) silt loam; weak fine and medium granular structure; friable, sticky, plastic; many fine medium and coarse roots; extremely acid; abrupt smooth boundary.

E--2 to 8 inches; light yellowish brown (2.5Y 6/4) silt loam; common fine distinct yellowish brown (10YR 5/6) mottles; moderate medium granular structure; friable, sticky, plastic; many fine and medium and coarse roots; many very fine tubular pores; common fine prominent very dark grayish brown (10YR 3/2) concretions; extremely acid; clear smooth boundary.

Bt1--8 to 11 inches; pale brown (10YR 6/3) silty clay loam; moderate medium subangular blocky structure; friable, sticky, plastic; many fine and medium and few coarse roots; common very fine tubular pores; few faint clay films on faces of peds, few fine prominent very dark grayish brown (10YR 3/2) concretions; few fine flakes of mica; extremely acid; clear smooth boundary.

Bt2--11 to 17 inches; light olive brown (2.5Y 5/4) clay; few fine distinct yellowish brown (10YR 5/6) mottles; strong medium and fine subangular blocky structure; firm, sticky, plastic; common fine and medium and few coarse roots; common fine and very fine tubular pores; few faint clay films on faces of peds; few fine flakes of mica; extremely acid; clear clear boundary.

Btg1--17 to 25 inches; olive gray (5Y 5/2) clay; common fine prominent yellowish brown (10YR 5/6) mottles and few medium prominent strong brown (7.5YR 5/6) mottles; strong medium and fine subangular blocky structure; firm, sticky, plastic; common fine and medium and few coarse roots; common fine and medium tubular pores; common distinct clay films on faces of peds; few fine flakes of mica; very strongly acid; clear smooth boundary.

Btg2--25 to 35 inches; gray (5Y 5/1) clay; common medium prominent yellowish brown (10YR 5/8) mottles and few fine prominent dark yellowish brown (10YR 4/4) mottles; weak medium prismatic structure parting to strong medium and fine subangular blocky; very firm, sticky, plastic; common fine and few medium roots; few very fine tubular pores; common distinct clay films on faces of peds; few fine flakes of mica; very strongly acid; gradual smooth boundary.

Btg3--35 to 52 inches; gray (N 5/0) clay; common medium prominent yellowish brown (10YR 5/6) mottles in vertical streaks up to 10 inches long; strong medium and coarse subangular blocky structure; very firm, sticky, plastic; few fine and medium roots; few very fine tubular pores; many prominent clay films on faces of peds; few fine flakes of mica; very strongly acid; gradual smooth boundary.

Btg4--52 to 66 inches; light gray (N 7/0) clay; common fine prominent yellowish brown (10YR 5/6) mottles; strong medium and fine subangular blocky structure; very firm, sticky, plastic; many prominent clay films on faces of peds; few fine flakes of mica; very strongly acid; gradual smooth boundary.

Btg5--66 to 80 inches; light gray (N 7/0) clay; common fine prominent yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; very firm, sticky, plastic; few fine flakes of mica; very strongly acid.

Table A: Particle-size distribution* for Newflat silt loam

| Depth | Sand | | | | | Total | Silt | Clay |
|---------------|----------------------------------|----|----|-----|----|-------|------|------|
| | VC | C | M | F | VF | | | |
| <u>inches</u> | <u>g kg⁻¹ of soil</u> | | | | | | | |
| 0-2 | 3 | 24 | 47 | 105 | 61 | 240 | 640 | 120 |
| 2-8 | 2 | 4 | 19 | 85 | 62 | 172 | 618 | 210 |
| 8-11 | 4 | 5 | 15 | 68 | 49 | 141 | 319 | 540 |
| 11-17 | 3 | 4 | 11 | 55 | 40 | 113 | 427 | 460 |
| 17-25 | 2 | 4 | 9 | 52 | 40 | 107 | 333 | 560 |
| 25-35 | 3 | 4 | 9 | 51 | 39 | 106 | 354 | 540 |
| 35-52 | 1 | 3 | 8 | 56 | 43 | 111 | 389 | 500 |
| 52-66 | 2 | 3 | 6 | 55 | 71 | 137 | 423 | 440 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table B. Chemical properties for Newflat silt loam

| Depth | Exchangeable cations | | | | CEC* | BS** |
|---------------|--|------------------|----------------|----------------|-------|----------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| <u>inches</u> | <u>cmol (+) kg⁻¹ soil</u> | | | | | <u>%</u> |
| 58 | 0.00 | 1.21 | 0.24 | 15.80 | 17.25 | 8.41 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.

**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for Newflat silt loam

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|------|--|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 58 | ND | 4.47 | 11.45 | 12.9 | 11.24 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.

**EBS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{ECEC}} \times 100$.

Table F. Chemical properties* for Newflat silt loam

| Depth | OM | pH | Ca ²⁺ | Mg ²⁺ | P | K ⁺ | Zn | Mn |
|---------------|----------|-----|------------------|------------------|----|----------------|-----|-----|
| <u>inches</u> | <u>%</u> | | <u>ppm</u> | | | | | |
| 0-2 | 7.4 | 3.6 | 51 | 24 | 19 | 45 | 3.8 | 1.8 |
| 2-8 | 1.2 | 4.3 | 34 | 4 | 13 | 23 | 0.7 | 0.5 |
| 8-11 | 0.5 | 4.3 | 34 | 12 | 16 | 26 | 0.8 | 0.8 |
| 11-17 | 0.4 | 4.4 | 17 | 36 | 16 | 21 | 1.2 | 1.0 |
| 17-25 | 0.2 | 4.6 | 33 | 78 | 13 | 21 | 1.1 | 0.7 |
| 25-35 | 0.2 | 4.8 | 33 | 82 | 10 | 26 | 1.2 | 0.5 |
| 35-52 | 0.1 | 4.7 | 33 | 103 | 12 | 26 | 1.7 | 0.6 |
| 52-66 | 0.1 | 4.6 | 51 | 112 | 12 | 37 | 2.5 | 0.8 |

*Soil Testing and Plant Analysis Laboratory, Agronomy Department, Va Tech, Blacksburg, VA 24061.

Newflat Series - Supplemental Profile 1

Supplemental pedon of Newflat clay loam, 0 to 2 percent slopes, Main Post Area, proposed Public Safety building site, near intersection of Washington Boulevard and Jackson Avenue, Fort Eustis, Newport News.

Fill--18 to 0 inches; various textures.

AB--0 to 12 inches; light yellowish brown (2.5Y 6/4) clay loam; many medium distinct yellowish brown (10YR 5/6) and common medium distinct light brownish gray (10YR 6/2) mottles; iron streaking forming in the interfaces of fill and old surface layers; massive traffic pan; firm, sticky, slightly plastic; few fine roots; very strongly acid; clear smooth boundary.

Btg1--12 to 22 inches; brownish yellow (10YR 6/6) clay loam; many medium distinct light brownish gray (10YR 6/2) mottles; weak medium subangular blocky structure; friable, sticky, plastic; few fine roots; very strongly acid; gradual smooth boundary.

Btg2--22 to 29 inches; light gray (10YR 7/2) clay loam, many medium distinct brownish yellow (10YR 6/6) and reddish yellow (7.5YR 6/8) mottles; weak medium subangular blocky structure; firm, sticky, plastic; very strongly acid; gradual smooth boundary.

Btg3--29 to 50 inches; light gray (10YR 7/1) clay loam, many medium distinct brownish yellow (10YR 6/6) mottles; massive; firm, sticky, plastic; very strongly acid.

Table A: Particle-size distribution* for Newflat clay loam

| Depth | Sand | | | | | Total | Silt | Clay |
|--------|----------------------------|---|---|---|----|-------|------|------|
| | VC | C | M | F | VF | | | |
| inches | g kg ⁻¹ of soil | | | | | | | |
| 0-12 | - | - | - | - | - | 322 | 399 | 279 |
| 12-22 | - | - | - | - | - | 319 | 392 | 289 |
| 22-29 | - | - | - | - | - | 313 | 327 | 360 |
| 29-50 | - | - | - | - | - | 417 | 197 | 386 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table B. Chemical properties for Newflat clay loam

| Depth | Exchangeable cations | | | | CEC* | BS** |
|--------|----------------------------------|------------------|----------------|----------------|-------|-------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| inches | cmol (+) kg ⁻¹ soil | | | | | % |
| 0-12 | 2.26 | 0.58 | 0.15 | 7.33 | 10.32 | 28.97 |
| 12-22 | 1.23 | 0.46 | 0.19 | 9.50 | 11.38 | 16.52 |
| 22-29 | 1.30 | 0.59 | 0.19 | 12.67 | 14.75 | 14.10 |
| 29-50 | 1.36 | 0.81 | 0.24 | 17.23 | 19.64 | 12.27 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.

**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for Newflat clay loam

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|------|--|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 0-12 | 0.21 | 4.68 | 2.45 | 5.44 | 54.96 |
| 12-22 | 0.0 | 4.60 | 3.95 | 5.83 | 32.25 |
| 22-29 | 0.0 | 4.50 | 6.45 | 8.53 | 24.38 |
| 29-50 | 0.0 | 4.52 | 12.05 | 14.46 | 16.67 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.

**EBS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{ECEC}} \times 100$.

Table D: Clay mineralogy for Newflat clay loam

| Depth | HIV* | Mica | Kaolinite | Quartz | Mont* | Verm* | Misc* |
|---------------|----------------------------------|------|-----------|--------|-------|-------|-------|
| <u>inches</u> | <u>g kg⁻¹ of clay</u> | | | | | | |
| 12-22 | 110 | 90 | 270 | 20 | 510 | Tr | 0 |

*HIV = hydroxy interlayered vermiculite. Mont = montmorillonite. Verm = vermiculite. Misc = vermiculite/montmorillonite.

Newflat Series - Supplemental Profile 2

Supplemental pedon of Newflat loam, 0 to 2 percent slopes, Main Post Area, proposed package store building site, near junction of 13th Street and unnamed street behind PX, Fort Eustis, Newport News.

Fill--16 to 0 inches; very dark grayish brown and yellowish brown mixed fill various textures; many fine roots.

A--0 to 4 inches; dark gray (10YR 4/1) loam; massive traffic pan; friable, slightly sticky, slightly plastic; few fine roots; slightly acid; clear smooth boundary.

E--4 to 10 inches; very pale brown (10YR 7/3) loam; common iron streaking; massive traffic pan; friable, slightly sticky, slightly plastic; few fine roots; slightly acid; clear smooth boundary.

Bt--10 to 15 inches; light yellowish brown (2.5Y 6/4) clay loam, common medium distinct very pale brown (10YR 7/3), many medium distinct strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; friable, sticky, plastic; moderately acid; gradual smooth boundary.

Btg--15 to 35 inches; streaked gray (10YR 6/1) brownish yellow (10YR 6/8), yellowish red (5YR 5/6) clay; weak coarse prismatic structure (moist), massive (wet); very firm, sticky, plastic; extremely acid; gradual smooth boundary.

BCg--35 to 70 inches; gray (10YR 6/1) clay; many medium distinct brownish yellow (10YR 6/8) and strong brown (7.5YR 5/6) mottles; massive; very firm, sticky, plastic; extremely acid.

Table A: Particle-size distribution* for Newflat loam

| Depth | Sand | | | | | Total | Silt | Clay |
|--------|----------------------------|---|---|---|----|-------|------|------|
| | VC | C | M | F | VF | | | |
| inches | g kg ⁻¹ of soil | | | | | | | |
| 0-4 | - | - | - | - | - | 410 | 400 | 190 |
| 4-10 | - | - | - | - | - | 349 | 455 | 196 |
| 10-15 | - | - | - | - | - | 276 | 409 | 315 |
| 15-35 | - | - | - | - | - | 218 | 314 | 468 |
| 35-70 | - | - | - | - | - | 325 | 249 | 426 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table B. Chemical properties for Newflat loam

| Depth | Exchangeable cations | | | | CEC* | BS** |
|---------------|--------------------------------------|------------------|----------------|----------------|-------|----------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| <u>inches</u> | <u>cmol (+) kg⁻¹ soil</u> | | | | | <u>%</u> |
| 0-4 | 6.60 | 0.44 | 0.10 | 2.38 | 9.52 | 75.00 |
| 4-10 | 3.00 | 0.30 | 0.07 | 2.38 | 5.75 | 58.61 |
| 10-15 | 5.30 | 0.68 | 0.13 | 5.54 | 11.65 | 52.45 |
| 15-35 | 0.99 | 1.23 | 0.26 | 11.58 | 14.06 | 17.64 |
| 35-70 | 3.10 | 0.67 | 0.23 | 16.21 | 20.21 | 19.79 |
| 60 | 2.22 | 0.62 | 0.23 | 15.44 | 18.51 | 16.59 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for Newflat loam

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|------|--------------------------------------|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 0-4 | 1.73 | 6.30 | 0.05 | 7.19 | 99.30 |
| 4-10 | 0.0 | 6.32 | 0.10 | 3.47 | 97.12 |
| 10-15 | 0.0 | 5.72 | 0.65 | 6.76 | 90.38 |
| 15-35 | 0.0 | 5.06 | 4.55 | 7.03 | 35.28 |
| 35-70 | 0.0 | 4.20 | 11.75 | 15.02 | 25.40 |
| 60 | 0.0 | 4.02 | 11.95 | 15.02 | 20.44 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.**EBS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{ECEC}} \times 100$.

Table D: Clay mineralogy for Newflat loam

| Depth | HIV* | Mica | Kaolinite | Quartz | Mont* | Gibbsite | Misc* |
|---------------|----------------------------------|------|-----------|--------|-------|----------|-------|
| <u>inches</u> | <u>g kg⁻¹ of clay</u> | | | | | | |
| 15-35 | Tr | 60 | 410 | 40 | 430 | 0 | 60* |

*HIV = hydroxy interlayered vermiculite. Mont = montmorillonite. Misc = vermiculite/montmorillonite.

Nimmo Series

Soils of the Nimmo series are deep and poorly drained. They formed in loamy fluvial sediments overlying sandy sediments. Nimmo soils are on low-lying flats and broad natural drains on the Coastal Plain. Slopes range from 0 to 2 percent.

Typical pedon of Nimmo fine sandy loam, about 1,600 feet northwest of the junction of VA-622 and VA-628 near Seaford, York County.

A1--0 to 8 inches; very dark grayish brown (2.5Y 3/2) fine sandy loam; weak fine granular structure; very friable, slightly sticky, nonplastic; many fine and medium and coarse roots; few fine and medium pores; extremely acid; clear smooth boundary.

E1--8 to 11 inches; dark gray (5Y 4/1) fine sandy loam; weak fine granular structure; very friable, slightly sticky, slightly plastic; common fine medium and coarse roots; few fine and medium pores; extremely acid; clear smooth boundary.

E2--11 to 17 inches; gray (5Y 6/1) fine sandy loam; weak fine granular structure; very friable, nonsticky, nonplastic; few fine medium and coarse roots; common fine and medium pores; extremely acid; clear smooth boundary.

Btg1--17 to 21 inches; gray (5Y 6/1) fine sandy loam; few fine distinct olive yellow (2.5Y 6/6) mottles; weak coarse subangular blocky structure; very friable, nonsticky, nonplastic; few fine medium and coarse roots; few fine and medium pores; few sand grains bridged with clay; few fine flakes of mica; extremely acid; clear smooth boundary.

Btg2--21 to 29 inches; dark gray (5Y 4/1) and gray (5Y 5/1) fine sandy loam; common medium faint gray (5Y 5/1) and olive yellow (2.5Y 6/6) mottles and common medium prominent yellowish brown (10YR 5/8) mottles; weak medium subangular blocky structure; very friable, slightly sticky, slightly plastic; few fine and medium roots; common fine and medium pores; many sand grains coated and bridged with clay; few fine flakes of mica; extremely acid; gradual smooth boundary.

Btg3--29 to 36 inches; dark gray (5Y 4/1) fine sandy loam; many medium faint gray (5Y 5/1) mottles and common coarse prominent yellowish brown (10YR 5/6) and brownish yellow (10YR 6/6) streaks and mottles; weak coarse subangular blocky structure; very friable, slightly sticky, slightly plastic; few fine roots; common fine and medium pores; few sand grains coated and bridged with clay; few fine flakes of mica; extremely acid; gradual smooth boundary.

Cg1--36 to 45 inches; dark gray (5Y 4/1) loamy fine sand; many medium and faint gray (5Y 5/1) mottles and common coarse prominent yellowish brown (10YR 5/6) and brownish yellow (10YR 6/6) streaks and mottles; massive; very friable, slightly sticky, slightly plastic; common fine flakes of mica; extremely acid; gradual wavy boundary.

Cg2--45 to 52 inches; dark gray (5Y 4/1) loamy fine sand; many medium faint gray (5Y 5/1) mottles and common coarse prominent yellowish brown (10YR 5/6) mottles; massive; very friable, slightly sticky, slightly plastic; common fine flakes of mica; extremely acid; gradual wavy boundary.

Cg3--52 to 60 inches; light olive gray (5Y 6/2) sand and strata of light gray (5Y 7/1) loamy fine sand; common coarse distinct olive yellow (2.5Y 6/8) mottles; single grain; loose; common fine flakes of mica; very strongly acid.

Table A: Particle-size distribution* for Nimmo fine sandy loam

| Depth | Sand | | | | | Total | Silt | Clay |
|--------|----------------------------|----|----|-----|-----|-------|------|------|
| | VC | C | M | F | VF | | | |
| inches | g kg ⁻¹ of soil | | | | | | | |
| 0-8 | 8 | 21 | 32 | 474 | 137 | 672 | 213 | 115 |
| 8-11 | 7 | 23 | 32 | 470 | 203 | 735 | 160 | 105 |
| 11-17 | 6 | 23 | 30 | 499 | 193 | 751 | 154 | 95 |
| 17-21 | 6 | 20 | 29 | 491 | 141 | 687 | 163 | 150 |
| 21-29 | 7 | 24 | 34 | 528 | 154 | 747 | 113 | 140 |
| 29-36 | 5 | 20 | 30 | 551 | 185 | 791 | 62 | 147 |
| 36-45 | 1 | 5 | 8 | 428 | 382 | 824 | 54 | 122 |
| 45-52 | 1 | 4 | 5 | 548 | 293 | 851 | 40 | 109 |
| 52-60 | 5 | 21 | 34 | 350 | 369 | 779 | 154 | 67 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Norfolk Series

Soils of the Norfolk series are deep and well drained. They formed in loamy fluvial and marine sediments. Norfolk soils are on broad uplands in the Coastal Plain. Slopes range from 2 to 6 percent.

Typical pedon of Norfolk fine sandy loam, 2 to 6 percent slopes, about 5,000 feet southwest of mouth of Carter's Creek at the York River, 800 feet south of Carter's Creek on Camp Peary, York County.

Ap--0 to 10 inches; grayish brown (10YR 5/2) fine sandy loam; weak fine and medium granular structure; friable, slightly sticky, nonplastic; many fine medium and coarse roots; common fine and medium tubular pores; very strongly acid; clear smooth boundary.

E--10 to 17 inches; yellowish brown (10YR 5/4) loam; few fine faint yellowish brown (10YR 5/8) mottles; moderate medium and fine granular structure; friable, slightly sticky, slightly plastic; common fine and medium roots; common fine and medium tubular pores; strongly acid; gradual smooth boundary.

Bt1--17 to 21 inches; yellowish brown (10YR 5/6) loam; common medium distinct strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; friable, sticky, plastic; few fine and medium roots; many fine and medium tubular pores; few faint clay films on faces of peds; very strongly acid; clear smooth boundary.

Bt2--21 to 39 inches; strong brown (7.5YR 5/6) loam; few fine distinct light yellowish brown (10YR 6/4) mottles; moderate medium and fine subangular blocky structure; friable, sticky, plastic; few fine roots; common fine and medium tubular pores; few faint clay films on faces of peds; strongly acid; gradual smooth boundary.

Bt3--39 to 53 inches; strong brown (7.5YR 5/6) sandy clay loam; few medium distinct light yellowish brown (10YR 6/4) mottles; weak medium subangular blocky structure; friable, sticky, plastic; few fine roots; common fine tubular pores; few faint clay films on faces of peds; strongly acid; gradual smooth boundary.

Bt4--53 to 72 inches; strong brown (7.5YR 5/6) sandy clay loam; common medium distinct light yellowish brown (10YR 6/4) and pale brown (10YR 6/3) mottles; weak medium subangular blocky structure; friable sticky plastic; few medium roots; common fine tubular pores; few faint clay films on faces of peds; strongly acid.

Table A: Particle-size distribution* for Norfolk fine sandy loam

| Depth | Sand | | | | | Total | Silt | Clay |
|--------|----------------------------|----|-----|-----|----|-------|------|------|
| | VC | C | M | F | VF | | | |
| inches | g kg ⁻¹ of soil | | | | | | | |
| 0-10 | 6 | 55 | 141 | 231 | 77 | 510 | 385 | 105 |
| 10-17 | 3 | 44 | 127 | 197 | 64 | 435 | 405 | 160 |
| 17-21 | 4 | 39 | 111 | 180 | 58 | 392 | 378 | 230 |
| 21-39 | 11 | 56 | 132 | 206 | 70 | 475 | 290 | 235 |
| 39-53 | 17 | 58 | 134 | 222 | 76 | 507 | 273 | 220 |
| 53-72 | 45 | 71 | 131 | 216 | 70 | 533 | 217 | 250 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table B. Chemical properties for Norfolk fine sandy loam

| Depth | Exchangeable cations | | | | CEC* | BS** |
|---------------|--------------------------------------|------------------|----------------|----------------|------|----------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| <u>inches</u> | <u>cmol (+) kg⁻¹ soil</u> | | | | | <u>%</u> |
| 67 | 0.34 | 0.56 | 0.14 | 6.20 | 7.24 | 14.36 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.

**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for Norfolk fine sandy loam

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|------|--------------------------------------|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 67 | ND | 4.36 | 2.65 | 3.69 | 28.18 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.

**EBS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{ECEC}} \times 100$.

Table F. Chemical properties* for Norfolk fine sandy loam

| Depth | OM | pH | Ca ²⁺ | Mg ²⁺ | P | K ⁺ | Zn | Mn |
|---------------|----------|-----|------------------|------------------|---|----------------|-----|-----|
| <u>inches</u> | <u>%</u> | | <u>ppm</u> | | | | | |
| 0-10 | 1.5 | 5.0 | 67 | 18 | 2 | 17 | 1.5 | 8.7 |
| 10-17 | 0.7 | 5.1 | 51 | 12 | 2 | 15 | 0.6 | 4.6 |
| 17-21 | 0.3 | 4.8 | 67 | 22 | 1 | 24 | 0.6 | 2.4 |
| 21-39 | 0.2 | 5.2 | 319 | 64 | 3 | 21 | 0.5 | 1.0 |
| 39-53 | 0.1 | 5.4 | 252 | 126 | 1 | 30 | 0.4 | 1.0 |
| 53-72 | 0.1 | 5.2 | 286 | 100 | 2 | 39 | 0.5 | 0.3 |

*Soil Testing and Plant Analysis Laboratory, Agronomy Department, Va Tech, Blacksburg, VA 24061.

Orangeburg Series

Soils of the Orangeburg series are very deep and well drained. They formed in fluviomarine sediments. They are on medium to broad ridges on the uplands. Slopes range from 2 to 6 percent.

Typical pedon of Orangeburg fine sandy loam, 2 to 6 percent slopes, about 1200 feet south of Pamunkey River, 1400 feet south southwest of Morgan Landing on Pamunkey River, and 2600 feet north of VA-623, New Kent County.

Ap--0 to 10 inches; yellowish brown (10YR 5/4) loam; weak fine granular structure; friable, slightly sticky, nonplastic; many fine, common medium, few coarse roots; common fine and medium tubular pores; strongly acid; clear smooth boundary.

AB--10 to 19 inches; mottled brown (10YR 4/3) and strong brown (7.5YR 5/6) loam; weak medium subangular and moderate medium granular structure; friable, sticky, slightly plastic; common fine and few medium roots; common fine and medium tubular pores; strongly acid; gradual smooth boundary.

Bt1--19 to 39 inches; yellowish red (5YR 4/6) sandy clay loam; moderate medium subangular blocky structure; friable, sticky, plastic; common fine and medium roots; common fine and medium pores; few faint clay films on faces of peds; mixing in part of horizon; strongly acid; gradual smooth boundary.

Bt2--39 to 53 inches; yellowish red (5YR 4/6) sandy clay loam; weak coarse and medium subangular blocky structure; friable, sticky, plastic; few fine and medium roots; common fine and medium tubular pores; common faint clay films on faces of peds; strongly acid; gradual smooth boundary.

Bt3--53 to 74 inches; yellowish red (5YR 4/6) sandy loam; weak coarse subangular blocky structure; friable, sticky, plastic; few medium roots; common fine tubular pores; few faint clay films on faces of peds; moderately acid.

Table A: Particle-size distribution* for Orangeburg fine sandy loam

| Depth | Sand | | | | | | Silt | Clay |
|--------|----------------------------|----|-----|-----|----|-------|------|------|
| | VC | C | M | F | VF | Total | | |
| inches | g kg ⁻¹ of soil | | | | | | | |
| 0-10 | 6 | 52 | 167 | 246 | 38 | 509 | 348 | 143 |
| 10-19 | 7 | 51 | 161 | 215 | 38 | 472 | 319 | 209 |
| 19-39 | 7 | 53 | 136 | 246 | 41 | 483 | 197 | 320 |
| 39-53 | 13 | 64 | 190 | 282 | 27 | 576 | 172 | 252 |
| 53-74 | 8 | 73 | 208 | 291 | 13 | 593 | 218 | 189 |
| 72 | 12 | 67 | 206 | 316 | 44 | 645 | 165 | 190 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table B. Chemical properties for Orangeburg fine sandy loam

| Depth | Exchangeable cations | | | | CEC* | BS** |
|---------------|--|------------------|----------------|----------------|-------|----------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| <u>inches</u> | <u>cmol (+) kg⁻¹ soil</u> | | | | | <u>%</u> |
| 0-10 | 0.77 | 0.10 | 0.08 | 7.35 | 8.30 | 11.45 |
| 10-19 | 2.41 | 0.32 | 0.09 | 6.30 | 9.12 | 30.92 |
| 19-39 | 1.73 | 1.60 | 0.14 | 9.03 | 12.50 | 27.76 |
| 39-53 | 0.01 | 1.01 | 0.19 | 7.35 | 8.56 | 14.14 |
| 53-74 | 0.01 | 0.71 | 0.25 | 6.09 | 7.06 | 13.74 |
| 69 | 0.01 | 0.62 | 0.25 | 5.46 | 6.34 | 13.88 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.

$$**BS = \frac{Ca^{2+} + Mg^{2+} + K^{+}}{CEC} \times 100.$$

Table C. Chemical properties for Orangeburg fine sandy loam

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|------|--|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 0-10 | ND | 5.08 | 1.05 | 2.00 | 47.50 |
| 10-19 | ND | 5.35 | 0.35 | 3.17 | 88.96 |
| 19-39 | ND | 5.50 | 0.95 | 4.42 | 78.51 |
| 39-53 | ND | 5.53 | 1.85 | 3.06 | 39.54 |
| 53-74 | ND | 5.65 | 1.65 | 2.62 | 37.02 |
| 69 | ND | 5.63 | 1.35 | 2.23 | 39.46 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.

$$**EBS = \frac{Ca^{2+} + Mg^{2+} + K^{+}}{ECEC} \times 100.$$

Table E: Sand mineralogy for Orangeburg fine sandy loam

| Depth | Quartz | Feldspar | Mica | Opaque Minerals* | Heavy Minerals* | Misc* |
|---------------|----------------------------------|----------|------|------------------|-----------------|-------|
| <u>inches</u> | <u>g kg⁻¹ of sand</u> | | | | | |
| 19-39 | 930 | 30 | 0 | 20 | 0 | 20 |

*Opaque Minerals are ilmenite, magnetite, hematite, etc. Heavy Minerals are translucent zircon, tourmaline, rutile, epidote, hornblende, etc. Misc = rock fragments.

Pamunkey Series

Soils of the Pamunkey series are very deep and well drained. They formed in loamy fluvial sediments. They are on stream terraces. Slopes range from 0 to 6 percent.

Typical pedon of Pamunkey fine sandy loam, 2 to 6 percent slopes, about 600 feet south of Pamunkey River 1.25 miles southeast of Southern Railroad bridge at White House, 3,500 feet west of mouth of White House Creek, New Kent County.

Ap--0 to 10 inches; brown (10YR 4/3) fine sandy loam; weak fine and medium granular structure; very friable, slightly sticky, slightly plastic; many fine roots; common fine and medium tubular pores; slightly acid; clear smooth boundary.

Bt1--10 to 17 inches; strong brown (7.5YR 5/6) loam; moderate medium subangular blocky structure; friable, slightly sticky, slightly plastic; common fine roots; common fine and medium tubular pores; common fine flakes of mica; common distinct clay films on faces of peds and bridges on sand grains; moderately acid; clear smooth boundary.

Bt2--17 to 28 inches; strong brown (7.5YR 5/6) sandy clay loam; moderate medium subangular blocky structure; friable, sticky, plastic; common fine roots; common fine and medium tubular pores; common distinct clay films on faces of peds; common fine flakes of mica; common medium prominent dark brown (7.5YR 3/2) mineral stains; moderately acid; clear smooth boundary.

Bt3--28 to 36; strong brown (7.5YR 5/6) fine sandy loam; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; common very fine roots; common fine and medium tubular pores; common fine and medium flakes of mica; common distinct clay films on faces of peds; slightly acid; gradual wavy boundary.

Bt4--36 to 46 inches; yellowish red (5YR 5/6) fine sandy loam; weak medium subangular blocky structure; very friable, slightly sticky, slightly plastic; few fine roots; common fine and medium tubular pores; common fine and medium flakes of mica; common distinct clay films on faces of peds; slightly acid; gradual smooth boundary.

2C1--46 to 57 inches; strong brown (7.5YR 5/6) sand; single grain; loose; few fine roots; common fine and medium flakes of mica; slightly acid; clear wavy boundary.

2C2--57 to 80 inches; yellowish brown (10YR 5/6) sand; single grain; loose; common fine and medium flakes of mica; slightly acid.

Table A: Particle-size distribution* for Pamunkey fine sandy loam

| Depth | Sand | | | | | Total | Silt | Clay |
|--------|----------------------------|-----|-----|-----|-----|-------|------|------|
| | VC | C | M | F | VF | | | |
| inches | g kg ⁻¹ of soil | | | | | | | |
| 0-10 | 13 | 61 | 124 | 280 | 156 | 634 | 264 | 102 |
| 10-17 | 9 | 51 | 118 | 213 | 121 | 512 | 281 | 207 |
| 17-28 | 5 | 30 | 107 | 202 | 129 | 473 | 247 | 280 |
| 28-36 | 13 | 67 | 224 | 327 | 114 | 745 | 78 | 177 |
| 36-46 | 15 | 34 | 152 | 391 | 184 | 776 | 102 | 122 |
| 46-57 | 113 | 234 | 274 | 239 | 77 | 937 | 28 | 35 |
| 57-108 | 77 | 289 | 440 | 171 | 9 | 986 | 3 | 11 |
| 62 | 75 | 223 | 367 | 302 | 1 | 968 | 17 | 15 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table B. Chemical properties for Pamunkey fine sandy loam

| Depth | Exchangeable cations | | | | CEC* | BS** |
|---------------|--|------------------|----------------|----------------|-------|----------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| <u>inches</u> | <u>cmol (+) kg⁻¹ soil</u> | | | | | <u>%</u> |
| 0-10 | 2.68 | 0.88 | 0.39 | 4.41 | 8.36 | 47.25 |
| 10-17 | 2.41 | 1.13 | 0.40 | 5.88 | 9.82 | 40.12 |
| 17-28 | 4.60 | 1.38 | 0.30 | 5.67 | 11.95 | 52.55 |
| 28-36 | 3.25 | 0.70 | 0.12 | 5.04 | 9.11 | 44.68 |
| 36-46 | 2.81 | 0.43 | 0.07 | 2.94 | 6.25 | 52.96 |
| 46-57 | 0.98 | 0.12 | 0.01 | 1.89 | 3.00 | 37.00 |
| 57-108 | 0.34 | 0.03 | 0.03 | 1.89 | 2.29 | 17.47 |
| 62 | 0.52 | 0.05 | 0.01 | 2.31 | 2.89 | 20.07 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.

**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for Pamunkey fine sandy loam

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|------|--|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 0-10 | ND | 6.15 | 0.05 | 4.00 | 98.75 |
| 10-17 | ND | 5.97 | 0.05 | 3.99 | 98.75 |
| 17-28 | ND | 5.95 | 0.05 | 6.33 | 99.21 |
| 28-36 | ND | 6.20 | 0.05 | 4.12 | 98.79 |
| 36-46 | ND | 6.23 | 0.05 | 3.36 | 98.51 |
| 46-57 | ND | 6.15 | 0.05 | 1.16 | 95.69 |
| 57-108 | ND | 6.10 | 0.05 | 0.45 | 88.89 |
| 62 | ND | 6.15 | 0.05 | 0.63 | 92.06 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.

**EBS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{ECEC}} \times 100$.

Table E: Sand mineralogy for Pamunkey fine sandy loam

| Depth | Quartz | Feldspar | Mica | Opaque Minerals* | Heavy Minerals* | Misc* |
|---------------|----------------------------------|----------|------|------------------|-----------------|-------|
| <u>inches</u> | <u>g kg⁻¹ of sand</u> | | | | | |
| 10-28 | 720 | 100 | 130 | 0 | 0 | 0 |

*Opaque Minerals are ilmenite, magnetite, hematite, etc. Heavy Minerals are translucent zircon, tourmaline, rutile, epidote, hornblende, etc. Misc = rock fragments.

Pamunkey Series - Supplemental Profile 1

Soils of the Pamunkey series are deep and well drained. They formed in loamy fluvial sediments. Pamunkey soils are on uplands of low stream terraces on the Coastal Plain. Slopes range from 2 to 6 percent.

Typical pedon of Pamunkey sandy loam, in an area of Pamunkey soils, 2 to 6 percent slopes, about 3,000 feet northwest of mouth of Skimino Creek at the James River, 1,000 feet north of Skimino Creek, 800 feet west of patrol road on Camp Peary, James City County.

A1--0 to 4 inches; dark grayish brown (10YR 4/2) sandy loam; weak fine and medium granular structure; very friable, nonsticky, nonplastic; many coarse medium and fine roots; many medium tubular pores; moderately acid; clear smooth boundary.

E--4 to 14 inches; brown (10YR 5/3) sandy loam; weak medium granular structure; very friable, slightly sticky, nonplastic; common coarse and few fine and medium roots; common fine and many medium tubular pores; slightly acid; gradual smooth boundary.

Bt1--14 to 21 inches; yellowish brown (10YR 5/4) sandy loam; common medium prominent dark brown (7.5YR 4/4) mottles; weak medium and fine subangular blocky structure; friable, sticky, slightly plastic; common fine medium and coarse roots; many fine and common medium tubular pores; few faint patchy clay films on faces of peds; few fine flakes of mica; slightly acid; clear smooth boundary.

Bt2--21 to 36 inches; dark brown (7.5YR 4/4) sandy clay loam; weak fine and medium subangular blocky structure; friable, sticky, plastic; common medium and fine and few coarse roots; many fine and medium tubular pores; few faint clay films on faces of peds; few fine flakes of mica; slightly acid; clear smooth boundary.

Bt3--36 to 43 inches; dark brown (7.5YR 4/4) sandy loam; weak medium subangular blocky and weak medium granular structure; friable, slightly sticky, slightly plastic; few fine and medium roots; many fine and medium pores; few faint clay films on faces of peds and common clay bridging between sand grains; few fine flakes of mica; few grains of feldspar; slightly acid; clear smooth boundary.

C1--43 to 53 inches; brown (7.5YR 5/4) loamy sand; massive; very friable, slightly sticky, nonplastic; few medium roots; many medium and fine pores; few fine flakes of mica; few grains of feldspar; few quartz pebbles; slightly acid; gradual smooth boundary.

C2--53 to 65 inches; strong brown (7.5YR 5/8) loamy sand; massive; very friable, slightly sticky, nonplastic; many medium pores; few fine flakes of mica; common quartz pebbles; few grains of feldspar; slightly acid; gradual smooth boundary.

C3--65 to 75 inches; strong brown (7.5YR 5/8) sand; single grain; loose; few fine flakes of mica; common quartz pebbles; few grains of feldspar; slightly acid.

Table A: Particle-size distribution* for Pamunkey sandy loam

| Depth | Sand | | | | | | Silt | Clay |
|---------------|----------------------------------|-----|-----|----|-----|-------|------|------|
| | VC | C | M | F | VF | Total | | |
| <u>inches</u> | <u>g kg⁻¹ of soil</u> | | | | | | | |
| 0-4 | 12 | 171 | 80 | 15 | 748 | 194 | 58 | |
| 4-14 | 11 | 169 | 481 | 77 | 16 | 754 | 173 | 73 |
| 14-21 | 10 | 142 | 434 | 67 | 13 | 666 | 206 | 128 |
| 21-36 | 4 | 100 | 391 | 62 | 10 | 567 | 200 | 233 |
| 36-43 | 6 | 161 | 499 | 75 | 10 | 751 | 94 | 155 |
| 43-53 | 22 | 208 | 537 | 79 | 10 | 856 | 41 | 103 |
| 53-65 | 27 | 243 | 529 | 74 | 9 | 882 | 15 | 103 |
| 65-75 | 68 | 279 | 478 | 83 | 9 | 917 | 8 | 75 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table B. Chemical properties for Pamunkey sandy loam

| Depth | Exchangeable cations | | | | CEC* | BS** |
|---------------|--------------------------------------|------------------|----------------|----------------|------|----------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| <u>inches</u> | <u>cmol (+) kg⁻¹ soil</u> | | | | | <u>%</u> |
| 65 | 1.67 | 0.19 | 0.06 | 2.16 | 4.08 | 47.06 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.

**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for Pamunkey sandy loam

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|-----|------------------|--------------------------------------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | | <u>cmol (+) kg⁻¹ soil</u> | <u>%</u> |
| 65 | ND | 5.4 | 0.10 | 2.02 | 95.05 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.

**EBS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{ECEC}} \times 100$.

Table F. Chemical properties* for Pamunkey sandy loam

| Depth | OM | pH | Ca ²⁺ | Mg ²⁺ | P | K ⁺ | Zn | Mn |
|---------------|----------|-----|------------------|------------------|----|----------------|-----|-----|
| <u>inches</u> | <u>%</u> | | <u>ppm</u> | | | | | |
| 0-4 | 1.4 | 5.6 | 235 | 18 | 10 | 24 | 1.3 | 5.3 |
| 4-14 | 0.3 | 6.3 | 235 | 14 | 10 | 17 | 0.2 | 4.4 |
| 14-21 | 0.2 | 6.2 | 302 | 32 | 10 | 21 | 0.2 | 3.6 |
| 21-36 | 0.2 | 6.2 | 403 | 16 | 10 | 41 | 0.2 | 1.5 |
| 36-43 | 0.1 | 6.2 | 336 | 12 | 12 | 26 | 0.1 | 0.6 |
| 43-53 | 0.1 | 6.2 | 252 | 10 | 15 | 21 | 0.1 | 0.9 |
| 53-65 | 0.1 | 6.2 | 219 | 12 | 16 | 21 | 0.1 | 0.9 |
| 65-75 | 0.1 | 6.1 | 269 | 16 | 17 | 19 | 0.1 | 1.1 |

*Soil Testing and Plant Analysis Laboratory, Agronomy Department, Va Tech, Blacksburg, VA 24061.

Pamunkey Series - Supplemental Profile 2

Supplemental pedon of Pamunkey loam, 0 to 2 percent slopes, 400 feet west of VA-614, 50 feet south of farm lane, 2300 feet northeast of VPI Extension Division, Jamestown 4H Center, James City County.

Ap--0 to 10 inches; dark yellowish brown (10YR 3/4) loam, moderate medium granular structure, friable, slightly sticky, slightly plastic; few fine roots; common fine and medium tubular pores; neutral; clear smooth boundary.

Bt1--10 to 16 inches; dark yellowish brown (10YR 3/4) and yellowish brown (10YR 5/6) clay loam; moderate medium and fine subangular blocky structure; friable, sticky, plastic; few fine roots; common fine and medium tubular pores; common distinct clay films on faces of peds; few fine flakes of mica; neutral; clear smooth boundary.

Bt2--16 to 35 inches; dark yellowish brown (10YR 4/4) clay loam; common fine prominent very dark grayish brown (10YR 3/2) mineral stains; moderate medium subangular blocky structure; friable, sticky, plastic; few fine roots; common fine and medium tubular pores; common distinct clay films on faces of peds; few fine flakes of mica; neutral; gradual smooth boundary.

Bt3--35 to 41 inches; yellowish brown (10YR 5/6) sandy clay loam; few fine very dark grayish brown (10YR 3/2) mineral stains; weak coarse subangular blocky structure; friable, sticky, plastic; few fine roots; common fine and medium tubular pores; few distinct clay films on faces of peds; few fine flakes of mica; neutral; clear wavy boundary.

C--41 to 60 inches; yellowish brown (10YR 5/6) fine sandy loam; mottled and streaked yellowish brown (10YR 5/4) and light yellowish brown (10YR 6/4); massive; friable, slightly sticky, slightly plastic; common fine and medium tubular pores; common fine flakes of mica; strongly acid.

Table A: Particle-size distribution* for Pamunkey loam

| Depth | Sand | | | | | Total | Silt | Clay | |
|---------------|----------------------------------|---|---|-----|-----|-------|------|------|--|
| | VC | C | M | F | VF | | | | |
| <u>inches</u> | <u>g kg⁻¹ of soil</u> | | | | | | | | |
| 10-30 | 2 | 3 | 6 | 206 | 146 | 363 | 267 | 370 | |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table B. Chemical properties for Pamunkey loam

| Depth | Exchangeable cations | | | | CEC* | BS** |
|---------------|--------------------------------------|------------------|----------------|----------------|------|----------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| <u>inches</u> | <u>cmol (+) kg⁻¹ soil</u> | | | | | <u>%</u> |
| 60 | 1.78 | 1.30 | 0.09 | 4.00 | 7.17 | 44.21 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.

**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for Pamunkey loam

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|-----|--------------------------------------|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 60 | ND | 5.4 | 0.15 | 4.82 | 65.77 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.

**EBS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{ECEC}} \times 100$.

Table F. Chemical properties* for Pamunkey loam

| Depth | OM | pH | Ca ²⁺ | Mg ²⁺ | P | K ⁺ | Zn | Mn |
|---------------|----------|-----|------------------|------------------|----|----------------|------|------|
| <u>inches</u> | <u>%</u> | | <u>ppm</u> | | | | | |
| 0-10 | 1.8 | 7.1 | 5.88 | 60 | 30 | 28 | 1.8 | 16.1 |
| 10-16 | 0.9 | 7.3 | 390 | 60 | 2 | 22 | 0.51 | 8.61 |
| 16-35 | 0.7 | 7.2 | 486 | 60 | 3 | 13 | 0.3 | 4.3 |
| 35-41 | 0.6 | 6.6 | 270 | 60 | 3 | 8 | 0.3 | 0.9 |
| 41-66 | 0.6 | 5.8 | 168 | 60 | 3 | 10 | 2.0 | 1.9 |

*Soil Testing and Plant Analysis Laboratory, Agronomy Department, Va Tech, Blacksburg, VA 24061.

Pamunkey Series - Supplemental Profile 3

Supplemental pedon of Pamunkey loam, 2 percent slopes, 300 feet north of National Park Service highway, 250 feet east of dwelling near dairy barns on Spratley Farm, James City County.

Ap--0 to 11 inches; dark grayish brown (10YR 4/2) loam, moderate fine and medium granular structure; friable, slightly sticky, slightly plastic; common fine and medium roots; common fine and medium tubular pores; few fine flakes of mica; slightly acid; clear smooth boundary.

Bt1--11 to 18 inches; strong brown (7.5YR 5/6) clay loam; common medium prominent dark grayish brown (10YR 4/2) mottles; moderate medium subangular structure; friable, sticky, plastic; common fine roots; few fine tubular pores; common distinct clay films on faces of peds; few fine flakes of mica; krotovina up to 1/2 inch in diameter filled with Ap material; neutral; clear smooth boundary.

Bt2--18 to 25 inches; strong brown (7.5YR 5/6) clay loam; few fine distinct light yellowish brown (10YR 6/4), yellowish red (5YR 4/6), and very dark grayish brown (10YR 3/2) mottles; moderate medium subangular blocky structure; friable, sticky, plastic; common fine and medium roots; few fine tubular pores; common distinct clay films on faces of peds; few fine flakes of mica; few coarse fragments of quartz and mica gneiss and few cobbles; neutral; clear smooth boundary.

Bt3--25 to 42 inches; strong brown (7.5YR 5/6) silty clay loam; few fine distinct light yellowish brown (10YR 6/4), and pales olive (5Y 6/3) mottles; moderate medium subangular blocky structure; friable, sticky, plastic; few fine roots; few medium tubular and common fine vesicular pores; common prominent clay films on faces of peds; few fine flakes of mica; few coarse fragments up to one inch in diameter; neutral; gradual smooth boundary.

Bt4--42 to 49 inches; strong brown (7.5YR 5/6) clay loam; few fine distinct light yellowish brown (10YR 6/4) mottles; weak coarse subangular blocky structure; friable, sticky, plastic; few fine roots; few medium tubular and common fine vesicular pores; few faint clay films on faces of peds; common fine flakes of mica; few coarse fragments less than one inch in diameter; neutral; gradual smooth boundary.

C--49 to 84 inches; yellowish brown (10YR 5/8) sandy clay loam; common medium distinct strong brown (7.5YR 5/6), few fine distinct very dark grayish brown (10YR 3/2), and few fine faint pale brown (10YR 6/3) mottles; strata of sandy loam and thin clay strata; massive; friable, sticky, slightly plastic; few fine vesicular pores; common fine flakes of mica; few thin clay lenses; neutral.

Table A: Particle-size distribution* for Pamunkey loam

| Depth | Sand | | | | | | Silt | Clay |
|--------|----------------------------|----|-----|-----|-----|-------|------|------|
| | VC | C | M | F | VF | Total | | |
| inches | g kg ⁻¹ of soil | | | | | | | |
| 0-11 | 1 | 38 | 183 | 134 | 89 | 445 | 380 | 175 |
| 11-18 | 1 | 7 | 44 | 93 | 67 | 212 | 443 | 345 |
| 18-25 | 1 | 5 | 28 | 89 | 73 | 196 | 409 | 395 |
| 25-42 | 1 | 8 | 32 | 118 | 20 | 179 | 447 | 375 |
| 42-49 | 1 | 2 | 34 | 184 | 165 | 386 | 304 | 310 |
| 49-60 | 1 | 1 | 47 | 245 | 139 | 433 | 297 | 270 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table B. Chemical properties for Pamunkey loam

| Depth | Exchangeable cations | | | | CEC* | BS** |
|---------------|--|------------------|----------------|----------------|-------|----------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| <u>inches</u> | <u>cmol (+) kg⁻¹ soil</u> | | | | | <u>%</u> |
| 61 | 5.3 | 1.32 | 0.39 | 3.11 | 10.12 | 69.27 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.

**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for Pamunkey loam

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|-----|--|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 61 | ND | 5.8 | 0.10 | 7.11 | 98.59 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.

**EBS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{ECEC}} \times 100$.

Table F. Chemical properties* for Pamunkey loam

| Depth | OM | pH | Ca ²⁺ | Mg ²⁺ | P | K ⁺ | Zn | Mn |
|---------------|----------|-----|------------------|------------------|-----|----------------|-----|------|
| <u>inches</u> | <u>%</u> | | <u>ppm</u> | | | | | |
| 0-11 | 1.5 | 6.2 | 806 | 132 | 125 | 31 | 4.2 | 20.5 |
| 11-18 | 0.8 | 6.7 | 672 | 168 | 20 | 100 | 1.3 | 9.8 |
| 18-25 | 0.2 | 6.9 | 873 | 148 | 4 | 58 | 0.4 | 3.8 |
| 25-42 | 0.1 | 7.1 | 1209 | 128 | 6 | 64 | 0.3 | 1.8 |
| 42-49 | 0.1 | 7.1 | 806 | 108 | 8 | 66 | 0.4 | 2.0 |
| 49-84 | 0.1 | 7.1 | 672 | 114 | 10 | 68 | 0.4 | 2.9 |

*Soil Testing and Plant Analysis Laboratory, Agronomy Department, Va Tech, Blacksburg, VA 24061.

Figure 12: Well drained soils, such as Pamunkey, Bojac, and Catpoint, are used for building sites.

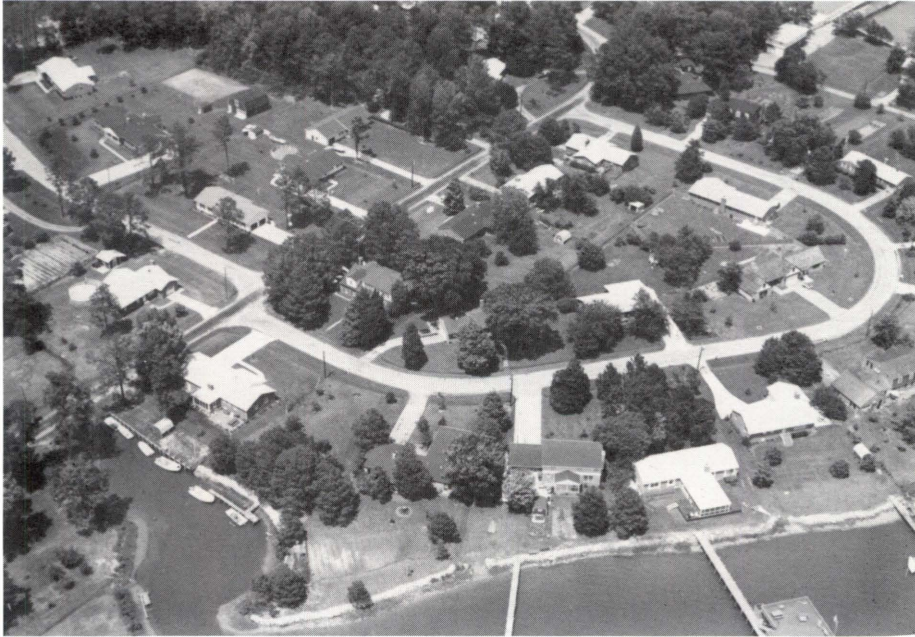


Figure 13: Housing constructed on Pamunkey soils that are prime farmland in James City County.



Figure 14: The Memorial Church on Jamestown Island was rebuilt in 1907 on the 1640 foundation. The church is on Pamunkey soils.



Peawick Series

Soils of the Peawick series are deep and moderately well drained. They formed in clayey fluvial sediments. Peawick soils are on stream terrace uplands on the Coastal Plain. Slopes range from 0 to 3 percent.

Typical pedon of Peawick silt loam, about 3,200 feet north-northeast of intersection of VA-613 and VA-5, 100 feet south of private road, James City County.

A1--0 to 2 inches; dark grayish brown (10YR 4/2) silt loam; moderate medium and fine granular structure; friable, sticky, plastic; many medium and fine and few coarse roots; extremely acid; abrupt smooth boundary.

Bt1--2 to 7 inches; light yellowish brown (2.5YR 6/4) silty clay loam; moderate medium and fine subangular blocky structure; friable, sticky, plastic; common fine medium and coarse roots; many fine and common medium tubular pores; few faint clay films on faces of peds; extremely acid; clear smooth boundary.

Bt2--7 to 16 inches; yellowish brown (10YR 5/6) silty clay; moderate medium and fine subangular and angular blocky structure; firm, sticky, plastic; common fine and medium and few coarse roots; common fine tubular pores; few faint clay films on faces of peds; extremely acid; clear smooth boundary.

Bt3--16 to 28 inches; mottled yellowish brown (10YR 5/8), gray (10YR 6/1), and strong brown (7.5YR 5/6) silty clay; strong medium and fine angular blocky structure; firm, sticky, plastic; common fine and medium and few coarse roots; few fine tubular pores; few faint clay films on faces of peds; extremely acid; gradual smooth boundary.

Bt4--28 to 41 inches; mottled yellowish brown (10YR 5/6), strong brown (7.5YR 5/6), and gray (5Y 6/1) silty clay; weak medium prismatic structure parting to strong fine and medium angular blocky structure; very firm, very sticky, very plastic; few fine medium and coarse roots; few fine tubular pores; many prominent clay films on faces of peds; few fine flakes of mica; extremely acid; gradual smooth boundary.

Bt5--41 to 70 inches; gray (5Y 6/1) silty clay; common medium prominent yellow brown (10YR 5/8) and strong brown (7.5YR 5/8) mottles; weak medium prismatic structure parting to strong coarse and medium angular blocky; very firm, very sticky, very plastic; few fine and medium roots; few fine tubular pores; many prominent clay films on faces of peds; few fine flakes of mica; extremely acid; gradual smooth boundary.

Bt6--70 to 99 inches; gray (5Y 6/1) clay; few fine prominent strong brown (7.5YR 5/8) and yellowish brown (10YR 5/8) mottles; moderate medium subangular blocky structure; very firm, very sticky, very plastic; common prominent clay films on faces of peds; few fine flakes of mica; extremely acid.

Table A: Particle-size distribution* for Peawick silt loam

| Depth | Sand | | | | | | Silt | Clay |
|---------------|----------------------------------|---|---|----|----|-------|------|------|
| | VC | C | M | F | VF | Total | | |
| <u>inches</u> | <u>g kg⁻¹ of soil</u> | | | | | | | |
| 0-2 | 0 | 1 | 4 | 15 | 19 | 39 | 801 | 160 |
| 2-7 | 1 | 1 | 2 | 8 | 17 | 29 | 681 | 290 |
| 7-16 | 1 | 3 | 1 | 4 | 11 | 20 | 510 | 470 |
| 16-28 | 1 | 1 | 1 | 1 | 9 | 13 | 497 | 490 |
| 28-41 | 1 | 1 | 2 | 5 | 14 | 23 | 487 | 490 |
| 41-70 | 4 | 9 | 3 | 5 | 26 | 47 | 473 | 480 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table B. Chemical properties for Peawick silt loam

| Depth | Exchangeable cations | | | | CEC* | BS** |
|---------------|--------------------------------------|------------------|----------------|----------------|-------|----------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| <u>inches</u> | <u>cmol (+) kg⁻¹ soil</u> | | | | | <u>%</u> |
| 55 | 0.00 | 1.26 | 0.24 | 19.20 | 20.70 | 7.25 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.

**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for Peawick silt loam

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|------|--------------------------------------|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 55 | ND | 4.01 | 15.35 | 16.85 | 8.90 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.

**EBS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{ECEC}} \times 100$.

Table F. Chemical properties* for Peawick silt loam

| Depth | OM | pH | Ca ²⁺ | Mg ²⁺ | P | K ⁺ | Zn | Mn |
|---------------|-----|-----|------------------|------------------|---|----------------|-----|-----|
| <u>inches</u> | % | | <u>ppm</u> | | | | | |
| 0-6 | 3.2 | 4.4 | 184 | 10 | 1 | 28 | .9 | 1.0 |
| 6-26 | .5 | 4.4 | 51 | 84 | 1 | 60 | .7 | 0 |
| 26-70 | .1 | 4.2 | 34 | 119 | 1 | 75 | 3.1 | 0 |

*Soil Testing and Plant Analysis Laboratory, Agronomy Department, Va Tech, Blacksburg, VA 24061.

Peawick Series - Supplemental Profile 1

Supplemental pedon of Peawick silt loam, 3 percent slopes, located 1.1 mile north of intersection of VA-633 and VA-611 and 3,000 feet west on logging road and 100 feet south of logging road, James City County.

A1--0 to 3 inches; dark grayish brown (10YR 4/2) silt loam; moderate medium granular structure; friable, slightly sticky, slightly plastic; many fine, medium, and coarse roots; common fine tubular pores; thin layer of Oi horizon; very strongly acid; abrupt smooth boundary.

E--3 to 6 inches; light yellowish brown (10YR 6/4) silt loam; common medium faint yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable, sticky, plastic; common fine, medium, and coarse roots; common fine and medium tubular pores; very strongly acid; abrupt smooth boundary.

Bt1--6 to 10 inches; yellowish brown (10YR 5/6) silty clay loam; moderate medium subangular blocky structure; friable, sticky, plastic; common fine, medium, and coarse roots; common fine and very fine tubular pores; few faint clay films on faces of peds; few fine flakes of mica; very strongly acid; clear smooth boundary.

Bt2--10 to 18 inches; yellowish brown (10YR 5/6) clay; strong fine angular and subangular blocky structure; firm, sticky, plastic; common fine, medium, and coarse roots; few fine tubular pores; many prominent clay films on faces of peds; few fine flakes of mica; very strongly acid; clear smooth boundary.

Bt3--18 to 25 inches; yellowish brown (10YR 5/6) clay; common medium distinct light brownish gray (10YR 6/2) mottles; strong fine angular blocky structure; firm, sticky, plastic; common fine, medium, and coarse roots; few very fine tubular pores; many prominent clay films on faces of peds; few fine flakes of mica; very strongly acid; clear smooth boundary.

Btg1--25 to 36 inches; light olive gray (5Y 6/2) clay; many medium and fine prominent yellowish brown (10YR 5/8) and strong brown (7.5YR 5/8) mottles; strong fine angular blocky structure; firm, sticky, plastic; common fine and medium roots; few very fine tubular pores; many prominent clay films on faces of peds; few fine flakes of mica; very strongly acid; clear smooth boundary.

Btg2--36 to 50 inches; gray (5Y 6/1) clay; common medium and coarse prominent yellowish brown (10YR 5/6) and strong brown (7.5YR 5/8) mottles; weak medium columnar parting to strong medium and fine angular blocky structure; firm, sticky, plastic; common fine and very fine tubular pores; many prominent clay films on faces of peds; few fine flakes of mica; few weak slickensides; very strongly acid; clear wavy boundary.

Btg3--50 to 57 inches; gray (5Y 6/1) sandy clay loam; common medium prominent yellowish brown (10YR 5/8) mottles; weak medium columnar parting to strong medium and fine angular blocky structure; firm, sticky, plastic; common fine and few medium roots; common very fine tubular pores; common distinct clay films on faces of peds; common fine flakes of mica; few weak slickensides; very strongly acid; clear wavy boundary.

C--57 to 65 inches; gray (5Y 6/1) sandy clay; common medium prominent light olive brown (2.5YR 5/4) mottles; weak medium subangular blocky structure; friable, sticky, plastic; few fine roots; common very fine tubular pores; few faint clay films on faces of peds; common fine flakes of mica; very strongly acid.

Cg1--65 to 82 inches; mottled gray, light olive brown, yellowish brown, and strong brown stratified sandy clay loam, sandy loam, and loamy sand.

Cg2--82 to 115 inches; mottled gray, light olive brown, yellowish brown, strong brown, and yellowish red stratified sandy loam, loamy sand, and sand.

Table A: Particle-size distribution* for Peawick silt loam

| Depth | Sand | | | | | Total | Silt | Clay |
|--------|----------------------------|----|----|-----|-----|-------|------|------|
| | VC | C | M | F | VF | | | |
| inches | g kg ⁻¹ of soil | | | | | | | |
| 0-3 | -- | 15 | 76 | 118 | 46 | 255 | 617 | 128 |
| 3-6 | 5 | 12 | 45 | 103 | 42 | 207 | 618 | 175 |
| 6-10 | 2 | 7 | 30 | 79 | 31 | 149 | 525 | 326 |
| 10-18 | 2 | 6 | 28 | 61 | 19 | 116 | 383 | 501 |
| 18-25 | 2 | 5 | 22 | 59 | 17 | 105 | 318 | 577 |
| 25-36 | 1 | 3 | 20 | 43 | 16 | 83 | 313 | 604 |
| 36-50 | 1 | 6 | 39 | 113 | 23 | 182 | 282 | 536 |
| 50-57 | 4 | 22 | 88 | 261 | 94 | 469 | 182 | 349 |
| 57-65 | 5 | 25 | 82 | 266 | 132 | 510 | 184 | 306 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table B. Chemical properties for Peawick silt loam

| Depth | Exchangeable cations | | | | CEC* | BS** |
|--------|----------------------------------|------------------|----------------|----------------|-------|------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| inches | cmol (+) kg ⁻¹ soil | | | | | % |
| 0-3 | 0.80 | 0.27 | 0.17 | 17.20 | 18.44 | 6.72 |
| 3-6 | 0.01 | 0.01 | 0.12 | 10.40 | 10.54 | 1.33 |
| 6-10 | 0.02 | 0.11 | 0.12 | 14.00 | 14.25 | 1.75 |
| 10-18 | 0.16 | 0.62 | 0.16 | 19.80 | 20.74 | 4.53 |
| 18-25 | 0.04 | 1.27 | 0.19 | 25.60 | 27.10 | 5.54 |
| 25-36 | 0.02 | 1.10 | 0.28 | 30.20 | 31.60 | 4.43 |
| 36-50 | 0.00 | 0.80 | 0.23 | 26.00 | 27.03 | 3.81 |
| 50-57 | 0.00 | 1.00 | 0.15 | 17.00 | 18.15 | 6.34 |
| 57-65 | 0.00 | 0.83 | 0.13 | 14.60 | 15.56 | 6.17 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.

**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for Peawick silt loam

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|-------|--|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 0-3 | 5.89 | 4.01 | 2.85 | 4.09 | 30.32 |
| 3-6 | 1.29 | 4.18 | 3.15 | 3.29 | 4.29 |
| 6-10 | 0.85 | 4.01 | 7.45 | 7.70 | 3.25 |
| 10-18 | 0.88 | 4.04 | 11.65 | 12.59 | 7.47 |
| 18-25 | 0.55 | 4.12 | 16.95 | 18.45 | 8.13 |
| 25-36 | 0.28 | 4.29 | 23.25 | 24.65 | 5.68 |
| 36-50 | 0.28 | 14.20 | 19.25 | 20.28 | 5.08 |
| 50-57 | 0.07 | 4.40 | 11.45 | 12.60 | 9.13 |
| 57-65 | 0.07 | 4.29 | 9.75 | 10.71 | 8.96 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.

**EBS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{ECEC}} \times 100$.

Table E: Sand mineralogy for Peawick silt loam

| Depth | Quartz | Feldspar | Mica | Opaque Minerals* | Heavy Minerals* | Misc* |
|---------------|----------------------------------|----------|------|------------------|-----------------|-------|
| <u>inches</u> | <u>g kg⁻¹ of sand</u> | | | | | |
| 6-18 | 940 | 40 | 5 | 0 | 15 | 0 |

*Opaque Minerals are ilmenite, magnetite, hematite, etc. Heavy Minerals are translucent zircon, tourmaline, rutile, epidote, hornblende, etc. Misc = rock fragments.

Peawick Series - Supplemental Profile 2

Supplemental pedon of Peawick silt loam, 0 to 2 percent slopes, Main Post Area, proposed Navy housing area, 900 feet southeast of cul de sac, Fort Eustis, Newport News.

Ap--0 to 8 inches; brown (10YR 4/3) silt loam; moderate medium granular structure (with traffic pans); friable, slightly sticky, slightly plastic; common medium roots; few large roots; moderately acid; clear smooth boundary.

Bt1--8 to 14 inches; yellowish brown (10YR 5/6) silty clay loam; moderately medium sub-angular blocky structure; firm, sticky, plastic; common medium fine and coarse roots; common medium distinct clay films on faces of peds; strongly acid; clear smooth boundary.

Bt2--14 to 22 inches; yellowish brown (10YR 5/6) silty clay loam; strong fine angular blocky structure; firm, sticky, plastic; few fine roots; many distinct clay films on faces of peds; strongly acid; gradual smooth boundary.

Bt3--22 to 30 inches; yellowish brown (10YR 5/6) silty clay loam; few fine prominent light brownish gray (10YR 6/2) and strong brown (7.5YR 5/8) mottles; firm, sticky, plastic; few fine roots; many distinct clay films on faces of peds; very strongly acid; clear smooth boundary.

Bt4--30 to 37 inches; yellowish brown (10YR 5/6) clay; common medium distinct gray (10YR 6/1) and strong brown (7.5YR 5/8) mottles; strong fine angular blocky structure; firm, sticky, plastic; few fine roots; many distinct clay films on faces of peds; very strongly acid; clear smooth boundary.

Bt5--37 to 65 inches; mottled gray (10YR 6/1) and strong brown (7.5YR 5/8) clay loam; strong fine angular blocky structure; firm, sticky, plastic; few fine roots; many distinct clay films on faces of peds; very strongly acid.

Table B. Chemical properties for Peawick silt loam

| Depth | Exchangeable cations | | | | CEC* | BS** |
|--------|--------------------------------|------------------|----------------|----------------|-------|-------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| inches | cmol (+) kg ⁻¹ soil | | | | | % |
| 0-8 | 4.93 | 0.98 | 0.34 | 7.33 | 13.58 | 46.02 |
| 8-14 | 1.92 | 0.96 | 0.21 | 6.73 | 9.82 | 31.47 |
| 14-22 | 2.82 | 1.53 | 0.24 | 7.52 | 12.11 | 37.90 |
| 22-30 | 4.01 | 2.10 | 0.29 | 11.29 | 17.69 | 36.18 |
| 30-37 | 3.63 | 2.20 | 0.30 | 16.63 | 22.76 | 26.93 |
| 37-65 | 2.10 | 1.87 | 0.30 | 17.82 | 22.09 | 19.33 |
| 58 | 1.84 | 2.00 | 0.31 | 18.22 | 22.37 | 18.55 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.

**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for Peawick silt loam

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|------|--|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 0-8 | 3.59 | 5.80 | 0.05 | 6.30 | 99.21 |
| 8-14 | 0.00 | 5.32 | 1.35 | 4.40 | 70.23 |
| 14-22 | 0.00 | 5.35 | 2.05 | 6.64 | 69.13 |
| 22-30 | 0.00 | 4.64 | 4.25 | 10.65 | 60.09 |
| 30-37 | 0.00 | 4.75 | 8.65 | 14.78 | 41.47 |
| 37-65 | 0.00 | 4.60 | 9.85 | 14.12 | 30.24 |
| 58 | 0.00 | 4.82 | 11.45 | 15.60 | 26.60 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.

**EBS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^+}{\text{ECEC}} \times 100$.

Table D: Clay mineralogy for Peawick silt loam

| Depth | HIV* | Mica | Kaolinite | Quartz | Mont* | Verm* | Misc* |
|---------------|----------------------------------|------|-----------|--------|-------|-------|-------|
| <u>inches</u> | <u>g kg⁻¹ of clay</u> | | | | | | |
| 8-14 | 80 | 270 | 360 | 60 | 0 | Tr | 270 |
| 37-65 | 0 | 380 | 300 | Tr | 320 | 0 | 0 |

*HIV = hydroxy interlayered vermiculite. Mont = montmorillonite. Verm = vermiculite. Misc = vermiculite/montmorillonite.

Peawick Series - Supplemental Profile 3

Supplemental pedon of Peawick silt loam, 0 to 2 percent slopes, Main Post Area, proposed Navy housing area, about 300 feet Northwest of road to Fort Eustis landfill, Fort Eustis, Newport News.

A--0 to 4 inches; brown (10YR 4/3) silt loam; moderate medium granular structure; friable, slightly sticky, slightly plastic; many fine, common medium and coarse roots; moderately acid; clear smooth boundary.

BA--4 to 11 inches; light yellowish brown (10YR 6/4) silt loam; weak medium subangular blocky structure; friable, sticky, plastic; common fine and medium and few coarse roots; very strongly acid; gradual smooth boundary.

Bt1--11 to 15 inches; light yellowish brown (10YR 6/3) and brownish yellow (10YR 6/6) silt loam; moderate medium angular blocky structure; friable, sticky, plastic; common medium and fine roots; very strongly acid; clear smooth boundary.

Bt2--15 to 22 inches; brownish yellow (10YR 6/6) silty clay loam; moderate medium angular blocky structure; firm, sticky, plastic; few fine and medium roots; very strongly acid; clear smooth boundary.

Bt3--22 to 33 inches; brownish yellow (10YR 6/6) clay; common fine distinct light brownish gray (10YR 6/2) and strong brown (7.5YR 5/6) mottles; firm, sticky, plastic; few fine roots; extremely acid; clear smooth boundary.

Btg--33 to 70 inches; light gray (10YR 7/2) silty clay; many coarse distinct reddish yellow (7.5YR 6/8) and brownish yellow (10YR 6/6) mottles; prismatic parting to strong medium angular blocky structure; very firm; sticky, plastic; few fine roots; extremely acid.

Table A: Particle-size distribution* for Peawick silt loam

| Depth | Sand | | | | | Total | Silt | Clay |
|--------|----------------------------|---|---|---|----|-------|------|------|
| | VC | C | M | F | VF | | | |
| inches | g kg ⁻¹ of soil | | | | | | | |
| 0-4 | - | - | - | - | - | 235 | 632 | 133 |
| 4-11 | - | - | - | - | - | 206 | 617 | 177 |
| 11-15 | - | - | - | - | - | 142 | 624 | 234 |
| 15-22 | - | - | - | - | - | 125 | 531 | 344 |
| 22-33 | - | - | - | - | - | 103 | 405 | 492 |
| 33-70 | - | - | - | - | - | 45 | 483 | 472 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table B. Chemical properties for Peawick silt loam

| Depth | Exchangeable cations | | | | CEC* | BS** |
|---------------|--------------------------------------|------------------|----------------|----------------|-------|----------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| <u>inches</u> | <u>cmol (+) kg⁻¹ soil</u> | | | | | <u>%</u> |
| 0-4 | 6.89 | 0.87 | 0.27 | 6.34 | 14.37 | 55.88 |
| 4-11 | 0.28 | 0.10 | 0.06 | 7.13 | 7.57 | 5.81 |
| 11-15 | 0.70 | 0.27 | 0.07 | 8.91 | 9.95 | 10.45 |
| 15-22 | 2.37 | 0.66 | 0.13 | 11.68 | 14.84 | 21.29 |
| 22-33 | 3.14 | 0.74 | 0.21 | 19.80 | 23.89 | 17.12 |
| 33-70 | 4.28 | 0.68 | 0.35 | 21.58 | 26.89 | 19.75 |
| 61 | 4.13 | 0.68 | 0.36 | 23.17 | 28.34 | 18.24 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for Peawick silt loam

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|------|--------------------------------------|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 0-4 | 3.33 | 5.90 | 0.05 | 8.08 | 99.38 |
| 4-11 | 0.00 | 4.60 | 2.25 | 2.69 | 16.36 |
| 11-15 | 0.00 | 4.65 | 4.15 | 5.19 | 20.04 |
| 15-22 | 0.00 | 4.75 | 5.65 | 8.81 | 35.87 |
| 22-33 | 0.00 | 4.28 | 11.85 | 15.94 | 25.66 |
| 33-70 | 0.00 | 4.28 | 15.65 | 20.96 | 25.33 |
| 61 | 0.00 | 4.35 | 16.75 | 21.92 | 23.59 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.**EBS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{ECEC}} \times 100$.

Table D: Clay mineralogy for Peawick silt loam

| Depth | HIV* | Mica | Kaolinite | Quartz | Mont* | Gibbsite | Misc* |
|---------------|----------------------------------|------|-----------|--------|-------|----------|-------|
| <u>inches</u> | <u>g kg⁻¹ of clay</u> | | | | | | |
| 15-22 | 0 | 170 | 350 | 20 | 460 | 0 | 0 |
| 33-70 | 0 | 200 | 350 | Tr | 450 | 0 | 0 |

*HIV = hydroxy interlayered vermiculite. Mont = montmorillonite. Misc = vermiculite/montmorillonite.

Peawick Series - Supplemental Profile 4

Supplemental pedon of Peawick fine sandy loam, 0 to 2 percent, Main Post area, near Sternberg Avenue, proposed medical warehouse site, 1,000 feet southeast of McDonald Hospital, Fort Eustis, Newport News.

Fill--11 to 0 inches; brown (10YR 5/3) fine sandy loam; moderate medium granular structure; friable, slightly sticky, nonplastic; few fine roots; slightly acid; abrupt smooth boundary.

E--0 to 7 inches; pale brown (10YR 6/3) fine sandy loam; moderate medium subangular blocky structure; friable, slightly sticky, nonplastic; few fine roots; slightly acid; clear smooth boundary.

AB--7 to 12 inches; yellowish brown (10YR 5/4) loam; moderate medium subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; few faint clay films on faces of peds; slightly acid; gradual smooth boundary.

Bt1--12 to 19 inches; yellowish brown (10YR 5/8) clay loam; common medium faint pale brown (10YR 6/3) mottles; friable, sticky, plastic; few fine roots; many distinct clay films on faces of peds; slightly acid; gradual smooth boundary.

Bt2--19 to 29 inches; yellowish brown (10YR 5/8) clay; common medium distinct light yellowish brown (10YR 6/4) and brown (7.5YR 5/4) mottles; moderate medium subangular blocky structure; firm, sticky, plastic; few fine roots; many distinct clay films on faces of peds; strongly acid; gradual smooth boundary.

Btg--29 to 62 inches; light gray (10YR 7/1) sandy clay loam with pockets of clay; common medium distinct yellowish brown (10YR 5/6) and strong brown (7.5YR 5/6) mottles; weak coarse angular blocky structure; few distinct clay films on faces of peds; very strongly acid.

Table A: Particle-size distribution* for Peawick fine sandy loam

| Depth | Sand | | | | | Total | Silt | Clay |
|---------------|----------------------------------|---|---|---|----|-------|------|------|
| | VC | C | M | F | VF | | | |
| <u>inches</u> | <u>g kg⁻¹ of soil</u> | | | | | | | |
| 0-2 | - | - | - | - | - | 570 | 308 | 122 |
| 2-7 | - | - | - | - | - | 542 | 338 | 120 |
| 7-12 | - | - | - | - | - | 497 | 330 | 173 |
| 12-19 | - | - | - | - | - | 447 | 250 | 303 |
| 19-29 | - | - | - | - | - | 400 | 193 | 407 |
| 29-62 | - | - | - | - | - | 582 | 140 | 278 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table B. Chemical properties for Peawick fine sandy loam

| Depth | Exchangeable cations | | | | CEC* | BS** |
|---------------|--------------------------------------|------------------|----------------|----------------|-------|----------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| <u>inches</u> | <u>cmol (+) kg⁻¹ soil</u> | | | | | <u>%</u> |
| 0-2 | 3.16 | 0.81 | 0.31 | 2.12 | 6.4 | 66.88 |
| 2-7 | 1.34 | 0.33 | 0.08 | 2.12 | 3.87 | 45.22 |
| 7-12 | 2.13 | 0.35 | 0.14 | 1.16 | 3.78 | 69.31 |
| 12-19 | 5.60 | 0.65 | 0.28 | 4.25 | 10.78 | 60.58 |
| 19-29 | 6.55 | 1.13 | 0.25 | 7.72 | 15.65 | 50.67 |
| 29-62 | 1.31 | 0.74 | 0.16 | 10.04 | 12.25 | 18.04 |
| 62 | 0.60 | 0.56 | 0.15 | 9.26 | 10.57 | 12.39 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for Peawick fine sandy loam

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|------|--------------------------------------|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 0-2 | 1.47 | 6.10 | 0.05 | 4.15 | 98.80 |
| 2-7 | 0.00 | 6.20 | 0.05 | 1.80 | 97.22 |
| 7-12 | 0.00 | 6.25 | 0.05 | 2.67 | 98.13 |
| 12-19 | 0.00 | 6.16 | 0.05 | 6.58 | 99.24 |
| 19-29 | 0.00 | 5.25 | 1.45 | 9.38 | 84.54 |
| 29-62 | 0.00 | 4.70 | 6.55 | 8.76 | 25.23 |
| 62 | 0.00 | 4.52 | 6.35 | 7.66 | 17.10 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.**EBS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{ECEC}} \times 100$.

Table D: Clay mineralogy for Peawick fine sandy loam

| Depth | HIV* | Mica | Kaolinite | Quartz | Mont* | Gibbsite | Misc* |
|---------------|----------------------------------|------|-----------|--------|-------|----------|-------|
| <u>inches</u> | <u>g kg⁻¹ of clay</u> | | | | | | |
| 12-19 | 50 | 110 | 380 | 30 | 430 | Tr | 0 |

*HIV = hydroxy interlayered vermiculite. Mont = montmorillonite. Misc = vermiculite/montmorillonite.

Peawick Series - Supplemental Profile 5

Supplemental pedon of Peawick loam, 0 to 2 percent slopes, Main Post area, 300 feet northeast of Education building, Fort Eustis, Newport News.

A--0 to 2 inches; very dark grayish brown (10YR 3/2) loam; weak fine granular structure; friable, slightly sticky, slightly plastic; many coarse, common fine and medium roots; very strongly acid; clear smooth boundary.

BA--2 to 11 inches; brown (10YR 5/3) loam; weak medium subangular blocky structure; friable, sticky, plastic; common fine and medium roots, and few coarse roots; few faint clay films on faces of peds; extremely acid; clear smooth boundary.

Bt1--11 to 24 inches; yellowish brown (10YR 5/6) clay loam; strong fine and medium angular blocky structure; firm, sticky, plastic; common fine and medium roots; many prominent clay films on faces of peds; very strongly acid; clear smooth boundary.

Bt2--24 to 32 inches; yellowish brown (10YR 5/8) clay loam; strong medium subangular blocky and angular blocky structure; firm, sticky, plastic; few fine roots; many prominent clay films on faces of peds; very strongly acid; clear smooth boundary.

Btg--32 to 64 inches; mottled gray (10YR 6/1), and yellowish brown (10YR 5/6) clay loam; weak coarse angular blocky structure; friable, sticky, plastic; few fine roots; few distinct clay films on faces of peds; many fine and very fine flakes of mica; very strongly acid; clear smooth boundary.

BCg--64 to 76 inches; gray (10YR 6/1) clay loam; common medium prominent strong brown (7.5YR 5/8); weak medium subangular blocky structure; friable, sticky, plastic; many fine and very fine flakes of mica; very strongly acid.

Table A: Particle-size distribution* for Peawick loam

| Depth | Sand | | | | | Total | Silt | Clay |
|---------------|----------------------------------|---|---|---|----|-------|------|------|
| | VC | C | M | F | VF | | | |
| <u>inches</u> | <u>g kg⁻¹ of soil</u> | | | | | | | |
| 0-11 | - | - | - | - | - | 411 | 452 | 137 |
| 11-24 | - | - | - | - | - | 298 | 352 | 350 |
| 24-32 | - | - | - | - | - | 296 | 316 | 388 |
| 32-64 | - | - | - | - | - | 403 | 248 | 349 |
| 64-76 | - | - | - | - | - | 316 | 298 | 386 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table B. Chemical properties for Peawick loam

| Depth | Exchangeable cations | | | | CEC* | BS** |
|---------------|--------------------------------------|------------------|----------------|----------------|-------|----------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| <u>inches</u> | <u>cmol (+) kg⁻¹ soil</u> | | | | | <u>%</u> |
| 0-11 | 0.03 | 0.04 | 0.08 | 9.46 | 9.61 | 1.56 |
| 11-24 | 0.08 | 0.34 | 0.17 | 13.32 | 13.91 | 4.24 |
| 24-32 | 0.03 | 0.15 | 0.23 | 13.70 | 14.11 | 2.91 |
| 32-64 | 0.03 | 1.37 | 0.19 | 13.90 | 15.49 | 10.26 |
| 64-76 | 0.02 | 1.43 | 0.19 | 13.32 | 14.96 | 10.96 |
| 61 | 0.03 | 1.41 | 0.17 | 13.70 | 15.31 | 10.52 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for Peawick loam

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|------|--------------------------------------|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 0-11 | 0.97 | 4.50 | 2.85 | 3.0 | 5.00 |
| 11-24 | 0.00 | 4.45 | 7.25 | 7.84 | 7.53 |
| 24-32 | 0.00 | 4.60 | 8.85 | 10.26 | 13.74 |
| 32-64 | 0.00 | 5.00 | 8.75 | 10.34 | 15.38 |
| 64-76 | 0.00 | 4.80 | 9.25 | 10.89 | 15.06 |
| 61 | 0.00 | 4.72 | 8.25 | 9.86 | 16.33 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.**EBS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{ECEC}} \times 100$.

Table D: Clay mineralogy for Peawick loam

| Depth | HIV* | Mica | Kaolinite | Quartz | Mont* | Gibbsite | Misc* |
|---------------|----------------------------------|------|-----------|--------|-------|----------|-------|
| <u>inches</u> | <u>g kg⁻¹ of clay</u> | | | | | | |
| 11-24 | Tr | 340 | 370 | 20 | 270 | 0 | 0 |

*HIV = hydroxy interlayered vermiculite. Mont = montmorillonite. Misc = vermiculite/montmorillonite.

Peawick Series - Supplemental Profile 6

Supplemental pedon of Peawick loam, 0 to 2 percent, Main Post area, proposed heavy equipment shop, Fort Eustis, Newport News.

A--0 to 4 inches; dark grayish brown (10YR 4/2) loam; weak fine granular structure; friable, slightly sticky, nonplastic; very strongly acid; clear smooth boundary.

E--4 to 10 inches; yellowish brown (10YR 5/4) loam; moderate medium granular structure; friable, slightly sticky, slightly plastic; very strongly acid; clear smooth boundary.

Bt1--10 to 16 inches; yellowish brown (10YR 5/4) clay loam; moderate medium subangular blocky structure; friable, slightly sticky, slightly plastic; very strongly acid; clear smooth boundary.

Bt2--16 to 22 inches; yellowish brown (10YR 5/8) clay loam; moderate medium subangular blocky structure; friable, sticky, plastic; very strongly acid; clear smooth boundary.

Bt3--22 to 34 inches; mottled yellowish brown (10YR 5/6) and light brownish gray (10YR 6/2) clay; moderate medium angular and subangular blocky structure; firm, sticky, plastic; very strongly acid; clear smooth boundary.

Btg1--34 to 48 inches; mottled yellowish brown (10YR 5/6) light brownish gray (10YR 6/2) and brown (7.5YR 5/4) clay loam; moderate medium subangular blocky structure; firm, sticky, plastic; very strongly acid; gradual smooth boundary.

Btg2--48 to 62 inches; light brownish gray (10YR 6/2) sandy clay loam, common medium distinct light yellowish brown (10YR 6/4) mottles; moderate medium subangular blocky structure; friable, sticky, plastic; very strongly acid.

Table A: Particle-size distribution* for Peawick loam

| Depth | Sand | | | | | Total | Silt | Clay |
|---------------|----------------------------------|---|---|---|----|-------|------|------|
| | VC | C | M | F | VF | | | |
| <u>inches</u> | <u>g kg⁻¹ of soil</u> | | | | | | | |
| 0-4 | - | - | - | - | - | 388 | 467 | 145 |
| 4-10 | - | - | - | - | - | 390 | 438 | 172 |
| 10-16 | - | - | - | - | - | 362 | 355 | 283 |
| 16-22 | - | - | - | - | - | 345 | 286 | 369 |
| 22-34 | - | - | - | - | - | 317 | 233 | 450 |
| 34-48 | - | - | - | - | - | 432 | 219 | 349 |
| 48-62 | - | - | - | - | - | 545 | 150 | 305 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table B. Chemical properties for Peawick loam

| Depth | Exchangeable cations | | | | CEC* | BS** |
|---------------|--------------------------------------|------------------|----------------|----------------|-------|----------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| <u>inches</u> | <u>cmol (+) kg⁻¹ soil</u> | | | | | <u>%</u> |
| 0-4 | 1.57 | 0.48 | 0.28 | 11.19 | 13.52 | 17.23 |
| 4-10 | 0.14 | 0.08 | 0.11 | 4.83 | 5.16 | 6.40 |
| 10-16 | 1.13 | 0.73 | 0.18 | 5.79 | 7.83 | 26.05 |
| 16-22 | 3.09 | 1.32 | 0.21 | 9.07 | 13.69 | 33.75 |
| 22-34 | 3.15 | 1.16 | 0.19 | 12.16 | 16.66 | 27.01 |
| 34-48 | 1.91 | 0.96 | 0.16 | 10.04 | 13.07 | 23.18 |
| 48-62 | 1.50 | 1.00 | 0.18 | 10.62 | 13.30 | 20.15 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for Peawick loam

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|------|--------------------------------------|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 0-4 | 4.08 | 4.50 | 1.75 | 4.08 | 57.11 |
| 4-10 | 0.00 | 4.50 | 1.65 | 1.98 | 16.67 |
| 10-16 | 0.00 | 4.80 | 2.05 | 4.09 | 49.88 |
| 16-22 | 0.00 | 4.78 | 2.45 | 7.07 | 65.35 |
| 22-34 | 0.00 | 4.62 | 4.95 | 9.45 | 47.62 |
| 34-48 | 0.00 | 4.68 | 7.05 | 10.08 | 30.06 |
| 48-62 | 0.00 | 4.75 | 7.25 | 9.93 | 26.99 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.**EBS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{ECEC}} \times 100$.

Table D: Clay mineralogy for Peawick loam

| Depth | HIV* | Mica | Kaolinite | Quartz | Mont* | Gibbsite | Misc* |
|---------------|----------------------------------|------|-----------|--------|-------|----------|-------|
| <u>inches</u> | <u>g kg⁻¹ of clay</u> | | | | | | |
| 10-16 | Tr | 150 | 320 | 70 | 360 | Tr | 100 |
| 48-62 | 0 | 200 | 280 | Tr | 520 | 0 | 0 |

*HIV = hydroxy interlayered vermiculite. Mont = montmorillonite. Misc = vermiculite/montmorillonite.

Peawick Series - Supplemental Profile 7

Pedon of Peawick silt loam, 0 to 2 percent slopes, First Colony Subdivision, near entrance to athletic field, James City County.

A1--0 to 5 inches; grayish brown (10YR 5/2) silt loam; moderate medium and fine granular structure; friable, sticky, plastic; many medium and fine roots; extremely acid; abrupt smooth boundary.

E--5 to 12 inches; pale yellow (2.5YR 7/4) loam; moderate medium and fine granular structure; friable, sticky, plastic; many medium and fine roots; extremely acid; abrupt smooth boundary.

Bt1--12 to 14 inches; light yellowish brown (2.5YR 6/4) silty clay loam; moderate medium and fine subangular blocky structure; friable, sticky, plastic; common fine and medium roots; common fine tubular pores; few faint clay films on faces of peds; extremely acid; clear smooth boundary.

Bt2--14 to 21 inches; light olive brown (2.5YR 5/4) silty clay loam; moderate medium and fine subangular blocky structure; firm, sticky, plastic; common fine roots; common fine tubular pores; few faint clay films on faces of peds; extremely acid; clear smooth boundary.

Bt3--21 to 31 inches; light olive brown (2.5YR 5/4) silty clay; common fine distinct yellowish brown (10YR 5/8) and light brownish gray (10YR 6/2) mottles; strong medium and fine angular blocky structure; firm, sticky, plastic; common fine roots; few fine tubular pores; few distinct clay films on faces of peds; extremely acid; gradual smooth boundary.

Btg--31 to 55 inches; light brownish gray (2.5YR 6/2) silty clay; many coarse prominent yellowish brown (10YR 5/8) mottles; strong medium angular blocky structure; very firm, very sticky, very plastic; few fine roots; few tubular pores; many prominent clay films on faces of peds; extremely acid.

Cg1--55 to 65 inches; light brownish gray (2.5YR 6/2) silty clay; common fine and medium prominent yellowish brown (10YR 5/8) mottles; massive; very firm, very sticky, very plastic; extremely acid; gradual smooth boundary.

Cg2--65 to 75 inches; gray (N 5/) silty clay; few fine prominent yellowish brown (10YR 5/8) mottles; massive; very firm, very sticky, very plastic; extremely acid.

Table A: Particle-size distribution* for Peawick silt loam

| Depth | Sand | | | | | | Silt | Clay |
|--------|----------------------------|---|---|----|-----|-------|------|------|
| | VC | C | M | F | VF | Total | | |
| inches | g kg ⁻¹ of soil | | | | | | | |
| 12-32 | 2 | 3 | 5 | 62 | 191 | 263 | 369 | 368 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Roanoke Series

Soils of the Roanoke series are very deep and poorly drained. They formed in clayey fluvial sediments. They are on low and intermediate river terraces along the Chickahominy, York, and Pamunkey Rivers. Slopes range from 0 to 2 percent.

Typical pedon of Roanoke silt loam, 0 to 2 percent slopes, about 250 feet south of US-33, 800 feet south of borrow pit and 1000 feet northeast of Virginia Power transmission line and US-33 crossing, New Kent County.

A--0 to 3 inches; very dark brown (10YR 2/2) silt loam; moderate medium granular structure; very friable, slightly sticky, slightly plastic; many fine medium and coarse roots; common fine and medium tubular pores; extremely acid; abrupt smooth boundary.

BA--3 to 8 inches; dark grayish brown (10YR 4/2) silt loam; weak medium and fine subangular blocky structure; very friable, slightly sticky, slightly plastic; common fine medium and few coarse roots; few fine and medium tubular pores; very few faint clay films on faces of peds; extremely acid; abrupt smooth boundary.

Btg1--8 to 17 inches; gray (5Y 5/1) clay; common medium distinct light olive brown (2.5Y 5/6) mottles; strong medium angular blocky structure; firm, sticky, plastic; few fine and medium roots; many distinct clay films on faces of peds; extremely acid; gradual smooth boundary.

Btg2--17 to 33 inches; dark gray (N 4/0) clay; common medium distinct light olive brown (2.5Y 5/6) mottles; strong medium and coarse angular blocky structure; firm, sticky, plastic; few fine roots; many distinct clay films on faces of peds; extremely acid; gradual smooth boundary.

Btg3--33 to 50 inches; dark gray (N 4/0) clay; few fine distinct light olive brown (2.5Y 5/6) mottles; strong medium and fine angular blocky structure; firm, sticky, plastic; few fine roots; many distinct clay films on faces of peds; extremely acid; gradual wavy boundary.

BCg--50 to 55 inches; mottled dark gray (N 4/0) and gray (5Y 5/1) sandy clay loam; moderate medium subangular and angular blocky structure; friable, sticky, plastic; very few faint clay films on faces of peds; extremely acid; clear wavy boundary.

2Cg--55 to 65 inches; light brownish gray (10YR 6/2) sand; common medium distinct yellowish brown (10YR 5/6) mottles; single grain; loose; extremely acid.

Table B. Chemical properties for Roanoke silt loam

| Depth | Exchangeable cations | | | | CEC* | BS** |
|--------|----------------------------------|------------------|----------------|----------------|-------|------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| inches | cmol (+) kg ⁻¹ soil | | | | | % |
| 5-25 | 0.50 | 0.73 | 0.19 | 15.60 | 17.02 | 8.34 |
| 55 | 0.11 | 0.26 | 0.18 | 9.60 | 10.15 | 5.42 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.

**BS = $\frac{Ca^{2+} + Mg^{2+} + K^{+}}{CEC} \times 100$.

Table C. Chemical properties for Roanoke silt loam

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|------|--------------------------------------|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 5-25 | 0.46 | 4.01 | 10.65 | 12.07 | 11.76 |
| 55 | -- | 3.93 | 7.95 | 8.5 | 6.47 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.

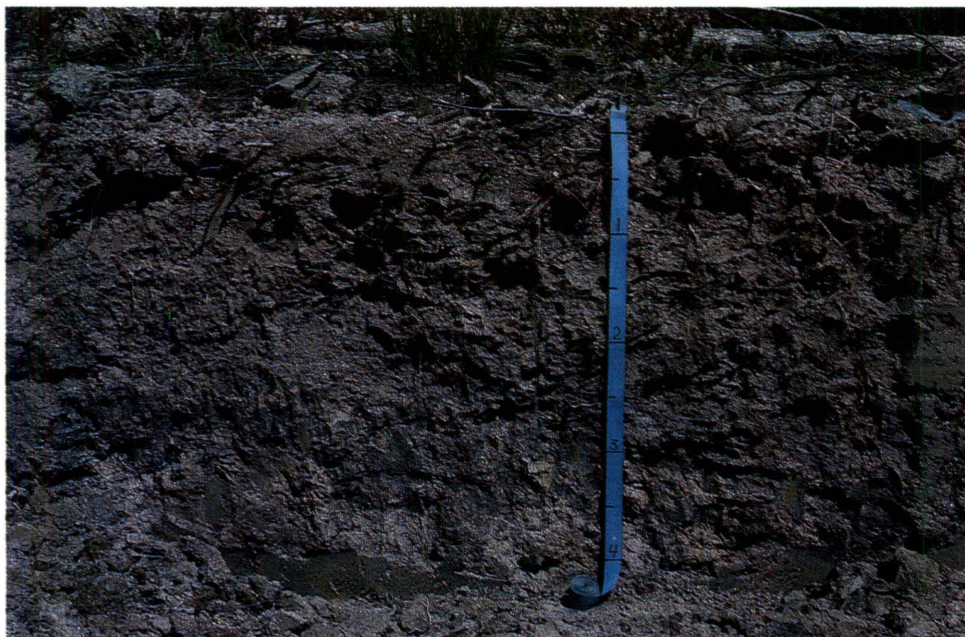
**EBS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^+}{\text{ECEC}} \times 100$.

Table F. Chemical properties* for Roanoke silt loam

| Depth | OM | pH | Ca ²⁺ | Mg ²⁺ | P | K ⁺ | Zn | Mn |
|---------------|----------|-----|------------------|------------------|---|----------------|-----|------|
| <u>inches</u> | <u>%</u> | | <u>ppm</u> | | | | | |
| 0-5 | 2.6 | 5.1 | 84 | 19 | 7 | 23 | 1.0 | 11.5 |
| 49-72 | 0.6 | 4.6 | 24 | 18 | 3 | 25 | 0.4 | 1.0 |

*Soil Testing and Plant Analysis Laboratory, Agronomy Department, Va Tech, Blacksburg, VA 24061.

Figure 15: A profile of a poorly drained Roanoke soil.



Seabrook Series

Soils of the Seabrook series are very deep and moderately well drained. They formed in sandy fluvial sediments. They are on low-lying stream terraces. Slopes range from 0 to 2 percent.

Typical pedon of Seabrook loamy sand, 0 to 2 percent slopes, about 300 feet east of camp pavillion in Chickahominy Outpost Campsite, about 800 feet southeast of Walkers Dam pump station, 3,500 feet west of junction VA-627 and C & O R.R. crossing, New Kent County.

A--0 to 5 inches; very dark grayish brown (10YR 3/2) loamy sand; weak fine granular structure; very friable; common fine and medium roots; many fine tubular pores; very strongly acid; gradual smooth boundary.

C1--5 to 11 inches; light olive brown (2.5Y 5/4) loamy sand; single grain; loose; common fine and medium roots; many fine tubular pores; very strongly acid; gradual smooth boundary.

C2--11 to 25 inches; light olive brown (2.5Y 5/6) loamy sand; few fine faint yellowish brown (10YR 5/6) and pale brown (10YR 6/3) mottles; single grain; loose; common medium roots; common fine tubular pores; few fine flakes of mica; very strongly acid; gradual smooth boundary.

C3--25 to 37 inches; mottled yellowish brown (10YR 5/8), pale brown (10YR 6/3), and light gray (10YR 7/2) loamy sand; single grain; loose; few fine and medium roots; few fine tubular pores; few fine flakes of mica; very strongly acid; gradual smooth boundary.

Cg--37 to 72 inches; light gray (5Y 7/2) sand; common coarse prominent yellowish brown (10YR 5/8) mottles; single grain; loose; few fine flakes of mica; very strongly acid.

Table A: Particle-size distribution* for Seabrook loamy sand

| Depth | Sand | | | | | Total | Silt | Clay |
|---------------|----------------------------------|----|-----|-----|-----|-------|------|------|
| | VC | C | M | F | VF | | | |
| <u>inches</u> | <u>g kg⁻¹ of soil</u> | | | | | | | |
| 0-5 | 15 | 61 | 328 | 392 | 67 | 863 | 94 | 43 |
| 5-11 | 3 | 37 | 290 | 454 | 60 | 844 | 107 | 49 |
| 11-25 | 4 | 28 | 287 | 432 | 116 | 867 | 84 | 49 |
| 25-37 | 2 | 37 | 286 | 434 | 98 | 857 | 75 | 68 |
| 37-60 | 7 | 43 | 499 | 410 | 13 | 972 | 17 | 11 |
| 72 | 9 | 63 | 477 | 423 | 14 | 986 | 6 | 8 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table B. Chemical properties for Seabrook loamy sand

| Depth | Exchangeable cations | | | | CEC* | BS** |
|---------------|--------------------------------------|------------------|----------------|----------------|-------|----------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| <u>inches</u> | <u>cmol (+) kg⁻¹ soil</u> | | | | | <u>%</u> |
| 0-5 | 0.06 | 0.03 | 0.04 | 11.13 | 11.26 | 1.15 |
| 5-11 | 0.05 | 0.01 | 0.01 | 7.14 | 7.21 | 0.97 |
| 11-25 | 0.04 | 0.01 | 0.01 | 4.41 | 4.47 | 1.34 |
| 25-37 | 0.05 | 0.01 | 0.02 | 4.41 | 4.49 | 1.78 |
| 37-60 | 0.02 | 0.00 | 0.00 | 1.68 | 1.70 | 1.18 |
| 72 | 0.04 | 0.00 | 0.00 | 1.89 | 1.93 | 2.07 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for Seabrook loamy sand

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|------|--------------------------------------|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 0-5 | ND | 4.68 | 2.65 | 2.78 | 4.68 |
| 5-11 | ND | 4.86 | 1.25 | 1.32 | 5.30 |
| 11-25 | ND | 4.70 | 1.25 | 1.31 | 4.80 |
| 25-37 | ND | 4.72 | 1.65 | 1.73 | 4.62 |
| 37-60 | ND | 4.97 | 0.45 | 1.72 | 1.16 |
| 72 | ND | 4.85 | 0.50 | 0.54 | 7.41 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.**EBS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{ECEC}} \times 100$.

Table E: Sand mineralogy for Seabrook loamy sand

| Depth | Quartz | Feldspar | Mica | Opaque Minerals* | Heavy Minerals* | Misc* |
|---------------|----------------------------------|----------|------|------------------|-----------------|-------|
| <u>inches</u> | <u>g kg⁻¹ of sand</u> | | | | | |
| 5-37 | 910 | 50 | 0 | 30 | 10 | 0 |

*Opaque Minerals are ilmenite, magnetite, hematite, etc. Heavy Minerals are translucent zircon, tourmaline, rutile, epidote, hornblende, etc. Misc = rock fragments.

Table F. Chemical properties* for Seabrook loamy sand

| Depth | OM | pH | Ca ²⁺ | Mg ²⁺ | P | K ⁺ | Zn | Mn |
|---------------|-----|-----|------------------|------------------|----|----------------|-----|------|
| <u>inches</u> | % | | <u>ppm</u> | | | | | |
| 0-5 | 2.7 | 3.9 | 36 | 6 | 7 | 14 | 0.6 | 0.00 |
| 5-11 | 1.1 | 4.4 | 24 | 3 | 11 | 4 | 0.4 | 0.00 |
| 11-25 | 0.7 | 4.3 | 24 | 2 | 7 | 4 | 0.2 | 0.00 |
| 25-37 | 0.5 | 4.3 | 36 | 3 | 9 | 9 | 0.2 | 0.00 |
| 37-60 | 0.5 | 4.5 | 24 | 2 | 5 | 4 | 0.3 | 0.00 |

*Soil Testing and Plant Analysis Laboratory, Agronomy Department, Va Tech, Blacksburg, VA 24061.

Seabrook Series - Supplemental Profile 1

Soils of the Seabrook series are deep and moderately well drained. They formed in sandy fluvial sediments. Seabrook soils are on low-lying stream terraces on the Coastal Plain. Slopes range from 0 to 2 percent.

Typical pedon of Seabrook loamy fine sand, about 1,000 feet northeast of junction of Mill Creek and Diascund Creek, and 300 feet west of Mill Creek, James City County.

A11-0 to 3 inches; very dark grayish brown (10YR 3/2) loamy fine sand; weak fine granular structure; very friable; many fine medium and coarse roots; many fine and common medium pores; strongly acid; clear smooth boundary.

A12-3 to 9 inches; dark brown (10YR 4/3) loamy fine sand; weak fine granular structure; very friable; common fine medium and coarse roots; many fine and medium pores; strongly acid; gradual smooth boundary.

C1-9 to 18 inches; yellowish brown (10YR 5/4) loamy fine sand; single grain; very friable; few fine and medium roots; few fine pores; very strongly acid; gradual smooth boundary.

C2-18 to 25 inches; light yellowish brown (2.5Y 6/4) loamy fine sand; single grain; very friable; few fine and medium roots; few fine pores; very strongly acid; gradual smooth boundary.

C3--25 to 40 inches; light yellowish brown (2.5Y 6/4) loamy fine sand; common fine prominent strong brown (7.5YR 5/8) mottles and common medium distinct light gray (2.5Y 7/2) mottles; single grain; very friable; few fine and medium roots; few fine pores; common strong brown (7.5YR 5/8) fine sandy loam bodies up to 1/4 inch in diameter; strongly acid; clear wavy boundary.

C4--40 to 57 inches; light olive brown (2.5Y 5/6) loamy fine sand; common medium distinct yellowish brown (10YR 5/6) and pale brown (10YR 6/3) mottles; single grain; very friable; common strong brown (7.5YR 5/8) fine sandy loam bodies up to 1/4 inch in diameter; many fine flakes of mica; strongly acid; gradual wavy boundary.

C5--57 to 72 inches; mottled light yellowish brown (2.5Y 6/4), yellowish brown (10YR 5/6), dark greenish gray (5GY 4/1), and yellowish red (5YR 4/6) loamy fine sand; single grain; very friable; common fine flakes of mica; strongly acid.

Table A: Particle-size distribution* for Seabrook loamy fine sand

| Depth | Sand | | | | | | Silt | Clay |
|---------------|----------------------------------|----|----|-----|-----|-------|------|------|
| | VC | C | M | F | VF | Total | | |
| <u>inches</u> | <u>g kg⁻¹ of soil</u> | | | | | | | |
| 0-3 | 1 | 12 | 65 | 565 | 196 | 839 | 90 | 71 |
| 3-9 | 1 | 8 | 54 | 607 | 119 | 789 | 148 | 63 |
| 9-18 | 2 | 10 | 58 | 612 | 201 | 883 | 67 | 50 |
| 18-25 | -- | 6 | 39 | 595 | 216 | 856 | 102 | 42 |
| 25-40 | 2 | 4 | 28 | 608 | 230 | 872 | 78 | 50 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table E: Sand mineralogy for Seabrook loamy fine sand

| Depth | Quartz | Feldspar | Mica | Opaque Minerals* | Heavy Minerals* | Misc* |
|---------------|----------------------------------|----------|------|------------------|-----------------|-------|
| <u>inches</u> | <u>g kg⁻¹ of sand</u> | | | | | |
| 9-40 | 890 | 100 | 0 | 0 | 10 | 0 |

*Opaque Minerals are ilmenite, magnetite, hematite, etc. Heavy Minerals are translucent zircon, tourmaline, rutile, epidote, hornblende, etc. Misc = rock fragments.

Slagle Series

Soils of the Slagle series are deep and moderately well drained. They formed in stratified loamy and clayey fluvial and marine sediments. Slagle soils are on upland flats, in slight depressions, and on side slopes of small drainageways on the Coastal Plain. Slopes range from 0 to 6 percent.

Pedon of Slagle fine sandy loam, 2 to 6 percent slopes, Green Springs, 300 feet east of VA-614, 1,800 feet north of junction of VA-614 and VA-5, James City County.

Ap--0 to 8 inches; brown (10YR 5/3) fine sandy loam; weak fine granular structure; friable, slightly sticky, slightly plastic; many fine roots; common fine tubular pores; moderately acid; abrupt smooth boundary.

BE--8 to 11 inches; yellowish brown (10YR 5/4) clay loam; moderate medium granular structure; friable, slightly sticky, slightly plastic; few fine roots; few fine tubular pores; strongly acid; clear smooth boundary.

Bt1--11 to 24 inches; yellowish brown (10YR 5/6) clay loam; weak medium subangular blocky structure; friable, sticky, plastic; few fine roots; common fine tubular pores; common faint clay films on faces of peds; strongly acid; clear smooth boundary.

Bt2--24 to 33 inches; yellowish brown (10YR 5/8) sandy clay; few fine distinct light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; firm, sticky, plastic; few fine roots; common fine tubular pores; common faint clay films on faces of peds; very strongly acid; gradual smooth boundary.

Bt3--33 to 45 inches; yellowish brown (10YR 5/6) clay; common medium prominent red (2.5YR 4/8), light gray (7.5YR 7/1) and strong brown (7.5YR 5/8) mottles; moderate medium subangular blocky structure; firm, sticky, plastic; few fine tubular pores; common faint clay films on faces of peds; very strongly acid; gradual smooth boundary.

Bt4--45 to 50 inches; mottled yellowish brown (10YR 5/6), strong brown (7.5YR 5/8), gray (10YR 6/1) and red (2.5YR 4/6) clay; moderate coarse subangular blocky structure; firm, sticky, plastic; common fine tubular pores; common distinct clay films on faces of peds; very strongly acid; gradual wavy boundary.

Cg--50 to 70 inches; variegated gray (10YR 6/1), red (2.5YR 4/6), strong brown (7.5YR 5/8), yellowish brown (10YR 5/6) and yellowish red (5YR 4/6) clay; massive; firm, sticky, plastic; very strongly acid.

Table A: Particle-size distribution* for Slagle fine sandy loam

| Depth | Sand | | | | | | Silt | Clay |
|--------|----------------------------|----|-----|-----|----|-------|------|------|
| | VC | C | M | F | VF | Total | | |
| inches | g kg ⁻¹ of soil | | | | | | | |
| 8-28 | 16 | 63 | 139 | 133 | 51 | 402 | 317 | 281 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Slagle Series - Supplemental Profile 1

Supplemental pedon of Slagle fine sandy loam, 2 percent slopes, located in area 5; 200 feet east of Sioux Road in Camp Peary, York County, Virginia.

Ap--0 to 6 inches; grayish brown (10YR 5/2) fine sandy loam; weak fine granular structure; friable, slightly sticky, nonplastic; many fine medium and coarse roots; few fine and medium tubular pores; very strongly acid; clear smooth boundary.

E--6 to 12 inches; light yellowish brown (10YR 6/4) fine sandy loam; weak fine granular structure; friable, slightly sticky, nonplastic; common medium and coarse and few fine roots; common fine and medium tubular pores; moderately acid; clear smooth boundary.

Bt1--12 to 16 inches; yellowish brown (10YR 5/6) sandy clay loam; common medium faint light yellowish brown (10YR 6/4) mottles; weak medium subangular blocky structure; friable, sticky, plastic; few fine and medium roots; many fine and medium tubular pores; few faint clay films on faces of peds; strongly acid; clear smooth boundary.

Bt2--16 to 28 inches; yellowish brown (10YR 5/6) sandy clay loam; moderately medium subangular blocky structure; friable, sticky, plastic; few fine roots; common fine and medium tubular pores; few faint clay films on faces of peds; moderately acid; gradual smooth boundary.

Bt3--28 to 41 inches; mottled yellowish brown (10YR 5/6) and gray (5Y 6/1) sandy clay loam; moderate medium subangular blocky structure; friable, sticky, plastic; few fine roots; common fine and medium tubular pores; few faint clay films on faces of peds; few fine flakes of mica; strongly acid; gradual smooth boundary.

Btg1--41 to 51 inches; mottled gray (N 6/), yellowish brown (10YR 5/6) and strong brown (7.5YR 5/6) clay; moderate medium subangular blocky structure; firm, sticky, plastic; few fine roots; common fine and medium tubular pores; few faint clay films on faces of peds; few fine flakes of mica; very strongly acid; abrupt wavy boundary.

C1--51 to 64 inches; mottled dark yellowish brown (10YR 4/4) and pale brown (10YR 6/3) loamy sand; single grain and compact in place; very friable, slightly sticky, nonplastic; few fine roots; few fine tubular pores; very strongly acid; gradual wavy boundary.

C2--64 to 74 inches; mottled dark yellowish brown (10YR 4/4), light yellowish brown (2.5Y 6/4) and light brownish gray (2.5Y 6/2) stratified loamy sand and sand; single grain; loose, slightly sticky, nonplastic; common fine highly weathered black mineral stains; few fine tubular pores in dark yellowish brown bodies; very strongly acid.

Table A: Particle-size distribution* for Slagle fine sandy loam

| Depth | Sand | | | | | | Silt | Clay |
|--------|----------------------------|----|-----|-----|-----|-------|------|------|
| | VC | C | M | F | VF | Total | | |
| inches | g kg ⁻¹ of soil | | | | | | | |
| 0-6 | 4 | 34 | 142 | 355 | 131 | 666 | 259 | 75 |
| 6-12 | 5 | 31 | 126 | 325 | 129 | 616 | 269 | 115 |
| 12-16 | 4 | 28 | 112 | 288 | 115 | 547 | 258 | 195 |
| 16-28 | 14 | 31 | 100 | 264 | 110 | 519 | 186 | 295 |
| 28-41 | 12 | 31 | 99 | 265 | 109 | 516 | 119 | 365 |
| 41-51 | 10 | 23 | 127 | 298 | 130 | 588 | 92 | 320 |
| 51-64 | 2 | 4 | 248 | 543 | 5 | 802 | 88 | 110 |
| 64-74 | 1 | 3 | 225 | 704 | 5 | 938 | 32 | 30 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table F. Chemical properties* for Slagle fine sandy loam

| Depth | OM | pH | Ca ²⁺ | Mg ²⁺ | P | K ⁺ | Zn | Mn |
|--------|-----|-----|------------------|------------------|---|----------------|-----|------|
| inches | % | | ppm | | | | | |
| 0-6 | 1.2 | 5.0 | 118 | 20 | 5 | 10 | 1.1 | 5.1 |
| 6-12 | 0.2 | 5.6 | 140 | 30 | 1 | 12 | 0.4 | 2.7 |
| 12-16 | 0.3 | 5.5 | 487 | 50 | 2 | 21 | 0.4 | 0.9 |
| 16-28 | 0.2 | 5.9 | 1024 | 60 | 1 | 21 | 0.4 | 0.2 |
| 28-41 | 0.1 | 4.9 | 454 | 66 | 1 | 21 | 0.5 | 0.00 |
| 41-51 | 0.1 | 4.6 | 118 | 60 | 4 | 21 | 0.4 | 0.00 |
| 51-64 | 0.1 | 4.7 | 34 | 34 | 1 | 15 | 0.4 | 0.1 |
| 64-74 | 0.1 | 5.0 | 17 | 20 | 2 | 0 | 0.4 | 0.1 |

*Soil Testing and Plant Analysis Laboratory, Agronomy Department, Va Tech, Blacksburg, VA 24061.

Slagle Series - Supplemental Profile 2

Supplemental pedon of Slagle fine sandy loam, 2 to 6 percent slopes, area 7, about 300 feet north of Warrior Road, Camp Peary, York County.

A1--0 to 5 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak fine granular structure; friable, slightly sticky, nonplastic; many coarse medium and fine roots; common fine tubular pores; very strongly acid; clear smooth boundary.

E--5 to 13 inches; grayish brown (2.5YR 5/2) fine sandy loam; weak medium and fine granular structure; friable, slightly sticky, slightly plastic; common fine and medium roots; common fine and medium tubular pores; strongly acid; gradual smooth boundary.

Bt1--13 to 18 inches; yellowish brown (10YR 5/6) sandy clay loam; common medium faint light yellowish brown (10YR 6/4) mottles; weak medium subangular blocky structure; friable, sticky, plastic; common fine and medium roots; common medium tubular pores; few faint clay films on faces of peds; strongly acid; clear smooth boundary.

Bt2--18 to 26 inches; yellowish brown (10YR 5/6) sandy clay loam; moderate medium subangular blocky structure; friable, sticky, plastic; few fine and common roots; common fine tubular pores; common faint clay films on faces of peds; strongly acid; clear smooth boundary.

Bt3--26 to 35 inches; mottled yellowish brown (10YR 5/6) and light olive gray (5Y 6/2) sandy clay loam; weak coarse subangular blocky structure; friable, sticky, plastic; few fine and medium roots; few fine tubular pores; few faint clay films on faces of peds; strongly acid; gradual smooth boundary.

Bt4--35 to 44 inches; mottled light olive gray (5Y 6/2), yellowish brown (10YR 5/6) and strong brown (7.5YR 5/6) sandy clay loam; weak coarse subangular blocky structure; friable, sticky, plastic; few fine roots; common fine tubular pores; few faint clay films on faces of peds; very strongly acid; gradual smooth boundary.

Bt5--44 to 58 inches; mottled yellowish brown (10YR 5/8), strong brown (7.5YR 5/8) and gray (5Y 6/1) sandy clay loam; weak medium subangular blocky structure; friable, sticky, plastic; few fine roots; common fine and medium pores; few faint clay films on faces of peds; few fine flakes of mica; about 5 percent of subrounded and rounded quartz fragments up to one inch in diameter; very strongly acid; clear smooth boundary.

C--58 to 82 inches; light olive brown (2.5Y 5/6) loamy sand; many medium distinct gray (5Y 6/1) mottles; massive; friable, slightly sticky, nonplastic; few common roots; few fine and medium tubular pores; few fine flakes of mica; few ironstone fragments up to 1/2 inch in diameter; very strongly acid.

Table B. Chemical properties for Slagle fine sandy loam

| Depth | Exchangeable cations | | | | CEC* | BS** |
|---------------|--------------------------------------|------------------|----------------|----------------|------|----------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| <u>inches</u> | <u>cmol (+) kg⁻¹ soil</u> | | | | | <u>%</u> |
| 63 | 0.33 | 0.71 | 0.18 | 7.40 | 8.62 | 14.15 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.

**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for Slagle fine sandy loam

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|------|--|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 63 | ND | 4.08 | 5.05 | 6.27 | 19.46 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.

**EBS = $\frac{Ca^{2+} + Mg^{2+} + K^{+}}{ECEC} \times 100$.

Table F. Chemical properties* for Slagle fine sandy loam

| Depth | OM | pH | Ca ²⁺ | Mg ²⁺ | P | K ⁺ | Zn | Mn |
|---------------|----------|-----|------------------|------------------|----|----------------|------|-----|
| <u>inches</u> | <u>%</u> | | <u>ppm</u> | | | | | |
| 0-5 | 2.0 | 4.6 | 51 | 16 | 2 | 15 | 1.0 | 2.8 |
| 5-13 | 0.2 | 5.5 | 39 | 8 | 7 | 10 | 0.50 | 16 |
| 13-18 | 0.2 | 5.4 | 135 | 60 | 2 | 15 | 0.40 | 7.3 |
| 18-26 | 0.2 | 5.1 | 454 | 102 | 2 | 15 | 0.40 | 0.7 |
| 26-35 | 0.1 | 5.4 | 437 | 60 | 3 | 12 | 0.40 | 0.2 |
| 35-44 | 0.1 | 5.2 | 487 | 100 | 3 | 17 | 0.40 | 0.4 |
| 44-58 | 0.1 | 4.8 | 190 | 96 | 7 | 28 | 0.50 | 0.1 |
| 58-82 | 0.1 | 4.8 | 101 | 140 | 39 | 45 | 0.60 | 0.2 |

*Soil Testing and Plant Analysis Laboratory, Agronomy Department, Va Tech, Blacksburg, VA 24061.

Slagle Series - Supplemental Profile 3

Supplemental pedon of Slagle fine sandy loam, 2 to 6 percent slopes, area 32, about 1000 feet west of Gatehouse Road, Camp Peary, York County.

Ap--0 to 14 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak fine granular structure; friable, slightly sticky, slightly plastic; many fine and few coarse roots; common fine tubular pores; moderately acid; clear wavy boundary.

E--14 to 21 inches; pale brown (10YR 6/3) loam; common fine faint yellowish brown (10YR 5/6) mottles; moderate medium granular structure; friable, slightly sticky, nonplastic; few fine roots; common fine and medium tubular pores; strongly acid; clear smooth boundary.

Bt1--21 to 28 inches; light olive brown (2.5Y 5/4) clay loam; weak medium subangular blocky structure; friable, sticky, plastic; few fine roots; common fine and medium tubular pores; few faint clay films on faces of peds; moderately acid; gradual smooth boundary.

Bt2--28 to 37 inches; yellowish brown (10YR 5/4) clay loam; few fine distinct light brownish gray (10YR 6/2) mottles in lower part; weak medium subangular blocky structure; friable, sticky, plastic; few fine roots; common fine pores; common faint clay films on faces of peds; moderately acid; clear smooth boundary.

Bt3--37 to 45 inches; mottled yellowish brown (10YR 5/4 and 5/6) and gray (10YR 6/1) clay loam; moderate medium subangular blocky structure; friable, sticky, plastic; few fine roots; common fine tubular pores; common faint clay films on faces of peds; moderately acid; gradual smooth boundary.

Btg--45 to 69 inches; mottled gray (10YR 6/1) and yellowish brown (10YR 5/4 and 5/6) sandy clay loam; moderate coarse subangular blocky structure; firm, sticky, plastic; few fine roots; common fine tubular pores; common distinct clay films on faces of peds; strongly acid; gradual wavy boundary.

Cg--69 to 81 inches; gray (N6) clay; common medium prominent yellowish red (5YR 4/8) and common medium distinct light olive brown (2.5Y 5/4) mottles; massive; firm, sticky, plastic; few fine tubular pores; very strongly acid.

Table A: Particle-size distribution* for Slagle fine sandy loam

| Depth | Sand | | | | | Total | Silt | Clay |
|--------|----------------------------|----|-----|-----|----|-------|------|------|
| | VC | C | M | F | VF | | | |
| inches | g kg ⁻¹ of soil | | | | | | | |
| 0-14 | 1 | 24 | 127 | 259 | 70 | 481 | 401 | 118 |
| 14-21 | 2 | 21 | 116 | 255 | 64 | 458 | 394 | 148 |
| 21-28 | 4 | 21 | 105 | 224 | 58 | 412 | 395 | 193 |
| 28-37 | 2 | 20 | 98 | 200 | 54 | 374 | 323 | 303 |
| 37-45 | 4 | 21 | 105 | 215 | 58 | 403 | 304 | 293 |
| 45-69 | 3 | 20 | 106 | 224 | 54 | 407 | 275 | 318 |
| 69-81 | 4 | 26 | 134 | 261 | 58 | 483 | 0 | 517 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table B. Chemical properties for Slagle fine sandy loam

| Depth | Exchangeable cations | | | | CEC* | BS** |
|---------------|--------------------------------------|------------------|----------------|----------------|-------|----------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| <u>inches</u> | <u>cmol (+) kg⁻¹ soil</u> | | | | | <u>%</u> |
| 71 | 1.34 | 0.78 | 0.11 | 8.40 | 10.63 | 20.98 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.

**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for Slagle fine sandy loam

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|------|--------------------------------------|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 71 | ND | 4.20 | 5.45 | 10.63 | 20.98 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.

**EBS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{ECEC}} \times 100$.

Table F. Chemical properties* for Slagle fine sandy loam

| Depth | OM | pH | Ca ²⁺ | Mg ²⁺ | P | K ⁺ | Zn | Mn |
|---------------|----------|-----|------------------|------------------|---|----------------|-----|-----|
| <u>inches</u> | <u>%</u> | | <u>ppm</u> | | | | | |
| 0-14 | 1.1 | 5.8 | 386 | 66 | 5 | 36 | 1.2 | 6.8 |
| 14-21 | 0.3 | 6.1 | 235 | 56 | 3 | 13 | 0.4 | 3.4 |
| 21-28 | 0.2 | 6.0 | 420 | 64 | 3 | 13 | 0.5 | 1.9 |
| 28-37 | 0.2 | 5.9 | 856 | 60 | 3 | 17 | 0.3 | 1.0 |
| 37-45 | 0.1 | 5.9 | 899 | 56 | 5 | 15 | 0.6 | 0.7 |
| 45-69 | 0.1 | 5.2 | 672 | 108 | 7 | 19 | 0.5 | 0.3 |
| 69-81 | 0.1 | 4.8 | 353 | 142 | 3 | 23 | 4 | 0.3 |

*Soil Testing and Plant Analysis Laboratory, Agronomy Department, Va Tech, Blacksburg, VA 24061.

Figure 16. Houses on Slagle and Craven soils in James City County.



State Series

Soils of the State series are very deep and well drained. They formed in loamy fluvial sediments. They are on low-lying stream terraces. Slopes range from 0 to 2 percent.

Typical pedon of State very fine sandy loam, 0 to 2 percent slopes, rarely flooded, 8,000 feet north of junction of VA-607 and VA-606, 1,200 feet west of Pamunkey River, New Kent County.

Ap-0 to 9 inches; brown (7.5YR 4/2) very fine sandy loam; moderate medium granular structure; very friable, slightly sticky, nonplastic; many fine roots; common fine and medium tubular pores; few rounded quartz gravel; strongly acid; abrupt smooth boundary.

Bt1-9 to 15 inches; brown (7.5YR 5/4) very fine sandy loam; weak medium and fine subangular blocky structure; very friable, slightly sticky, slightly plastic; common fine roots; common fine and medium tubular pores; common fine flakes of mica; common faint clay films on faces of peds; few rounded quartz gravel; strongly acid; clear smooth boundary.

Bt2-15 to 29 inches; brown (7.5YR 4/4) sandy clay loam; moderate medium subangular blocky structure; very friable, slightly sticky, slightly plastic; common fine roots; common fine and medium tubular pores; common fine flakes of mica; many distinct clay films on faces of peds; few rounded quartz gravel; moderately acid; clear smooth boundary.

Bt3-29 to 36 inches; brown (7.5YR 4/4) sandy clay loam; weak coarse subangular blocky structure; very friable, slightly sticky, slightly plastic; few fine roots; common fine and medium pores; common fine flakes of mica; common distinct clay films on faces of peds; few rounded quartz gravel; moderately acid; clear smooth boundary.

BC-36 to 47 inches; yellowish brown (10YR 5/6) very fine sandy loam; weak moderate and fine subangular blocky structure; very friable, slightly sticky, slightly plastic; common fine and medium pores; common fine flakes of mica; few clay bridges on sand grains; few rounded quartz gravel; moderately acid; gradual smooth boundary.

C--47 to 60 inches; yellowish brown (10YR 5/6) fine sandy loam; common medium prominent light brownish gray (10YR 6/2) mottles and few fine distinct strong brown (7.5YR 5/8) mottles; massive; very friable; nonsticky, nonplastic; few rounded quartz gravel; common fine flakes of mica; strongly acid.

Table A: Particle-size distribution* for State very fine sandy loam

| Depth | Sand | | | | | Total | Silt | Clay |
|--------|----------------------------|-----|-----|-----|-----|-------|------|------|
| | VC | C | M | F | VF | | | |
| inches | g kg ⁻¹ of soil | | | | | | | |
| 0-9 | 15 | 115 | 505 | 99 | 29 | 763 | 151 | 86 |
| 9-15 | 6 | 11 | 49 | 247 | 362 | 675 | 156 | 169 |
| 15-29 | 7 | 13 | 43 | 312 | 334 | 709 | 110 | 181 |
| 29-36 | 3 | 10 | 37 | 231 | 333 | 614 | 118 | 268 |
| 36-47 | 20 | 27 | 59 | 244 | 423 | 773 | 118 | 109 |
| 47-60 | 2 | 5 | 73 | 378 | 302 | 760 | 141 | 99 |
| 59 | 1 | 4 | 68 | 456 | 291 | 820 | 101 | 79 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table B. Chemical properties for State very fine sandy loam

| Depth | Exchangeable cations | | | | CEC* | BS** |
|---------------|--|------------------|----------------|----------------|-------|----------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| <u>inches</u> | <u>cmol (+) kg⁻¹ soil</u> | | | | | <u>%</u> |
| 0-9 | 4.00 | 1.01 | 0.45 | 4.83 | 10.29 | 53.06 |
| 9-15 | 5.84 | 1.63 | 0.30 | 7.98 | 15.75 | 49.33 |
| 15-29 | 10.00 | 1.73 | 0.30 | 8.19 | 20.22 | 59.50 |
| 29-36 | 7.01 | 1.14 | 0.21 | 6.51 | 14.87 | 56.22 |
| 36-47 | 3.80 | 0.85 | 0.10 | 5.25 | 10.00 | 47.50 |
| 47-60 | 2.70 | 1.25 | 0.12 | 5.88 | 9.95 | 40.90 |
| 59 | 2.56 | 1.27 | 0.10 | 4.83 | 8.76 | 44.86 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for State very fine sandy loam

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|------|--|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 0-9 | ND | 5.40 | 0.05 | 5.51 | 99.09 |
| 9-15 | ND | 5.51 | 0.15 | 7.92 | 98.11 |
| 15-29 | ND | 5.73 | 0.15 | 12.18 | 98.77 |
| 29-36 | ND | 5.98 | 0.15 | 8.51 | 98.24 |
| 36-47 | ND | 5.74 | 0.95 | 5.7 | 83.33 |
| 47-60 | ND | 5.51 | 1.55 | 9.95 | 40.90 |
| 59 | ND | 5.43 | 1.45 | 8.76 | 44.86 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.**EBS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{ECEC}} \times 100$.

Table E: Sand mineralogy for State very fine sandy loam

| Depth | Quartz | Feldspar | Mica | Opaque Minerals* | Heavy Minerals* | Misc* |
|---------------|----------------------------------|----------|------|------------------|-----------------|-------|
| <u>inches</u> | <u>g kg⁻¹ of sand</u> | | | | | |
| 9-29 | 790 | 100 | 50 | 10 | 10 | 0 |

*Opaque Minerals are ilmenite, magnetite, hematite, etc. Heavy Minerals are translucent zircon, tourmaline, rutile, epidote, hornblende, etc. Misc = rock fragments.

State Series - Supplemental Profile 1

Supplemental pedon of State fine sandy loam, 2 to 6 percent slopes, Range area, 150 feet northeast of trail to old observation tower and trail crossing marsh at Nells Creek, Fort Eustis, Newport News.

Ap--0 to 6 inches; brown (10YR 4/3) fine sandy loam; weak fine granular structure; loose; many fine and medium roots, few large roots; very strongly acid; clear smooth boundary.

BA--6 to 14 inches; strong brown (7.5YR 5/6) sandy loam; weak medium subangular blocky structure; slightly sticky, slightly plastic; many fine and medium roots, few large roots; very strongly acid; gradual smooth boundary.

Bt--14 to 35 inches; strong brown (7.5YR 5/6) sandy clay loam; moderate medium subangular blocky structure; friable, sticky, plastic; common fine and few medium roots; very strongly acid; gradual smooth boundary.

BC--35 to 44 inches; strong brown (7.5YR 5/8) sandy loam (and loamy sand); weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; common fine roots; few fine flakes of mica; strongly acid; clear smooth boundary.

C--44 to 70 inches; brownish yellow (10YR 6/6) fine sand, common medium distinct light yellowish brown (10YR 6/4) mottles; single grain; loose; few fine roots; common fine flakes of mica; strongly acid.

Table A: Particle-size distribution* for State fine sandy loam

| Depth | Sand | | | | | Total | Silt | Clay |
|--------|----------------------------|---|---|---|----|-------|------|------|
| | VC | C | M | F | VF | | | |
| inches | g kg ⁻¹ of soil | | | | | | | |
| 0-6 | - | - | - | - | - | 680 | 230 | 90 |
| 6-14 | - | - | - | - | - | 690 | 180 | 130 |
| 14-35 | - | - | - | - | - | 550 | 160 | 290 |
| 35-44 | - | - | - | - | - | 780 | 80 | 140 |
| 44-70 | - | - | - | - | - | 910 | 60 | 30 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table B. Chemical properties for State fine sandy loam

| Depth | Exchangeable cations | | | | CEC* | BS** |
|---------------|--------------------------------------|------------------|----------------|----------------|-------|----------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| <u>inches</u> | <u>cmol (+) kg⁻¹ soil</u> | | | | | <u>%</u> |
| 0-6 | 0.70 | 0.20 | 0.12 | 6.34 | 7.36 | 13.86 |
| 6-14 | 0.60 | 0.28 | 0.11 | 3.56 | 4.55 | 21.76 |
| 14-35 | 2.43 | 1.56 | 0.30 | 8.71 | 13.00 | 33.00 |
| 35-44 | 0.88 | 0.89 | 0.18 | 3.37 | 5.32 | 36.65 |
| 44-70 | 0.19 | 0.24 | 0.07 | 3.17 | 3.67 | 13.62 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for State fine sandy loam

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|------|--------------------------------------|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 0-6 | 1.24 | 4.90 | 0.85 | 1.86 | 54.30 |
| 6-14 | 0.00 | 5.02 | 0.75 | 1.75 | 56.57 |
| 14-35 | 0.00 | 5.00 | 0.65 | 4.94 | 86.84 |
| 35-44 | 0.00 | 5.22 | 0.15 | 2.1 | 92.86 |
| 44-70 | 0.00 | 5.44 | 0.10 | 0.6 | 83.32 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.**EBS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{ECEC}} \times 100$.

Table D: Clay mineralogy for State fine sandy loam

| Depth | HIV* | Mica | Kaolinite | Quartz | Verm | Gibbsite | Misc* |
|---------------|----------------------------------|------|-----------|--------|------|----------|-------|
| <u>inches</u> | <u>g kg⁻¹ of clay</u> | | | | | | |
| 14-35 | 250 | 50 | 390 | 70 | Tr | Tr | 240 |

*HIV = hydroxy interlayered vermiculite. Verm = vermiculite. Misc = vermiculite/montmorillonite.

State Series - Supplemental Profile 2

Supplemental pedon of State loam, 2 to 6 percent slopes, Range area, 450 feet off fire lane, 1000 feet southeast of junction of firelanes, 900 feet west of Warwick River, Fort Eustis, Newport News.

Ap--0 to 4 inches; dark grayish brown (10YR 4/2) loam; weak fine granular structure; friable, slightly sticky, nonplastic; many coarse, common fine, and medium roots; strongly acid; clear smooth boundary.

BA--4 to 9 inches; yellowish brown (10YR 5/6) loam; moderate medium granular structure; friable, slightly sticky, slightly plastic; common fine roots; common fine flakes of mica; strongly acid; gradual smooth boundary.

Bt1--9 to 38 inches; strong brown (7.5YR 5/6) clay loam; moderate medium subangular blocky structure; friable, sticky, plastic; common fine roots; common fine flakes of mica; strongly acid; gradual smooth boundary.

Bt2--38 to 53 inches; strong brown (7.5YR 5/8) clay loam; moderate medium subangular blocky structure; friable, sticky, plastic; few fine roots; few fine flakes of mica; strongly acid; gradual smooth boundary.

Bt3--53 to 65 inches; mottled strong brown (7.5YR 5/8), light brownish gray (10YR 6/2), and pale brown (10YR 6/3) loam; weak medium subangular blocky structure; friable, sticky, plastic; few fine roots in upper part; few fine roots; common fine flakes of mica; strongly acid; abrupt smooth boundary.

2C--65 to 80 inches; strong brown (7.5YR 5/6) loamy sand; single grain; loose, nonsticky, nonplastic; few fine flakes of mica; strongly acid.

Table A: Particle-size distribution* for State loam

| Depth | Sand | | | | | | Silt | Clay |
|--------|----------------------------|---|---|---|----|-------|------|------|
| | VC | C | M | F | VF | Total | | |
| inches | g kg ⁻¹ of soil | | | | | | | |
| 0-4 | - | - | - | - | - | 462 | 432 | 106 |
| 4-9 | - | - | - | - | - | 450 | 394 | 156 |
| 9-38 | - | - | - | - | - | 454 | 267 | 279 |
| 38-53 | - | - | - | - | - | 306 | 408 | 286 |
| 53-65 | - | - | - | - | - | 394 | 352 | 254 |
| 65-80 | - | - | - | - | - | 850 | 26 | 124 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table B. Chemical properties for State loam

| Depth | Exchangeable cations | | | | CEC* | BS** |
|---------------|--------------------------------------|------------------|----------------|----------------|-------|----------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| <u>inches</u> | <u>cmol (+) kg⁻¹ soil</u> | | | | | <u>%</u> |
| 0-4 | 4.67 | 0.74 | 0.60 | 10.49 | 16.50 | 36.42 |
| 4-9 | 1.09 | 0.28 | 0.09 | 4.55 | 6.01 | 24.29 |
| 9-38 | 3.48 | 1.05 | 0.21 | 5.15 | 9.89 | 47.93 |
| 38-53 | 0.83 | 2.46 | 0.08 | 10.89 | 14.26 | 23.63 |
| 53-65 | 0.20 | 2.11 | 0.07 | 10.30 | 12.68 | 18.77 |
| 65-80 | 0.11 | 0.90 | 0.04 | 6.34 | 7.39 | 14.21 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for State loam

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|------|--------------------------------------|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 0-4 | 4.45 | 5.20 | 0.10 | 6.11 | 98.36 |
| 4-9 | 0.00 | 5.25 | 0.55 | 2.01 | 72.64 |
| 9-38 | 0.00 | 5.45 | 0.35 | 5.09 | 93.12 |
| 38-53 | 0.00 | 5.10 | 2.85 | 6.22 | 54.18 |
| 53-65 | 0.00 | 5.15 | 3.05 | 5.43 | 43.83 |
| 65-80 | 0.00 | 5.24 | 0.90 | 1.95 | 53.85 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.**EBS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{ECEC}} \times 100$.

Table D: Clay mineralogy for State loam

| Depth | HIV* | Mica | Kaolinite | Quartz | Verm* | Gibbsite | Misc* |
|---------------|----------------------------------|------|-----------|--------|-------|----------|-------|
| <u>inches</u> | <u>g kg⁻¹ of clay</u> | | | | | | |
| 9-38 | Tr | 160 | 420 | Tr | 370 | Tr | 50 |
| 65-80 | 0 | 70 | 450 | 20 | 260 | Tr | 200 |

*HIV = hydroxy interlayered vermiculite. Verm = vermiculite. Misc = vermiculite/montmorillonite.

State Series - Supplemental Profile 3

Supplemental pedon of State loam, 2 to 6 percent slopes, Range area, 2,200 feet southeast of combat position range, 200 feet east of fire trail, Fort Eustis, Newport News.

Ap--0 to 10 inches; brown (10YR 4/3) loam; weak medium granular structure; friable, slightly sticky; many fine and medium roots; strongly acid; clear smooth boundary.

Bt1--10 to 36 inches; strong brown (7.5YR5/6) sandy clay loam; moderate medium subangular blocky structure; friable, sticky, plastic; common fine roots; strongly acid; gradual smooth boundary.

Bt2--36 to 54 inches; strong brown (7.5YR 5/6) clay loam; common fine faint pale brown (10YR 6/3) mottles; moderate medium subangular blocky structure; friable, sticky, plastic; few fine roots; common fine flakes of mica; moderately acid; gradual smooth boundary.

BC--54 to 69 inches; strong brown (7.5YR 5/6) clay loam; few fine faint pale brown (10YR 6/3) mottles; single grain; loose; nonsticky, nonplastic; few fine roots; many fine flakes of mica; strongly acid.

C--69 to 75 inches; strong brown (7.5YR 5/6) fine sandy loam, common fine faint pale brown (10YR 6/3) mottles; single grain; loose; common fine flakes of mica; strongly acid.

Table A: Particle-size distribution* for State loam

| Depth | Sand | | | | | Total | Silt | Clay |
|--------|----------------------------|---|---|---|----|-------|------|------|
| | VC | C | M | F | VF | | | |
| inches | g kg ⁻¹ of soil | | | | | | | |
| 0-10 | - | - | - | - | - | 457 | 423 | 120 |
| 10-36 | - | - | - | - | - | 682 | 113 | 205 |
| 36-54 | - | - | - | - | - | 266 | 448 | 286 |
| 54-69 | - | - | - | - | - | 303 | 406 | 291 |
| 69-75 | - | - | - | - | - | 790 | 111 | 99 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table B. Chemical properties for State loam

| Depth | Exchangeable cations | | | | CEC* | BS** |
|---------------|--|------------------|----------------|----------------|-------|----------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| <u>inches</u> | <u>cmol (+) kg⁻¹ soil</u> | | | | | <u>%</u> |
| 0-10 | 2.98 | 0.93 | 0.36 | 7.92 | 12.19 | 35.03 |
| 10-36 | 0.54 | 1.88 | 0.09 | 8.32 | 10.83 | 23.18 |
| 36-54 | 2.76 | 1.27 | 0.29 | 8.71 | 13.03 | 33.15 |
| 54-69 | 1.83 | 2.50 | 0.11 | 10.30 | 14.74 | 30.12 |
| 69-75 | 0.28 | 0.99 | 0.07 | 4.95 | 6.29 | 21.30 |
| 60 | 0.81 | 2.00 | 0.10 | 7.52 | 10.43 | 27.90 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for State loam

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|-------|----------------|------|------------------|-------|-------|
| | | | | | |
| 0-10 | 2.53 | 5.24 | 0.10 | 4.37 | 97.71 |
| 10-36 | 0.00 | 5.34 | 1.45 | 3.96 | 63.38 |
| 36-54 | 0.00 | 5.80 | 1.05 | 5.37 | 80.45 |
| 54-69 | 0.00 | 5.32 | 1.85 | 6.29 | 70.59 |
| 69-75 | 0.00 | 5.70 | 0.75 | 2.09 | 64.11 |
| 60 | 0.00 | 5.54 | 1.35 | 4.26 | 68.31 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.**EBS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{ECEC}} \times 100$.

Table D: Clay mineralogy for State loam

| Depth | HIV* | Mica | Kaolinite | Quartz | Verm* | Gibbsite | Misc* |
|---------------|----------------------------------|------|-----------|--------|-------|----------|-------|
| <u>inches</u> | <u>g kg⁻¹ of clay</u> | | | | | | |
| 10-36 | Tr | 90 | 370 | Tr | 410 | Tr | 130 |
| 69-75 | Tr | 230 | 410 | 20 | 110 | Tr | 230 |

*HIV = hydroxy interlayered vermiculite. Verm = vermiculite. Misc = vermiculite/montmorillonite.

State Series - Supplemental Profile 4

Supplemental pedon of State fine sandy loam, about 1.8 miles east of Jamestown Island parking lot on Loop Road and 500 feet north of Loop Road, James City County.

A1--0 to 5 inches; very dark grayish brown (10YR 3/2) fine sandy loam; moderate medium granular structure; friable, slightly sticky, slightly plastic; many coarse medium and fine roots; few tubular pores; few fine flakes of mica; strongly acid; clear smooth boundary.

BE--5 to 11 inches; dark yellowish brown (10YR 4/4) fine sandy loam; weak fine subangular blocky structure and moderate medium granular structure; friable, slightly sticky, slightly plastic; many fine medium and coarse roots; few tubular pores; few quartz gravel; few krotovina filled with A1 material; few fine flakes of mica; strongly acid; clear smooth boundary.

Bt1--11 to 19 inches; dark brown (7.5YR 4/4) loam; moderate medium subangular blocky structure; friable, sticky, plastic; common fine and medium roots; few tubular pores; few distinct clay films on faces of peds; few quartz gravel; few krotovina filled with A1 material; few fine flakes of mica; strongly acid; clear smooth boundary.

Bt2--19 to 33 inches; dark brown (7.5YR 4/4) clay loam; moderate medium subangular blocky structure; friable, sticky, plastic; common fine and medium roots; few tubular pores; few distinct clay films on faces of peds; few quartz gravel; few krotovina; common fine flakes of mica; strongly acid; clear smooth boundary.

Bt3--33 to 43 inches; dark brown (7.5YR 4/4) sandy clay loam; few medium distinct yellowish brown (10YR 5/6) mottles; weak medium and coarse subangular blocky structure; friable, sticky, plastic; common fine and medium roots; few tubular pores; few faint clay films on faces of peds; few quartz gravel; common fine flakes of mica; strongly acid; clear smooth boundary.

Bt4--43 to 52 inches; dark brown (7.5YR 4/4) sandy clay loam; few fine faint light yellowish brown (10YR 6/4) mottles; weak coarse subangular blocky structure; friable, slightly sticky, slightly plastic; few fine and medium roots; few tubular pores; few faint clay films on faces of peds; few quartz gravel; common fine flakes of mica; strongly acid; gradual smooth boundary.

C--52 to 97 inches; dark brown (7.5YR 4/4) fine sandy loam; few medium faint light yellowish brown (10YR 6/4) mottles; massive; slightly compact in place; very friable, slightly sticky, nonplastic; few quartz gravel; common fine flakes of mica; strongly acid.

Table A: Particle-size distribution* for State fine sandy loam

| Depth | Sand | | | | | Total | Silt | Clay |
|--------|----------------------------|----|-----|-----|-----|-------|------|------|
| | VC | C | M | F | VF | | | |
| inches | g kg ⁻¹ of soil | | | | | | | |
| 0-5 | 22 | 24 | 159 | 313 | 115 | 633 | 239 | 74 |
| 5-11 | 3 | 22 | 97 | 285 | 120 | 527 | 313 | 160 |
| 11-19 | 3 | 16 | 80 | 244 | 99 | 442 | 324 | 234 |
| 19-33 | 5 | 11 | 69 | 218 | 99 | 402 | 288 | 310 |
| 33-43 | 3 | 8 | 118 | 358 | 88 | 575 | 171 | 254 |
| 43-52 | 2 | 11 | 167 | 424 | 77 | 681 | 109 | 210 |
| 52-67 | 0 | 2 | 194 | 579 | 45 | 820 | 30 | 150 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table B. Chemical properties for State fine sandy loam

| Depth | Exchangeable cations | | | | CEC* | BS** |
|---------------|--------------------------------------|------------------|----------------|----------------|------|----------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| <u>inches</u> | <u>cmol (+) kg⁻¹ soil</u> | | | | | <u>%</u> |
| 61 | 0.32 | 1.10 | 0.12 | 5.80 | 7.34 | 20.98 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.

**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for State fine sandy loam

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|------|--------------------------------------|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 61 | ND | 4.98 | 1.35 | 2.89 | 53.29 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.

**EBS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{ECEC}} \times 100$.

Table F. Chemical properties* for State fine sandy loam

| Depth | OM | pH | Ca ²⁺ | Mg ²⁺ | P | K ⁺ | Zn | Mn |
|---------------|----------|-----|------------------|------------------|----|----------------|-----|-----|
| <u>inches</u> | <u>%</u> | | <u>ppm</u> | | | | | |
| 0-5 | 2.3 | 5.7 | 621 | 92 | 11 | 47 | 8.8 | 1.9 |
| 5-11 | 1.0 | 6.0 | 302 | 72 | 5 | 53 | 3.9 | 0.8 |
| 11-19 | 0.3 | 5.3 | 190 | 90 | 13 | 58 | 3.7 | 0.5 |
| 19-33 | 0.2 | 5.4 | 219 | 114 | 10 | 33 | 2.9 | 0.4 |
| 33-43 | 0.1 | 5.7 | 219 | 167 | 11 | 24 | 0.7 | 0.3 |
| 43-52 | 0.1 | 5.5 | 151 | 193 | 20 | 19 | 0.9 | 0.4 |
| 52-67 | 0.1 | 5.4 | 67 | 151 | 20 | 23 | 0.9 | 0.5 |

*Soil Testing and Plant Analysis Laboratory, Agronomy Department, Va Tech, Blacksburg, VA 24061.

State Series - Supplemental Profile 5

Supplemental pedon of State fine sandy loam, 2 percent slopes, about 600 feet north of Confederate fort on southern part of Loop Road on Jamestown Island, James City County.

Ap--0 to 9 inches; dark brown (10YR 4/3) fine sandy loam; weak fine granular structure; very friable, nonsticky, nonplastic; many coarse, medium, and fine roots; common fine tubular pores; few fine flakes of mica; very strongly acid; clear smooth boundary.

E--9 to 13 inches; dark brown (7.5YR 4/4) fine sandy loam; weak fine granular structure; very friable, nonsticky, nonplastic; common fine, few medium, and coarse roots; common fine and medium tubular pores; few fine flakes of mica; very strongly acid; clear smooth boundary.

Bt1--13 to 18 inches; dark brown (7.5YR 4/4) fine sandy loam; weak and medium granular and weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; common fine, few medium, and coarse roots; common fine and medium tubular pores; common clay bridging between sand grains, few fine flakes of mica; strongly acid; gradual smooth boundary.

Bt2--18 to 42 inches; dark brown (7.5YR 4/4) sandy clay loam; weak medium subangular blocky structure; friable, sticky, plastic; few fine and medium roots; few fine and medium tubular pores; few faint clay films on faces of peds; moderately acid; clear smooth boundary.

Bt3--42 to 49 inches; dark brown (7.5YR 4/4) sandy clay loam; weak fine granular and weak medium subangular blocky structure; friable, sticky, slightly plastic; few fine roots; few fine tubular pores; few fine flakes of mica; few faint clay films on faces of peds; very strongly acid; gradual smooth boundary.

C1--49 to 55 inches; strong brown (7.5YR 5/6) sandy loam; massive; very friable, slightly sticky, nonplastic; few medium roots; few clay bridgings between sand grains; few fine tubular pores; few fine flakes of mica; very strongly acid; gradual smooth boundary.

C2--55 to 74 inches; yellowish brown (10YR 5/6) loamy sand, few fine faint light yellowish brown mottles; single grain; loose; nonsticky, nonplastic; few common roots; few fine flakes of mica; moderately acid.

Table A: Particle-size distribution* for State fine sandy loam

| Depth | Sand | | | | | Total | Silt | Clay |
|--------|----------------------------|----|-----|-----|----|-------|------|------|
| | VC | C | M | F | VF | | | |
| inches | g kg ⁻¹ of soil | | | | | | | |
| 0-9 | 3 | 41 | 227 | 334 | 71 | 676 | 219 | 105 |
| 9-13 | 4 | 33 | 247 | 280 | 57 | 621 | 244 | 135 |
| 13-18 | 3 | 28 | 204 | 315 | 53 | 603 | 242 | 155 |
| 18-42 | 1 | 15 | 246 | 235 | 39 | 536 | 219 | 245 |
| 42-49 | 5 | 31 | 341 | 252 | 42 | 671 | 109 | 220 |
| 49-55 | 7 | 61 | 407 | 263 | 42 | 780 | 70 | 150 |
| 55-74 | 6 | 51 | 395 | 321 | 52 | 825 | 70 | 105 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table B. Chemical properties for State fine sandy loam

| Depth | Exchangeable cations | | | | CEC* | BS** |
|---------------|--------------------------------------|------------------|----------------|----------------|------|----------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| <u>inches</u> | <u>cmol (+) kg⁻¹ soil</u> | | | | | <u>%</u> |
| 63 | 0.54 | 1.15 | 0.04 | 3.11 | 4.84 | 35.74 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.

**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for State fine sandy loam

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|-----|--------------------------------------|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 63 | ND | 5.5 | 0.50 | 2.23 | 77.58 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.

**EBS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{ECEC}} \times 100$.

Table E: Sand mineralogy for State fine sandy loam

| Depth | Quartz | Feldspar | Mica | Opaque Minerals* | Heavy Minerals* | Misc* |
|---------------|----------------------------------|----------|------|------------------|-----------------|-------|
| <u>inches</u> | <u>g kg⁻¹ of sand</u> | | | | | |
| 13-42 | 870 | 100 | 0 | 0 | 30 | 0 |

*Opaque Minerals are ilmenite, magnetite, hematite, etc. Heavy Minerals are translucent zircon, tourmaline, rutile, epidote, hornblende, etc. Misc = rock fragments.

Table F. Chemical properties* for State fine sandy loam

| Depth | OM | pH | Ca ²⁺ | Mg ²⁺ | P | K ⁺ | Zn | Mn |
|---------------|----------|-----|------------------|------------------|----|----------------|-----|------|
| <u>inches</u> | <u>%</u> | | <u>ppm</u> | | | | | |
| 0-9 | 0.5 | 5.3 | 51 | 10 | 5 | 17 | 0.7 | 9.3 |
| 9-13 | 0.2 | 5.0 | 51 | 14 | 5 | 21 | 0.2 | 11.6 |
| 13-18 | 0.2 | 5.4 | 135 | 46 | 9 | 24 | 0.1 | 5.6 |
| 18-42 | 0.2 | 5.6 | 286 | 142 | 4 | 17 | 0.2 | 0.7 |
| 42-49 | 0.1 | 5.3 | 185 | 164 | 7 | 15 | 0.4 | 0.9 |
| 49-55 | 0.1 | 5.4 | 118 | 140 | 9 | 15 | 0.3 | 2.5 |
| 55-74 | 0.1 | 5.6 | 118 | 124 | 10 | 15 | 0.3 | 2.4 |

*Soil Testing and Plant Analysis Laboratory, Agronomy Department, Va Tech, Blacksburg, VA 24061.

State Series - Supplemental Profile 6

Pedon of State loam, 0 to 2 percent slopes, Felkes Army Airfield Area, 300 feet east of Mulberry Island Road, Fort Eustis, Newport News.

Ap--0 to 8 inches; brown (10YR 4/4) loam; weak fine granular structure; friable, slightly sticky, slightly plastic; many fine and medium roots; common fine and medium tubular pores; strongly acid; clear smooth boundary.

Bt1--8 to 23 inches; brown (7.5YR 5/4) loam; moderate medium subangular blocky structure; friable, sticky, plastic; common fine roots; common fine tubular pores; few fine faint clay films on faces of peds; strongly acid; clear smooth boundary.

Bt2--23 to 39 inches; brown (7.5YR 5/4) clay loam; moderate medium subangular blocky structure; friable, sticky, plastic; few fine roots; common fine tubular pores; common fine clay films on faces of peds; moderately acid; clear smooth boundary.

Bt3--39 to 50 inches; strong brown (7.5YR 5/6) sandy clay loam; weak medium subangular blocky structure; friable, sticky, plastic; common fine tubular pores; few fine faint clay films on faces of peds; moderately acid; gradual wavy boundary.

C--50 to 60 inches; strong brown (7.5YR 5/6) sandy clay loam; massive; friable, sticky, slightly plastic; common fine flakes of mica; slightly acid.

Table A: Particle-size distribution* for State loam

| Depth | Sand | | | | | Total | Silt | Clay |
|---------------|----------------------------------|---|---|---|----|-------|------|------|
| | VC | C | M | F | VF | | | |
| <u>inches</u> | <u>g kg⁻¹ of soil</u> | | | | | | | |
| 0-8 | - | - | - | - | - | 526 | 334 | 140 |
| 8-23 | - | - | - | - | - | 420 | 388 | 192 |
| 23-39 | - | - | - | - | - | 359 | 371 | 270 |
| 39-50 | - | - | - | - | - | 593 | 170 | 237 |
| 50-60 | - | - | - | - | - | 774 | 67 | 159 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table B. Chemical properties for State loam

| Depth | Exchangeable cations | | | | CEC* | BS** |
|--------|--------------------------------|------------------|----------------|----------------|-------|-------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| inches | cmol (+) kg ⁻¹ soil | | | | | % |
| 0-8 | 0.81 | 0.34 | 0.10 | 6.93 | 8.18 | 15.28 |
| 8-23 | 1.58 | 0.55 | 0.15 | 4.16 | 6.44 | 35.40 |
| 23-39 | 3.52 | 1.37 | 0.23 | 5.94 | 11.06 | 46.29 |
| 39-50 | 2.72 | 1.56 | 0.23 | 5.54 | 10.05 | 44.88 |
| 50-60 | 1.29 | 1.07 | 0.15 | 3.96 | 6.47 | 38.79 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.

**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for State loam

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|--------|--------------------|------|--------------------------------|-------|-------|
| inches | g kg ⁻¹ | | cmol (+) kg ⁻¹ soil | | % |
| 0-8 | 1.20 | 5.20 | 0.75 | 2.1 | 64.29 |
| 8-23 | 0.0 | 5.40 | 0.65 | 2.93 | 77.82 |
| 23-39 | 0.0 | 5.70 | 0.25 | 5.37 | 95.34 |
| 39-50 | 0.0 | 5.82 | 0.10 | 4.61 | 97.83 |
| 50-60 | 0.0 | 6.10 | 0.05 | 2.56 | 98.05 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.

**EBS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{ECEC}} \times 100$.

Table D: Clay mineralogy for State loam

| Depth | HIV* | Mica | Kaolinite | Quartz | Verm* | Gibbsite | Misc* |
|--------|----------------------------|------|-----------|--------|-------|----------|-------|
| inches | g kg ⁻¹ of clay | | | | | | |
| 8-23 | Tr | 150 | 360 | 370 | 60 | 0 | 60 |

*HIV = hydroxy interlayered vermiculite. Verm = vermiculite. Misc = vermiculite/montmorillonite.

State Series - Supplemental Profile 7

Pedon of State fine sandy loam, 0 to 2 percent slopes, Felkes Airfield Area, troop training area, Fort Eustis, Newport News.

A1--0 to 4 inches; brown (10YR 4/2) fine sandy loam; weak fine granular structure; very friable, slightly sticky, nonplastic; many fine and medium roots; common fine and medium tubular pores; very strongly acid; clear smooth boundary.

BA--4 to 9 inches; strong brown (7.5YR 5/6) loam; weak medium subangular blocky structure; sticky, plastic; many fine roots; common fine and medium tubular pores; very strongly acid; gradual smooth boundary.

Bt1--9 to 31 inches; strong brown (7.5YR 5/6) clay loam; moderate medium subangular blocky structure; friable, sticky, plastic; common fine roots; common fine tubular pores; moderately acid; gradual smooth boundary.

Bt2--31 to 55 inches; brown (7.5YR 5/4) sandy clay loam; weak medium subangular blocky structure; friable, sticky, plastic; common fine roots; common fine tubular pores; common fine flakes of mica; strongly acid; gradual smooth boundary.

BC--55 to 60 inches; strong brown (7.5YR 5/6) sandy clay loam; massive; friable, sticky, plastic; few fine roots; common fine flakes of mica; strongly acid.

Table A: Particle-size distribution* for State fine sandy loam

| Depth | Sand | | | | | Total | Silt | Clay |
|--------|----------------------------|---|---|---|----|-------|------|------|
| | VC | C | M | F | VF | | | |
| inches | g kg ⁻¹ of soil | | | | | | | |
| 0-4 | - | - | - | - | - | 554 | 318 | 128 |
| 4-9 | - | - | - | - | - | 460 | 349 | 191 |
| 9-31 | - | - | - | - | - | 296 | 411 | 293 |
| 31-55 | - | - | - | - | - | 317 | 346 | 337 |
| 55-60 | - | - | - | - | - | 575 | 114 | 311 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table B. Chemical properties for State fine sandy loam

| Depth | Exchangeable cations | | | | CEC* | BS** |
|---------------|--------------------------------------|------------------|----------------|----------------|-------|----------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| <u>inches</u> | <u>cmol (+) kg⁻¹ soil</u> | | | | | <u>%</u> |
| 0-4 | 0.42 | 0.31 | 0.18 | 11.48 | 12.39 | 7.34 |
| 4-9 | 0.43 | 0.50 | 0.14 | 6.93 | 8.00 | 13.38 |
| 9-31 | 3.01 | 0.74 | 0.21 | 6.53 | 10.49 | 37.75 |
| 31-55 | 2.04 | 2.10 | 0.21 | 6.73 | 11.08 | 39.26 |
| 55-60 | 0.45 | 2.00 | 0.22 | 9.70 | 12.37 | 21.58 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.

**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for State fine sandy loam

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|------|--------------------------------------|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 0-4 | 3.19 | 4.60 | 2.85 | 3.76 | 24.20 |
| 4-9 | 0.0 | 4.95 | 2.05 | 3.12 | 34.29 |
| 9-31 | 0.0 | 5.65 | 0.35 | 4.31 | 91.88 |
| 31-55 | 0.0 | 5.40 | 0.75 | 5.1 | 85.29 |
| 55-60 | 0.0 | 5.50 | 2.65 | 5.32 | 50.19 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.

**EBS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{ECEC}} \times 100$.

Table D: Clay mineralogy for State fine sandy loam

| Depth | HIV* | Mica | Kaolinite | Quartz | Verm* | Gibbsite | Misc* |
|---------------|----------------------------------|------|-----------|--------|-------|----------|-------|
| <u>inches</u> | <u>g kg⁻¹ of clay</u> | | | | | | |
| 9-31 | - | 210 | 420 | 70 | 300 | Tr | 0 |

*HIV = hydroxy interlayered vermiculite. Verm = vermiculite. Misc = vermiculite/montmorillonite.

Suffolk Series

Soils of the Suffolk series are very deep and well drained. They formed in loamy fluvial and marine sediments. They are on uplands. Slopes range from 2 to 6 percent.

Typical pedon of Suffolk fine sandy loam, 2 to 6 percent slope, about 4,500 feet northeast of the intersection of VA-635 and VA-600 and 2,000 feet west of VA-600, 3,000 feet south southwest of VA-600, which is also dam of Goddins Pond, New Kent County.

Ap--0 to 7 inches; brown (10YR 4/3) fine sandy loam; weak fine granular structure; very friable, nonsticky, nonplastic; many fine medium and coarse roots; common fine and medium tubular pores; strongly acid; clear smooth boundary.

Bt1--7 to 11 inches; brown (7.5YR 5/4) fine sandy loam; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; common fine medium and coarse roots; common fine and medium tubular pores; few distinct clay films on faces of peds; strongly acid; clear smooth boundary.

Bt2--11 to 22 inches; strong brown (7.5YR 5/6) sandy clay loam; weak fine and medium subangular blocky structure; friable, slightly sticky, slightly plastic; common fine, medium, and coarse roots; common medium tubular pores; common distinct clay films on faces of peds; strongly acid; clear smooth boundary.

Bt3--22 to 36 inches; brown (7.5YR 4/4) fine sandy loam; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; common fine and few medium roots; common fine and medium tubular pores; common faint clay films on faces of peds; strongly acid; gradual smooth boundary.

BC--36 to 45 inches; strong brown (7.5YR 5/6) loamy sand; weak medium subangular blocky structure parting to weak fine and medium granular; very friable, slightly sticky, nonplastic; few fine roots; common fine and medium tubular pores; very few clay bridges on sand grains; strongly acid; gradual wavy boundary.

C--45 to 60 inches; strong brown (7.5YR 5/6) stratified loamy sand and sandy loam; massive; very friable, nonsticky nonplastic; few fine roots; common fine medium and coarse tubular pores; few ironstone concretions; strongly acid.

Table A: Particle-size distribution* for Suffolk fine sandy loam

| Depth | Sand | | | | | | Silt | Clay |
|--------|----------------------------|-----|-----|-----|----|-------|------|------|
| | VC | C | M | F | VF | Total | | |
| inches | g kg ⁻¹ of soil | | | | | | | |
| 0-7 | 5 | 66 | 334 | 265 | 73 | 743 | 198 | 59 |
| 7-11 | 7 | 68 | 286 | 203 | 26 | 590 | 267 | 143 |
| 11-22 | 7 | 48 | 243 | 178 | 45 | 521 | 239 | 240 |
| 22-36 | 6 | 77 | 305 | 213 | 59 | 660 | 156 | 184 |
| 36-45 | 16 | 91 | 388 | 257 | 65 | 817 | 106 | 77 |
| 45-60 | 33 | 115 | 401 | 219 | 53 | 821 | 103 | 76 |
| 57 | 34 | 120 | 312 | 185 | 44 | 695 | 118 | 187 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table B. Chemical properties for Suffolk fine sandy loam

| Depth | Exchangeable cations | | | | CEC* | BS** |
|---------------|--|------------------|----------------|----------------|-------|----------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| <u>inches</u> | <u>cmol (+) kg⁻¹ soil</u> | | | | | <u>%</u> |
| 0-7 | 0.60 | 0.10 | 0.05 | 4.41 | 5.16 | 14.53 |
| 7-11 | 0.98 | 0.30 | 0.07 | 6.09 | 7.44 | 18.15 |
| 11-22 | 2.14 | 0.89 | 0.19 | 8.82 | 12.04 | 26.74 |
| 22-36 | 0.69 | 1.20 | 0.19 | 8.19 | 10.27 | 20.25 |
| 36-45 | 0.13 | 0.58 | 0.14 | 4.20 | 5.05 | 16.83 |
| 45-60 | 0.07 | 0.61 | 0.10 | 3.99 | 4.77 | 16.35 |
| 57 | 0.07 | 1.32 | 0.21 | 9.03 | 10.63 | 15.05 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.

**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for Suffolk fine sandy loam

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|------|--|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 0-7 | ND | 5.20 | 0.35 | 1.1 | 68.18 |
| 7-11 | ND | 5.40 | 0.65 | 2 | 67.50 |
| 11-22 | ND | 5.35 | 0.75 | 3.97 | 81.11 |
| 22-36 | ND | 5.32 | 1.25 | 3.33 | 62.46 |
| 36-45 | ND | 5.13 | 0.65 | 1.5 | 56.67 |
| 45-60 | ND | 5.34 | 0.55 | 1.33 | 58.65 |
| 57 | ND | 5.70 | 1.05 | 2.65 | 60.38 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.

**EBS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{ECEC}} \times 100$.

Table E: Sand mineralogy for Suffolk fine sandy loam

| Depth | Quartz | Feldspar | Mica | Opaque Minerals* | Heavy Minerals* | Misc* |
|---------------|----------------------------------|----------|------|------------------|-----------------|-------|
| <u>inches</u> | <u>g kg⁻¹ of sand</u> | | | | | |
| 7-22 | 950 | 50 | 0 | Tr | 0 | 0 |

*Opaque Minerals are ilmenite, magnetite, hematite, etc. Heavy Minerals are translucent zircon, tourmaline, rutile, epidote, hornblende, etc. Misc = rock fragments.

Table F. Chemical properties* for Suffolk fine sandy loam

| Depth | OM | pH | Ca ²⁺ | Mg ²⁺ | P | K ⁺ | Zn | Mn |
|---------------|----------|-----|------------------|------------------|---|----------------|-----|------|
| <u>inches</u> | <u>%</u> | | <u>ppm</u> | | | | | |
| 0-7 | 2.3 | 5.0 | 60 | 11 | 5 | 20 | 1.2 | 10.0 |
| 7-11 | 0.9 | 4.8 | 36 | 5 | 3 | 9 | 0.3 | 6.5 |
| 11-22 | 0.7 | 4.6 | 36 | 3 | 3 | 9 | 0.2 | 3.6 |
| 22-36 | 0.6 | 4.9 | 72 | 38 | 6 | 17 | 0.3 | 3.1 |
| 36-45 | 0.6 | 4.9 | 96 | 53 | 7 | 15 | 0.2 | 1.9 |
| 45-60 | 0.5 | 5.0 | 36 | 41 | 5 | 9 | 0.2 | 1.3 |

*Soil Testing and Plant Analysis Laboratory, Agronomy Department, Va Tech, Blacksburg, VA 24061.

Suffolk Series - Supplemental Profile 1

Supplemental pedon of Suffolk fine sandy loam, 2 to 6 percent slopes, about 900 feet west of VA-612 at Chisel Run Swamp, and 200 feet southwest of the road leading into Ford Colony subdivision, James City County.

A1--0 to 4 inches; very dark grayish brown (10YR 3/2) fine sandy loam; weak fine granular structure; very friable; many medium and fine roots; many fine and medium pores; extremely acid; clear smooth boundary.

E--4 to 14 inches; yellowish brown (10YR 5/4) fine sandy loam; weak medium granular structure; very friable; common fine and medium and few coarse roots; many fine and medium pores; strongly acid; clear smooth boundary.

Bt1--14 to 19 inches; strong brown (7.5YR 5/6) fine sandy loam; common fine faint light yellowish brown (10YR 6/4) mottles; weak medium subangular blocky structure; friable; common fine and medium roots; common fine and medium pores; few sand grains bridged with clay; strongly acid; clear smooth boundary.

Bt2--19 to 32 inches; strong brown (7.5YR 5/6) sandy clay loam; moderate medium subangular blocky structure; friable; common fine and medium roots; common fine and medium pores; few faint clay films on faces of peds; strongly acid; clear smooth boundary.

Bt3--32 to 40 inches; strong brown (7.5YR 5/6) fine sandy loam; weak fine subangular blocky structure and weak fine granular structure; friable; few fine roots; common fine and medium pores; few sand grains bridged with clay; moderately acid; clear smooth boundary.

C1--40 to 50 inches; yellowish brown (10YR 5/8) loamy fine sand; few fine faint pale brown (10YR 6/3) mottles; massive; very friable; few fine and medium roots; many fine and medium pores; few iron concretions; moderately acid; abrupt wavy boundary.

C2--50 to 64 inches; strong brown (7.5YR 5/6) loamy fine sand; massive; friable; few medium roots; many fine and few medium pores; few very fine dark mineral grains; strongly acid.

Table A: Particle-size distribution* for Suffolk fine sandy loam

| Depth | Sand | | | | | Total | Silt | Clay |
|--------|----------------------------|---|----|-----|-----|-------|------|------|
| | VC | C | M | F | VF | | | |
| inches | g kg ⁻¹ of soil | | | | | | | |
| 0-4 | 1 | 1 | 8 | 529 | 107 | 646 | 309 | 45 |
| 4-14 | 1 | 5 | 60 | 507 | 136 | 709 | 221 | 70 |
| 14-19 | 0 | 5 | 48 | 439 | 123 | 615 | 238 | 147 |
| 19-32 | 0 | 5 | 47 | 397 | 107 | 556 | 228 | 216 |
| 32-40 | 0 | 2 | 50 | 410 | 164 | 626 | 223 | 151 |
| 40-50 | 3 | 5 | 54 | 550 | 180 | 792 | 146 | 62 |
| 50-64 | 0 | 3 | 57 | 475 | 156 | 691 | 154 | 155 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table B. Chemical properties for Suffolk fine sandy loam

| Depth | Exchangeable cations | | | | CEC* | BS** |
|---------------|--------------------------------------|------------------|----------------|----------------|------|----------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| <u>inches</u> | <u>cmol (+) kg⁻¹ soil</u> | | | | | <u>%</u> |
| 0-4 | 0.55 | 0.20 | 0.10 | 7.59 | 8.44 | 10.07 |
| 4-14 | 0.10 | 0.10 | 0.06 | 1.90 | 2.16 | 12.04 |
| 14-19 | 0.39 | 0.35 | 0.13 | 3.94 | 4.81 | 18.09 |
| 19-32 | 1.27 | 1.14 | 0.20 | 4.67 | 7.28 | 35.85 |
| 32-40 | 1.03 | 0.73 | 0.10 | 2.48 | 4.34 | 42.86 |
| 40-50 | 0.41 | 0.37 | 0.04 | 0.88 | 1.70 | 48.24 |
| 50-64 | 0.34 | 1.33 | 0.12 | 2.63 | 4.42 | 40.50 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.

**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for Suffolk fine sandy loam

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|-----|--------------------------------------|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 0-4 | 3.99 | 4.4 | 1.46 | 2.31 | 36.80 |
| 4-14 | 0.32 | 5.4 | 0.55 | 0.81 | 32.10 |
| 14-19 | 0.19 | 5.3 | 0.82 | 1.69 | 51.48 |
| 19-32 | 0.17 | 5.3 | 0.73 | 3.34 | 78.14 |
| 32-40 | 0.04 | 5.8 | 0.27 | 2.13 | 87.32 |
| 40-50 | 0.01 | 5.6 | 0.09 | 0.91 | 90.11 |
| 50-64 | 0.04 | 5.5 | 0.18 | 1.97 | 90.86 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.

**EBS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{ECEC}} \times 100$.

Table E: Sand mineralogy for Suffolk fine sandy loam

| Depth | Quartz | Feldspar | Mica | Opaque Minerals* | Heavy Minerals* | Misc* |
|---------------|----------------------------------|----------|------|------------------|-----------------|-------|
| <u>inches</u> | <u>g kg⁻¹ of sand</u> | | | | | |
| 14-32 | 980 | 10 | 0 | 0 | 10 | 0 |

*Opaque Minerals are ilmenite, magnetite, hematite, etc. Heavy Minerals are translucent zircon, tourmaline, rutile, epidote, hornblende, etc. Misc = rock fragments.

Suffolk Series - Supplemental Profile 2

Pedon of Suffolk fine sandy loam, 2 to 6 percent slopes, Fort Colony Subdivision, 200 feet southwest of road along golf course, James City County.

A1--0 to 2 inches; very dark grayish brown (10YR 3/2) fine sandy loam; weak fine granular structure; very friable; many medium and fine roots; many fine and medium pores; extremely acid; abrupt smooth boundary.

E--2 to 14 inches; yellowish brown (10YR 5/4) fine sandy loam; weak medium granular structure; very friable; common fine and medium roots; many fine and medium tubular pores; strongly acid; clear smooth boundary.

Bt1--14 to 22 inches; yellowish brown (10YR 5/4) sandy clay loam; weak medium subangular blocky structure; friable, sticky, plastic; common fine and medium roots; common fine and medium tubular pores; few faint clay films on faces of peds; strongly acid; clear smooth boundary.

Bt2--22 to 35 inches; dark brown (7.5YR 4/4) sandy clay loam; moderate medium subangular blocky structure; friable, sticky, plastic; common fine roots; common fine tubular pores; few faint clay films on faces of peds; strongly acid; clear smooth boundary.

BC--35 to 41 inches; strong brown (7.5YR 5/6) fine sandy loam; weak fine granular structure; friable, slightly sticky, slightly plastic; few sand grains bridged with clay; moderately acid; clear smooth boundary.

C--41 to 60 inches; yellowish brown (10YR 5/6) loamy sand; single grain, very friable; many fine and medium tubular pores; strongly acid.

Table A: Particle-size distribution* for Suffolk fine sandy loam

| Depth | Sand | | | | | | Silt | Clay |
|---------------|----------------------------------|---|----|-----|-----|-------|------|------|
| | VC | C | M | F | VF | Total | | |
| <u>inches</u> | <u>g kg⁻¹ of soil</u> | | | | | | | |
| 14-34 | 0 | 4 | 70 | 387 | 125 | 586 | 246 | 168 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Suffolk Series - Supplemental Profile 3

Pedon of Suffolk fine sandy loam, 2 to 6 percent slopes, 150 feet south of VA-607 and VA-609, in cultivated field, James City County.

Ap--0 to 10 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak fine granular structure; very friable; many fine roots; many fine and medium pores; strongly acid; abrupt smooth boundary.

E--10 to 16 inches; light yellowish brown (10YR 6/4) loamy fine sand; weak fine granular structure; very friable; common fine roots; many fine tubular pores; strongly acid; clear smooth boundary.

Bt1--16 to 25 inches; yellowish brown (10YR 5/4) sandy loam; moderate medium granular structure; friable, slightly sticky, nonplastic; common fine roots; common fine and medium tubular pores; few sand grains bridged with clay; strongly acid; clear smooth boundary.

Bt2--25 to 32 inches; strong brown (7.5YR 5/6) sandy clay loam; moderate medium subangular blocky structure; friable, sticky, plastic; common fine roots; common fine and medium tubular pores; few faint clay films on faces of peds; strongly acid; clear smooth boundary.

BC--32 to 50 inches; strong brown (7.5YR 5/6) fine sandy loam; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; common fine and medium tubular pores; few sand grains bridged with clay; strongly acid; clear smooth boundary.

C1--50 to 60 inches; yellowish brown (10YR 5/6) loamy fine sand; single grain; loose; many fine and medium tubular pores; strongly acid; gradual wavy boundary.

C2--60 to 75 inches; yellowish brown (10YR 5/6) loamy fine sand; common medium prominent white (10YR 8/2) mottles; single grain; loose; strongly acid.

Table A: Particle-size distribution* for Suffolk fine sandy loam

| Depth | Sand | | | | | Total | Silt | Clay |
|---------------|----------------------------------|---|----|-----|-----|-------|------|------|
| | VC | C | M | F | VF | | | |
| <u>inches</u> | <u>g kg⁻¹ of soil</u> | | | | | | | |
| 16-36 | 0 | 3 | 48 | 435 | 114 | 600 | 167 | 233 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Tetotum Series

Soils of the Tetotum series are very deep and moderately well drained. They formed in loamy fluvial sediments. They are on stream terraces. Slopes range from 0 to 2 percent.

Typical pedon of Tetotum loam, 0 to 2 percent slopes, about 250 feet southeast of farm gate at the end of state maintenance on VA-625, 1,300 feet south of the Pamunkey River and 5,700 feet northeast of junction of VA-623 and VA-625, 1,500 feet south of Pamunkey River, New Kent County.

Ap--0 to 13 inches; dark grayish brown (10YR 4/2) loam; moderate medium granular structure; friable, slightly sticky, slightly plastic; few fine roots; common fine and medium and few large tubular pores; few fine flakes of mica; moderately acid; clear smooth boundary.

BA--13 to 18 inches; mixed light yellowish brown (10YR 6/4) and brown (10YR 5/3) fine sandy loam; weak medium and fine subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; few fine and medium tubular pores; very few clay bridges on sand grains; few fine flakes of mica; moderately acid; clear smooth boundary.

Bt1--18 to 27 inches; yellowish brown (10YR 5/6) clay loam; moderate medium subangular blocky structure; friable, sticky, plastic; few fine roots; few fine tubular pores; many distinct clay films on faces of peds; common fine flakes of mica; strongly acid; gradual smooth boundary.

Bt2--27 to 40 inches; mottled yellowish brown (10YR 5/4) and light brownish gray (10YR 6/2) loam; moderate medium subangular blocky structure; friable, sticky, plastic; few fine roots; few fine tubular pores; many distinct clay films on faces of peds; common fine flakes of mica; very strongly acid; gradual smooth boundary.

Bt3--40 to 52 inches; mottled light gray (10YR 7/1), yellowish brown (10YR 5/6), and strong brown (7.5YR 5/8) sandy clay loam; weak coarse subangular blocky structure; friable, sticky, plastic; few fine roots; few fine tubular pores; few distinct clay films on faces of peds; common fine and medium flakes of mica; very strongly acid; abrupt wavy boundary.

2C--52 to 75 inches; light yellowish brown (10YR 6/4) sand; common medium faint yellowish brown (10YR 5/6) mottles; single grain; loose; common fine medium and large tubular pores; common fine flakes of mica; very strongly acid.

Table A: Particle-size distribution* for Tetotum loam

| Depth | Sand | | | | | Total | Silt | Clay |
|--------|----------------------------|----|-----|-----|-----|-------|------|------|
| | VC | C | M | F | VF | | | |
| inches | g kg ⁻¹ of soil | | | | | | | |
| 0-13 | 3 | 26 | 99 | 170 | 184 | 482 | 366 | 152 |
| 13-18 | 3 | 17 | 88 | 200 | 223 | 531 | 348 | 121 |
| 18-27 | 2 | 9 | 60 | 167 | 182 | 420 | 301 | 279 |
| 27-40 | 1 | 7 | 60 | 175 | 209 | 452 | 283 | 265 |
| 40-52 | 2 | 15 | 109 | 320 | 202 | 648 | 159 | 193 |
| 52-75 | 5 | 99 | 585 | 201 | 41 | 931 | 21 | 48 |
| 68 | 5 | 88 | 699 | 154 | 14 | 960 | 9 | 31 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table B. Chemical properties for Tetotum loam

| Depth | Exchangeable cations | | | | CEC* | BS** |
|---------------|--------------------------------------|------------------|----------------|----------------|-------|----------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| <u>inches</u> | <u>cmol (+) kg⁻¹ soil</u> | | | | | <u>%</u> |
| 0-13 | 2.42 | 0.84 | 0.27 | 6.09 | 9.62 | 36.69 |
| 13-18 | 1.26 | 0.77 | 0.13 | 4.20 | 6.36 | 33.96 |
| 18-27 | 2.55 | 1.45 | 0.11 | 7.98 | 12.09 | 34.00 |
| 27-40 | 2.30 | 1.69 | 0.10 | 9.03 | 13.12 | 31.17 |
| 40-52 | 1.03 | 1.85 | 0.08 | 8.40 | 11.36 | 26.06 |
| 52-75 | 0.13 | 0.29 | 0.02 | 1.47 | 1.91 | 23.04 |
| 68 | 0.03 | 0.18 | 0 | 1.26 | 1.47 | 14.29 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.

**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for Tetotum loam

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|------|--------------------------------------|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 0-13 | ND | 5.82 | 0.05 | 3.58 | 98.60 |
| 13-18 | ND | 5.74 | 0.25 | 2.41 | 89.63 |
| 18-27 | ND | 5.10 | 1.65 | 5.76 | 71.35 |
| 27-40 | ND | 4.94 | 2.35 | 6.44 | 63.51 |
| 40-52 | ND | 4.68 | 2.45 | 5.41 | 54.71 |
| 52-75 | ND | 4.70 | 0.45 | 0.89 | 49.44 |
| 68 | ND | 5.06 | 0.25 | 0.46 | 45.65 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.

**EBS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{ECEC}} \times 100$.

Table E: Sand mineralogy for Tetotum loam

| Depth | Quartz | Feldspar | Mica | Opaque Minerals* | Heavy Minerals* | Misc* |
|---------------|----------------------------------|----------|------|------------------|-----------------|-------|
| <u>inches</u> | <u>g kg⁻¹ of sand</u> | | | | | |
| 18-40 | 580 | 120 | 110 | Tr | 20 | Tr |

*Opaque Minerals are ilmenite, magnetite, hematite, etc. Heavy Minerals are translucent zircon, tourmaline, rutile, epidote, hornblende, etc. Misc = rock fragments.

Tetotum Series - Supplemental Profile 1

Supplemental pedon of Tetotum silt loam, about 1.7 miles east of Jamestown Island parking lot on Loop Road and 500 feet north of Loop Road, James City County.

A1--0 to 5 inches; dark grayish brown (10YR 4/2) silt loam; moderate medium granular structure; friable, slightly sticky, slightly plastic; many fine and medium and coarse roots; common fine tubular pores; few fine flakes of mica; very strongly acid; clear smooth boundary.

E--5 to 10 inches; dark brown (10YR 4/3) loam; moderate medium granular structure and weak fine subangular blocky structure; friable, sticky, plastic; common fine and medium and few coarse roots; common fine tubular pores; few fine flakes of mica; very strongly acid; clear smooth boundary.

Bt1--10 to 14 inches; yellowish brown (10YR 5/4) silt loam; moderate medium subangular blocky structure; friable, sticky, plastic; common fine and medium roots; common fine tubular pores; few faint clay films and silt coatings on faces of peds; common fine flakes of mica; common fine prominent dark brown (10YR 3/3) mineral stains; very strongly acid; clear smooth boundary.

Bt2--14 to 27 inches; yellowish brown (10YR 5/6) silty clay loam; moderate medium subangular blocky structure; friable, sticky, plastic; common fine and medium roots; common fine tubular pores; common distinct clay films and silt coatings on faces of peds; common fine flakes of mica; common fine prominent dark brown (10YR 3/3) mineral stains; strongly acid; gradual smooth boundary.

Bt3--27 to 35 inches; yellowish brown (10YR 5/6) clay loam; common fine distinct light brownish gray (10YR 6/2) mottles; moderate medium and fine subangular blocky structure; friable, sticky, plastic; few fine roots; common fine tubular pores; few faint clay films and silt coatings on faces of peds; common fine flakes of mica; common fine prominent dark brown (10YR 3/3) mineral stains; very strongly acid; gradual smooth boundary.

Bt4--35 to 46 inches; mottled yellowish brown (10YR 5/6), strong brown (7.5YR 5/8), and light brownish gray (10YR 6/2) clay loam; moderate medium and coarse subangular blocky structure; firm, sticky, plastic, few fine roots; few fine tubular pores; few faint clay films on faces of peds; common fine flakes of mica; common fine prominent dark brown (10YR 3/3) mineral stains; very strongly acid; gradual smooth boundary.

Bt5--46 to 51 inches; mottled yellowish brown (10YR 5/6), strong brown (7.5YR 5/8), and gray (5Y 6/1) loam; moderate coarse subangular blocky structure; friable, sticky, plastic; few fine roots; few fine tubular pores; few faint clay films on faces of peds; common fine flakes of mica; common fine prominent dark brown (10YR 3/3) mineral stains; extremely acid; gradual smooth boundary.

C--51 to 65 inches; mottled gray (5Y 6/1), yellowish brown (10YR 5/6), and strong brown (7.5YR 5/8) fine sandy loam; massive; friable, sticky, plastic; few fine roots; few tubular pores; common fine flakes of mica; very strongly acid.

Table A: Particle-size distribution* for Tetotum silt loam

| Depth | Sand | | | | | | Silt | Clay |
|---------------|----------------------------------|----|----|-----|-----|-------|------|------|
| | VC | C | M | F | VF | Total | | |
| <u>inches</u> | <u>g kg⁻¹ of soil</u> | | | | | | | |
| 0-5 | 4 | 36 | 60 | 152 | 93 | 345 | 545 | 110 |
| 5-10 | 5 | 16 | 45 | 135 | 103 | 304 | 496 | 200 |
| 10-14 | 2 | 12 | 35 | 107 | 90 | 246 | 504 | 250 |
| 14-27 | 2 | 7 | 20 | 82 | 76 | 187 | 413 | 400 |
| 27-35 | 2 | 6 | 18 | 81 | 98 | 205 | 425 | 370 |
| 35-46 | 3 | 6 | 20 | 100 | 97 | 226 | 424 | 350 |
| 46-51 | 4 | 8 | 42 | 199 | 136 | 389 | 341 | 270 |
| 51-65 | 5 | 20 | 64 | 203 | 170 | 462 | 338 | 200 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table B. Chemical properties for Tetotum silt loam

| Depth | Exchangeable cations | | | | CEC* | BS** |
|---------------|--------------------------------------|------------------|----------------|----------------|-------|----------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| <u>inches</u> | <u>cmol (+) kg⁻¹ soil</u> | | | | | <u>%</u> |
| 60 | 0.05 | 1.25 | 0.05 | 10.00 | 11.35 | 11.89 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.

**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for Tetotum silt loam

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|------|--------------------------------------|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 60 | ND | 4.36 | 4.05 | 16.9 | 7.99 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.

**EBS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{ECEC}} \times 100$.

Table F. Chemical properties* for Tetotum silt loam

| Depth | OM | pH | Ca ²⁺ | Mg ²⁺ | P | K ⁺ | Zn | Mn |
|---------------|----------|-----|------------------|------------------|----|----------------|-----|-----|
| <u>inches</u> | <u>%</u> | | <u>ppm</u> | | | | | |
| 0-5 | 2.6 | 4.9 | 190 | 68 | 14 | 51 | 16 | 2.5 |
| 5-10 | 1.0 | 4.6 | 34 | 12 | 12 | 8 | 16 | 1.3 |
| 10-14 | 0.3 | 4.9 | 67 | 63 | 10 | 6 | 16 | 1.3 |
| 14-27 | 0.2 | 5.2 | 185 | 167 | 16 | 10 | 4.3 | 1.1 |
| 27-35 | 0.1 | 4.9 | 135 | 189 | 12 | 10 | 3.6 | 1.2 |
| 35-46 | 0.2 | 4.5 | 84 | 199 | 11 | 12 | 0.9 | 1.6 |
| 46-51 | 0.5 | 4.3 | 34 | 135 | 14 | 10 | 0.7 | 1.3 |
| 51-65 | 0.1 | 4.5 | 34 | 120 | 17 | 8 | 3.5 | 1.3 |

*Soil Testing and Plant Analysis Laboratory, Agronomy Department, Va Tech, Blacksburg, VA 24061.

Tetotum Series - Supplemental Profile 2

Pedon of Tetotum loam, 0 to 2 percent slopes, Felkes Airfield area, Clubhouse Pines golf course, Fort Eustis, Newport News.

A1--0 to 3 inches; dark grayish brown (10YR 4/2) loam; moderate medium granular structure; friable, slightly sticky, slightly plastic; many fine and medium roots; common fine tubular pores; moderately acid; clear smooth boundary.

E--3 to 7 inches; light yellowish brown (10YR 6/3) loam; moderate medium granular structure; friable, slightly sticky, plastic; common fine and medium roots; common fine tubular pores; moderately acid; clear smooth boundary.

BA--7 to 11 inches; yellowish brown (10YR 5/4) silt loam; moderate medium subangular blocky structure; friable, sticky, plastic; common fine and medium roots; common fine tubular pores; few faint clay films and silt coatings on faces of peds; very strongly acid; clear smooth boundary.

Bt1--11 to 22 inches; yellowish brown (10YR 5/8) silty clay loam; friable, sticky, plastic; common fine roots; common fine tubular pores; common distinct clay films and silt coatings on faces of peds; common fine flakes of mica; extremely acid; gradual smooth boundary.

Bt2--22 to 35 inches; mottled yellowish brown (10YR 5/6) and brownish gray (10YR 6/2) silty clay loam; moderate medium and fine subangular blocky structure; friable, sticky, plastic; few fine roots; common fine tubular pores; few faint clay films and silt coatings on faces of peds; common fine flakes of mica; extremely acid; gradual smooth boundary.

Bt3--35 to 60 inches; mottled yellowish brown (10YR 5/6), gray (10YR 6/1), and strong brown (7.5YR 5/6) clay loam; moderate coarse subangular blocky structure; firm, sticky, plastic; few fine tubular pores; few faint clay films on faces of peds; extremely acid.

Table A: Particle-size distribution* for Tetotum loam

| Depth | Sand | | | | | Total | Silt | Clay |
|--------|----------------------------|---|---|---|----|-------|------|------|
| | VC | C | M | F | VF | | | |
| inches | g kg ⁻¹ of soil | | | | | | | |
| 0-3 | - | - | - | - | - | 522 | 377 | 101 |
| 3-7 | - | - | - | - | - | 353 | 489 | 158 |
| 7-11 | - | - | - | - | - | 214 | 521 | 265 |
| 11-22 | - | - | - | - | - | 181 | 483 | 336 |
| 22-35 | - | - | - | - | - | 201 | 437 | 362 |
| 35-60 | - | - | - | - | - | 263 | 387 | 350 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table B. Chemical properties for Tetotum loam

| Depth | Exchangeable cations | | | | CEC* | BS** |
|---------------|--------------------------------------|------------------|----------------|----------------|-------|----------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| <u>inches</u> | <u>cmol (+) kg⁻¹ soil</u> | | | | | <u>%</u> |
| 0-3 | 5.85 | 1.30 | 0.28 | 6.76 | 14.19 | 52.36 |
| 3-7 | 2.50 | 0.72 | 0.14 | 3.67 | 7.03 | 47.80 |
| 7-11 | 1.64 | 0.73 | 0.16 | 6.56 | 9.09 | 27.83 |
| 11-22 | 2.23 | 1.21 | 0.22 | 8.88 | 12.54 | 29.19 |
| 22-35 | 2.42 | 2.06 | 0.16 | 10.42 | 15.06 | 30.81 |
| 35-60 | 1.42 | 2.93 | 0.12 | 9.65 | 14.12 | 31.66 |
| 57 | 1.21 | 3.07 | 0.11 | 8.88 | 13.27 | 33.08 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.

**BS = $\frac{Ca^{2+} + Mg^{2+} + K^{+}}{CEC} \times 100$.

Table C. Chemical properties for Tetotum loam

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|------|--------------------------------------|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 0-3 | 5.81 | 5.68 | 0.15 | 7.58 | 98.02 |
| 3-7 | 0 | 5.85 | 0.05 | 3.41 | 98.53 |
| 7-11 | 0 | 4.70 | 1.35 | 3.88 | 62.21 |
| 11-22 | 0 | 4.45 | 2.55 | 6.21 | 58.94 |
| 22-35 | 0 | 4.40 | 2.75 | 7.39 | 62.79 |
| 35-60 | 0 | 4.25 | 3.15 | 7.62 | 58.66 |
| 57 | 0 | 4.10 | 2.65 | 7.04 | 62.36 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.

**EBS = $\frac{Ca^{2+} + Mg^{2+} + K^{+}}{ECEC} \times 100$.

Table D: Clay mineralogy for Tetotum loam

| Depth | HIV* | Mica | Kaolinite | Quartz | Verm* | Gibbsite | Misc* |
|---------------|----------------------------------|------|-----------|--------|-------|----------|-------|
| <u>inches</u> | <u>g kg⁻¹ of clay</u> | | | | | | |
| 11-22 | Tr | 140 | 260 | 40 | 100 | Tr | 460 |

*HIV = hydroxy interlayered vermiculite. Verm = vermiculite. Misc = vermiculite/montmorillonite.

Tomotley Series

Soils of the Tomotley series are very deep and poorly drained. They formed in loamy fluvial sediments. They are on low-lying flats and old stream channels. Slopes range from 0 to 2 percent.

Typical pedon of Tomotley loam, 0 to 2 percent slopes, about 1,000 feet north of road in Virginia Division of Forestry pine seedling nursery and 2,000 feet south of US-60, New Kent County.

A--0 to 7 inches; very dark grayish brown (10YR 3/2) loam, moderate medium granular structure; very friable, slightly sticky, slightly plastic; many fine and medium roots and common coarse roots; common fine and medium tubular pores; few fine flakes of mica; very strongly acid; clear smooth boundary.

E--7 to 17 inches; dark grayish brown (10YR 4/2) fine sandy loam; moderate medium and fine granular structure; very friable, slightly sticky, nonplastic; common fine and medium roots and few coarse roots; common fine medium and few coarse tubular pores; very strongly acid; gradual smooth boundary.

Btg1--17 to 31 inches; dark gray (10YR 4/1) sandy clay loam; common fine distinct yellowish brown (10YR 5/6) and dark yellowish brown (10YR 4/4) mottles; weak coarse subangular blocky structure; friable, sticky, plastic; common fine and few medium roots; common fine and medium tubular pores; many distinct clay films and bridges on sand grains; common distinct clay films on faces of peds; few fine flakes of mica; strongly acid; clear smooth boundary.

Btg2--31 to 40 inches; dark gray (10YR 4/1) sandy clay loam; common medium distinct gray (10YR 6/1) mottles; moderate medium subangular blocky structure; friable, sticky, plastic; common fine and medium roots; common fine and medium tubular pores; many distinct clay films and bridges on sand grains; common distinct clay films on faces of peds; few fine flakes of mica; moderately acid; gradual wavy boundary.

2Cg--40 to 65 inches; gray (10YR 5/1) stratified coarse sand and sand; single grain; loose; few fine flakes of mica; few fine black mineral grains; few fine weathered feldspar crystals; 5 percent rounded gravel; moderately acid.

Table B. Chemical properties for Tomotley loam

| Depth | Exchangeable cations | | | | CEC* | BS** |
|--------|----------------------------------|------------------|----------------|----------------|------|------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| inches | cmol (+) kg ⁻¹ soil | | | | | % |
| 8-28 | 0.14 | 0.08 | 0.03 | 4.20 | 4.45 | 5.62 |
| 59 | 0.09 | 0.13 | 0.06 | 9.40 | 9.68 | 2.89 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.

**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for Tomotley loam

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|------|--|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 8-28 | 0.71 | 3.82 | 5.45 | 5.73 | 4.87 |
| 59 | 0 | 4.03 | 1.65 | 1.9 | 13.16 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.

**EBS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{ECEC}} \times 100$.

Tomotley Series - Supplemental Profile 1

Soils of the Tomotley series are deep and poorly drained. They formed in loamy fluvial sediments. Tomotley soils are on broad flats along stream terraces on the Coastal Plain. Slopes range from 0 to 2 percent.

Supplemental pedon of Tomotley fine sandy loam, about 1,800 feet north of the intersection of VA-622 and VA-1236 (Rebecca Drive) near Seaford, York County.

A1--0 to 4 inches; very dark grayish brown (10YR 3/2) fine sandy loam; weak fine granular structure; friable, slightly sticky, slightly plastic; common fine and medium roots; common fine and medium pores; very strongly acid; abrupt smooth boundary.

E--4 to 8 inches; grayish brown (2.5Y 5/2) fine sandy loam; common fine distinct brownish yellow (10YR 6/6) mottles; weak fine granular structure; friable, slightly sticky, slightly plastic; common fine medium and coarse roots; common fine pores; very strongly acid; clear smooth boundary.

Btg1--8 to 11 inches; grayish brown (2.5Y 5/2) fine sandy loam; common medium prominent yellowish brown (10YR 5/6) mottles and few medium prominent strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; friable, sticky, plastic; common fine and medium roots; common fine and medium pores; few faint clay films on faces of peds; very strongly acid; clear smooth boundary.

Btg2--11 to 24 inches; dark gray (N 4/0) sandy clay loam; many coarse distinct gray (5Y 5/1) and common medium prominent yellowish brown (10YR 5/6) mottles; moderate coarse subangular blocky structure; firm, sticky, plastic; common fine and medium roots; few fine pores; common distinct films on faces of peds; few fine gravel; few fine flakes of mica; very strongly acid; clear smooth boundary.

Btg3--24 to 35 inches; dark gray (N 4/0) sandy clay loam; common medium prominent yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm, sticky, plastic; common fine and medium roots; few fine pores; common distinct clay films on faces of peds; few fine gravel; few fine flakes of mica; strongly acid; gradual smooth boundary.

Btg4--35 to 50 inches; mottled light olive gray (5Y 6/2), dark gray (5Y 4/1), and gray (5Y 5/1) fine sandy loam; many coarse prominent yellowish brown (10YR 5/6) mottles and many medium prominent strong brown (7.5YR 5/6) mottles; weak coarse subangular blocky structure; friable, sticky, plastic; few fine roots; few fine and medium pores; common faint clay films on faces of peds; common fine flakes of mica; strongly acid; gradual smooth boundary.

Cg--50 to 68 inches; light gray (5Y 7/1) and gray (5Y 6/1) fine sandy loam; common coarse prominent yellowish brown (10YR 5/6) mottles; massive; friable, sticky, plastic; few fine roots; few fine pores; common fine flakes of mica; moderately acid.

Table A: Particle-size distribution* for Tomotley fine sandy loam

| Depth | Sand | | | | | Total | Silt | Clay |
|--------|----------------------------|----|----|-----|-----|-------|------|------|
| | VC | C | M | F | VF | | | |
| inches | g kg ⁻¹ of soil | | | | | | | |
| 0-4 | 5 | 25 | 28 | 510 | 122 | 690 | 230 | 80 |
| 4-8 | 10 | 22 | 19 | 467 | 136 | 654 | 226 | 120 |
| 8-11 | 7 | 21 | 18 | 431 | 113 | 590 | 225 | 185 |
| 11-24 | 8 | 20 | 17 | 380 | 124 | 549 | 231 | 220 |
| 24-35 | 7 | 23 | 21 | 382 | 103 | 536 | 224 | 240 |
| 35-50 | 2 | 8 | 7 | 470 | 113 | 600 | 210 | 190 |
| 50-70 | 1 | 5 | 6 | 479 | 126 | 617 | 223 | 160 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Tomotley Series - Supplemental Profile 2

Supplemental pedon of Tomotley fine sandy loam, 0 to 2 percent slopes, about 0.6 mile east of the intersection of VA-173 and VA-718 and 100 yards south of VA-718 near Seaford, York County.

Ap--0 to 8 inches; very dark grayish brown (10YR 3/2) fine sandy loam; weak fine granular structure; friable, slightly sticky, slightly plastic; many fine and medium and common coarse roots; few fine pores; very strongly acid; abrupt smooth boundary.

E--8 to 12 inches; dark gray (5Y 4/1) fine sandy loam; few common distinct light olive brown (2.5Y 5/4) and few fine prominent dark reddish brown (5YR 3/4) mottles; weak fine granular structure; friable, slightly sticky, slightly plastic; common fine and medium and few coarse roots; few fine pores; extremely acid; clear smooth boundary.

Btg1--12 to 18 inches; dark gray (5Y 4/1) fine sandy loam; few fine prominent dark brown (7.5YR 4/4) mottles; weak medium subangular blocky parting to weak fine granular structure; friable, slightly sticky and slightly plastic; common fine and medium roots; common fine pores; few faint clay films on faces of peds; extremely acid; clear smooth boundary.

Btg2--18 to 29 inches; dark gray (5Y 4/1) sandy clay loam; common medium dominant light olive brown (2.5Y 5/4) and few prominent strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; friable, sticky, plastic; common fine and medium roots; few fine pores; few faint clay films on faces of peds; moderately acid; clear smooth boundary.

Btg3--29 to 34 inches; dark gray (5Y 4/1) sandy clay loam; common medium distinct light olive brown (2.5Y 5/4) and few fine prominent yellowish brown (10YR 5/6) mottles; weak fine subangular blocky structure; friable, sticky, slightly plastic; few fine roots; few fine pores; few faint clay films on faces of peds; mildly alkaline; gradual wavy boundary.

Cg--34 to 60 inches; vertically streaked gray (5Y 6/1 and 5Y 5/1) and yellowish brown (10YR 5/6) coarse sandy loam with pockets of sandy clay loam; common medium prominent yellowish brown (10YR 5/8) mottles; massive; friable, sticky, plastic; few fine roots in the gray streaks; few fine pores; alkaline.

Table A: Particle-size distribution* for Tomotley fine sandy loam

| Depth | Sand | | | | | Total | Silt | Clay |
|--------|----------------------------|----|----|-----|-----|-------|------|------|
| | VC | C | M | F | VF | | | |
| inches | g kg ⁻¹ of soil | | | | | | | |
| 0-8 | 8 | 26 | 42 | 483 | 115 | 674 | 249 | 77 |
| 8-12 | 8 | 24 | 41 | 489 | 121 | 683 | 202 | 115 |
| 12-18 | 8 | 22 | 37 | 445 | 145 | 657 | 186 | 157 |
| 18-29 | 8 | 21 | 33 | 400 | 127 | 589 | 201 | 210 |
| 29-34 | 8 | 22 | 35 | 418 | 143 | 626 | 189 | 185 |
| 34-60 | 15 | 44 | 46 | 496 | 131 | 732 | 133 | 135 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Uchee Series

Soils of the Uchee series are very deep and well drained. They formed in loamy fluvial and marine sediments. They are on upland ridges and side slopes. Slopes range from 2 to 6 percent.

Typical pedon of Uchee loamy fine sand, 2 to 6 percent slopes, about 4,400 feet south of junction of VA-(273) and VA-634, or 2,900 feet north of junction of VA-633 and VA-(273), and 100 feet east of VA-(273), New Kent County.

Ap--0 to 11 inches; brown (10YR 5/3) loamy fine sand; weak fine granular structure; very friable, nonsticky, nonplastic; few fine and common roots; common fine and medium and few large tubular pores; strongly acid; abrupt smooth boundary.

E--11 to 25 inches; pale brown (10YR 6/3) loamy fine sand; single grain; very friable, non-sticky, nonplastic few fine roots; common fine and medium and few large tubular pores; few discontinuous yellowish brown (10YR 5/6) loamy fine sand lamellae 1/8 inch thick; strongly acid; clear smooth boundary.

Bt1--25 to 35 inches yellowish brown (10YR 5/6) sandy clay loam; weak medium subangular blocky structure; friable, sticky, plastic; few fine and medium roots; common fine and medium and few large tubular pores; many distinct clay films and bridges on sand grains; few faint clay films on faces of peds; very strongly acid; clear smooth boundary.

Bt2--35 to 50 inches; yellowish brown (10YR 5/6) sandy clay loam; few medium faint brownish yellow (10YR 6/8) mottles, common medium distinct gray (10YR 6/1) mottles, and common medium distinct strong brown (7.5YR 5/6) mottles; weak coarse angular blocky structure; compact in place, friable, sticky, plastic; few fine roots; few fine and medium tubular pores; common distinct clay films on faces of peds; very strongly acid; clear wavy boundary.

C--50 to 63 inches; mottled gray (10YR 6/1), light yellowish brown (10YR 6/4), and brownish yellow (10YR 6/8) fine sandy loam; massive, compact in place; firm, slightly sticky, slightly plastic; few fine tubular pores; very strongly acid.

Table A: Particle-size distribution* for Uchee loamy fine sand

| Depth | Sand | | | | | Total | Silt | Clay |
|--------|----------------------------|----|-----|-----|-----|-------|------|------|
| | VC | C | M | F | VF | | | |
| inches | g kg ⁻¹ of soil | | | | | | | |
| 0-11 | 0 | 13 | 71 | 563 | 213 | 860 | 100 | 40 |
| 11-25 | 1 | 11 | 106 | 554 | 180 | 852 | 97 | 51 |
| 25-35 | 0 | 18 | 123 | 445 | 93 | 679 | 17 | 304 |
| 35-50 | 0 | 7 | 45 | 364 | 327 | 743 | 32 | 225 |
| 50-63 | 0 | 4 | 46 | 451 | 295 | 796 | 80 | 124 |
| 63-95 | 0 | 7 | 87 | 631 | 159 | 884 | 20 | 96 |
| 95-112 | 0 | 15 | 135 | 548 | 151 | 849 | 21 | 130 |
| 72 | 0 | 6 | 81 | 652 | 154 | 893 | 33 | 74 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table B. Chemical properties for Uchee loamy fine sand

| Depth | Exchangeable cations | | | | CEC* | BS** |
|---------------|--------------------------------------|------------------|----------------|----------------|-------|----------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| <u>inches</u> | <u>cmol (+) kg⁻¹ soil</u> | | | | | <u>%</u> |
| 0-11 | 0.93 | 0.11 | 0.17 | 3.99 | 5.20 | 23.27 |
| 11-25 | 0.43 | 0.07 | 0.10 | 2.52 | 3.12 | 19.23 |
| 25-35 | 2.60 | 0.58 | 0.09 | 9.24 | 12.51 | 26.14 |
| 35-50 | 1.30 | 0.24 | 0.04 | 7.77 | 9.35 | 16.90 |
| 50-63 | 0.52 | 0.15 | 0.02 | 5.67 | 6.36 | 10.85 |
| 63-95 | 0.32 | 0.13 | 0.01 | 3.57 | 4.03 | 11.41 |
| 95-112 | 0.34 | 0.45 | 0.02 | 4.62 | 5.43 | 14.92 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for Uchee loamy fine sand

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|------|--------------------------------------|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 0-11 | ND | 5.28 | 0.05 | 1.26 | 96.031 |
| 11-25 | ND | 5.30 | 0.05 | 0.65 | 92.31 |
| 25-35 | ND | 4.90 | 1.45 | 4.72 | 69.28 |
| 35-50 | ND | 4.93 | 2.35 | 3.93 | 40.20 |
| 50-63 | ND | 4.96 | 1.55 | 2.24 | 30.80 |
| 63-95 | ND | 5.00 | 1.25 | 1.71 | 26.90 |
| 95-112 | ND | 4.80 | 1.45 | 2.26 | 35.84 |
| 72 | ND | 4.81 | 1.05 | 1.45 | 27.59 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.**EBS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{ECEC}} \times 100$.

Table E: Sand mineralogy for Uchee loamy fine sand

| Depth | Quartz | Feldspar | Mica | Opaque Minerals* | Heavy Minerals* | Misc* |
|---------------|----------------------------------|----------|------|------------------|-----------------|-------|
| <u>inches</u> | <u>g kg⁻¹ of sand</u> | | | | | |
| 25-50 | 980 | 10 | Tr | 10 | Tr | Tr |

*Opaque Minerals are ilmenite, magnetite, hematite, etc. Heavy Minerals are translucent zircon, tourmaline, rutile, epidote, hornblende, etc. Misc = rock fragments.

Uchee Series - Supplemental Profile 1

Pedon of Uchee loamy fine sand, 2 to 6 percent slopes, about 1.3 miles north of Croaker Road, 1,000 feet south of York River State Park and 1,000 feet west of Taskinas Creek, James City County.

A1--0 to 5 inches; dark grayish brown (10YR 4/2) loamy fine sand; weak fine granular structure; very friable, nonsticky, nonplastic; many fine medium and coarse roots; many fine pores; very strongly acid; clear smooth boundary.

E1--5 to 11 inches; light yellowish brown (10YR 6/4) loamy fine sand; weak fine granular structure; very friable, nonsticky, nonplastic; many fine medium and coarse roots; many fine and common medium pores; very strongly acid; clear smooth boundary.

E2--11 to 24 inches; very pale brown (10YR 7/4) loamy fine sand; weak fine granular structure; very friable, nonsticky, nonplastic; few fine roots; many fine pores; strongly acid; abrupt smooth boundary.

Bt1--24 to 29 inches; strong brown (7.5YR 5/6) sandy clay loam; common medium faint light yellowish brown (10YR 6/4) mottles; moderate fine and medium subangular blocky structure; friable, slightly sticky, slightly plastic; few fine and common medium roots; common fine and medium pores; few faint clay films on faces of peds; strongly acid; clear smooth boundary.

Bt2--29 to 36 inches; strong brown (7.5YR 5/6) sandy clay loam; few fine prominent yellowish red (5YR 5/6) mottles and common medium distinct light yellowish brown (10YR 6/4) mottles; moderate medium subangular blocky structure; friable, sticky, plastic; few fine and medium roots; many fine pores; common distinct clay films on faces of peds; very strongly acid; gradual smooth boundary.

Bt3--36 to 50 inches; strong brown (7.5YR 5/6) sandy clay loam; many fine prominent yellowish red (5YR 5/6) mottles, common fine distinct brownish yellow (10YR 6/6) mottles; weak medium subangular blocky structure; friable, sticky, plastic; few fine and medium roots; many fine and medium pores; common distinct clay films on faces of peds; very strongly acid; gradual smooth boundary.

Bt4--50 to 56 inches; strong brown (7.5YR 5/6) sandy clay; common fine distinct light yellowish brown (10YR 6/4) and light gray (10YR 7/1) mottles, and few fine prominent yellowish red (5YR 5/6) mottles; weak coarse subangular blocky structure; friable, sticky, plastic; few fine roots; common fine pores; strongly acid; gradual wavy boundary.

C--56 to 65 inches; variegated yellowish red (5YR 5/6), yellowish brown (10YR 5/6), very pale brown (10YR 7/4), light gray (10YR 7/1), and strong brown (7.5YR 5/6) strata of sandy loam and sandy clay loam; massive; friable, sticky, plastic; few fine roots; common fine pores; very strongly acid.

Table A: Particle-size distribution* for Uchee loamy fine sand

| Depth | Sand | | | | | | Silt | Clay |
|---------------|----------------------------------|---|----|-----|-----|-------|------|------|
| | VC | C | M | F | VF | Total | | |
| <u>inches</u> | <u>g kg⁻¹ of soil</u> | | | | | | | |
| 5-11 | 0 | 6 | 76 | 548 | 145 | 775 | 167 | 58 |
| 11-24 | 1 | 6 | 78 | 557 | 142 | 784 | 166 | 50 |
| 24-29 | 0 | 1 | 14 | 497 | 104 | 616 | 132 | 252 |
| 29-36 | 2 | 7 | 63 | 423 | 52 | 547 | 125 | 328 |
| 36-50 | 1 | 9 | 75 | 439 | 88 | 612 | 95 | 293 |
| 50-56 | 0 | 2 | 26 | 462 | 8 | 498 | 202 | 300 |
| 56-65 | 0 | 4 | 46 | 425 | 123 | 598 | 125 | 277 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table E: Sand mineralogy for Uchee loamy fine sand

| Depth | Quartz | Feldspar | Mica | Opaque Minerals* | Heavy Minerals* | Misc* |
|---------------|----------------------------------|----------|------|------------------|-----------------|-------|
| <u>inches</u> | <u>g kg⁻¹ of sand</u> | | | | | |
| 24-29 | 940 | 10 | 20 | 0 | 20 | 10 |

*Opaque Minerals are ilmenite, magnetite, hematite, etc. Heavy Minerals are translucent zircon, tourmaline, rutile, epidote, hornblende, etc. Misc = rock fragments.

Yemassee Series

Soils of the Yemassee series are deep and somewhat poorly drained. They formed in loamy fluvial and marine sediments. Yemassee soils are on low-lying uplands in the Coastal Plain. Slopes range from 0 to 2 percent.

Typical pedon of Yemassee fine sandy loam, about 1,600 feet northwest of junction of VA-636 with the Chessie and Ohio Railroad along powerline and 250 feet north of powerline, York County.

A1--0 to 4 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak fine and medium granular structure; very friable, slightly sticky, slightly plastic; many fine medium and coarse roots; common fine tubular pores; extremely acid; clear smooth boundary.

E--4 to 11 inches; light yellowish brown (2.5Y 6/4) fine sandy loam; moderate fine granular structure; friable, slightly sticky, slightly plastic; common fine medium and coarse roots; common fine and very tubular pores; few krotovina up to 1/4 inch in diameter; extremely acid; clear smooth boundary.

Bt1--11 to 15 inches; light yellowish brown (2.5Y 6/4) sandy clay loam; common medium distinct yellowish brown (10YR 5/4) mottles; weak medium and fine subangular blocky structure; friable, sticky, plastic; common fine medium and coarse roots; common fine and very fine tubular pores; few faint clay films on faces of peds; few krotovina up to 1/4 inch in diameter; extremely acid; clear smooth boundary.

Bt2--15 to 20 inches; light olive brown (2.5Y 5/4) sandy clay loam; common fine prominent dark brown (7.5YR 4/4) mottles and few fine distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable, sticky, plastic; common fine and medium roots; few fine tubular pores; common distinct clay films on faces of peds; few krotovina up to 1/4 inch in diameter; very strongly acid; gradual smooth boundary.

Bt3--20 to 30 inches; mottled light gray (10YR 6/1), yellowish brown (10YR 5/6), and strong brown (7.5YR 5/6) sandy clay loam; weak medium subangular blocky structure; friable, sticky, plastic; few fine and medium roots; few very fine tubular pores; few faint clay films on faces of peds; mottling pattern is vertically oriented but not continuous or streaked; the yellowish brown and strong brown portion is firmer in place than the gray portion; very strongly acid; gradual smooth boundary.

Btg--30 to 51 inches; gray (5Y 6/1) sandy clay loam; many coarse prominent yellowish brown (10YR 5/6) mottles and common fine prominent strong brown (7.5YR 5/6) mottles; weak coarse subangular blocky structure; friable, sticky, plastic; few fine and medium roots; few very fine tubular pores; few faint discontinuous clay films on faces of peds; very strongly acid; gradual smooth boundary.

Cg--51 to 63 inches; gray (5Y 6/1) fine sandy loam; common medium prominent yellowish brown (10YR 5/8) mottles; massive; friable, sticky, plastic; few fine flakes of mica; very strongly acid.

Table A: Particle-size distribution* for Yemassee fine sandy loam

| Depth | Sand | | | | | Total | Silt | Clay |
|---------------|----------------------------------|----|----|-----|----|-------|------|------|
| | VC | C | M | F | VF | | | |
| <u>inches</u> | <u>g kg⁻¹ of soil</u> | | | | | | | |
| 0-4 | 1 | 34 | 66 | 404 | 78 | 583 | 327 | 90 |
| 4-11 | 1 | 6 | 47 | 402 | 72 | 528 | 312 | 160 |
| 11-15 | 1 | 5 | 40 | 369 | 76 | 491 | 289 | 220 |
| 15-20 | 1 | 6 | 38 | 343 | 59 | 447 | 303 | 250 |
| 20-30 | 2 | 7 | 46 | 396 | 68 | 519 | 261 | 220 |
| 30-51 | 2 | 6 | 47 | 393 | 67 | 515 | 205 | 280 |
| 51-63 | 1 | 8 | 56 | 432 | 76 | 573 | 237 | 190 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table B. Chemical properties for Yemassee fine sandy loam

| Depth | Exchangeable cations | | | | CEC* | BS** |
|---------------|--------------------------------------|------------------|----------------|----------------|------|----------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| <u>inches</u> | <u>cmol (+) kg⁻¹ soil</u> | | | | | <u>%</u> |
| 61 | 0 | 0 | 0.02 | 7.80 | 7.82 | 0.26 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.

**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for Yemassee fine sandy loam

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|------|------------------|--------------------------------------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | | <u>cmol (+) kg⁻¹ soil</u> | <u>%</u> |
| 61 | ND | 4.44 | 3.75 | 3.77 | 0.53 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.

**EBS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{ECEC}} \times 100$.

Table F. Chemical properties* for Yemassee fine sandy loam

| Depth | OM | pH | Ca ²⁺ | Mg ²⁺ | P | K ⁺ | Zn | Mn |
|---------------|-----|-----|------------------|------------------|----|----------------|-----|-----|
| <u>inches</u> | % | | <u>ppm</u> | | | | | |
| 0-4 | 4.0 | 4.0 | 34 | 10 | 10 | 17 | 1.0 | 0.4 |
| 4-11 | 0.5 | 4.4 | 34 | 4 | 11 | 12 | 0.6 | 0.3 |
| 11-15 | 0.2 | 4.3 | 17 | 6 | 10 | 19 | 0.6 | 0.4 |
| 15-20 | 0.2 | 4.5 | 17 | 12 | 11 | 11.5 | 0.9 | 0.4 |
| 20-30 | 0.1 | 4.6 | 34 | 16 | 14 | 9.5 | 0.8 | 1.0 |
| 30-51 | 0.1 | 4.7 | 34 | 14 | 14 | 9.5 | 0.4 | 1.4 |
| 51-63 | 0.1 | 4.6 | 34 | 10 | 12 | 6 | 0.3 | 0.1 |

*Soil Testing and Plant Analysis Laboratory, Agronomy Department, Va Tech, Blacksburg, VA 24061.

Transect of Emporia Complex map unit

Emporia Complex 1

Emporia complex 1, 25 to 60 percent slopes, transect side slope, York River State Park, near Christenson's Corner, James City County.

A1--0 to 4 inches; brown (10YR 5/7) fine sandy loam; weak fine granular structure; very friable, nonsticky, nonplastic; many fine and medium roots; few coarse, common medium and fine tubular pores; extremely acid; abrupt smooth boundary.

E--4 to 10 inches; yellowish brown (10YR 5/6) fine sandy loam; weak fine granular structure; friable, nonsticky, nonplastic; many fine and medium roots; common fine and medium tubular pores; extremely acid; clear smooth boundary.

Bt1--10 to 32 inches; yellowish brown (10YR 5/6) sandy clay loam; moderate medium subangular blocky structure; friable, sticky, plastic; common fine roots; common fine and medium tubular pores; extremely acid; clear smooth boundary.

Bt2--32 to 37 inches; yellowish brown (10YR 5/8) fine sandy loam; weak fine subangular blocky structure; friable, slightly sticky, nonplastic; few fine roots; common fine and medium tubular pores; extremely acid; abrupt wavy boundary.

2C--37 to 70 inches; olive (5Y 5/3) shelly sandy loam; massive; friable, nonsticky, nonplastic; 50 percent clam and oyster shells; moderately alkaline.

Table A: Particle-size distribution* for Emporia complex 1

| Depth | Sand | | | | | Total | Silt | Clay |
|---------------|----------------------------------|---|---|---|----|-------|------|------|
| | VC | C | M | F | VF | | | |
| <u>inches</u> | <u>g kg⁻¹ of soil</u> | | | | | | | |
| 10-30 | - | - | - | - | - | 533 | 127 | 340 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table B. Chemical properties for Emporia complex 1

| Depth | Exchangeable cations | | | | CEC* | BS** |
|---------------|--|------------------|----------------|----------------|-------|----------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| <u>inches</u> | <u>cmol (+) kg⁻¹ soil</u> | | | | | <u>%</u> |
| 60 | 17.70 | 0.09 | 0.12 | 1.0 | 18.91 | 94.7 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.

**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for Emporia complex 1

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|------|--|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 60 | - | 7.82 | 0.00 | 17.91 | 100 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.

**EBS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{ECEC}} \times 100$.

Table F. Chemical properties* for Emporia complex 1

| Depth | OM | pH | Ca ²⁺ | Mg ²⁺ | P | K ⁺ | Zn | Mn |
|---------------|----------|-----|------------------|------------------|----|----------------|-----|-----|
| <u>inches</u> | <u>%</u> | | <u>ppm</u> | | | | | |
| 0-10 | 1.2 | 4.4 | 66 | 4 | 2 | 6 | 0.9 | 0.1 |
| 10-32 | 0.7 | 4.1 | 54 | 36 | 3 | 32 | 1.2 | 0.6 |
| 32-37 | 0.6 | 4.6 | 216 | 35 | 22 | 27 | 0.5 | 1.5 |
| 37-70 | 0.6 | 8.1 | 600 | 7 | 2 | 14 | 0.2 | 0.5 |

*Soil Testing and Plant Analysis Laboratory, Agronomy Department, Va Tech, Blacksburg, VA 24061.

Emporia Complex 2

Emporia complex 2, 25 feet from site 1, near Christenson's Corner, James City County.

A1--0 to 3 inches; very dark grayish brown (10YR 3/2) fine sandy loam; weak fine granular structure; very friable, nonsticky, nonplastic; many fine and medium roots; few coarse, common fine and medium tubular pores; slightly acid; clear smooth boundary.

E--3 to 10 inches; yellowish brown (10YR 5/6) fine sandy loam; weak fine granular structure; friable, nonsticky, nonplastic; many fine and medium roots; many fine and medium tubular pores; slightly acid; clear smooth boundary.

Bt1--10 to 16 inches; yellowish brown (10YR 5/6) fine sandy loam; weak medium subangular blocky structure; friable, slightly sticky, nonplastic; common fine roots; common medium and many fine tubular pores; few faint clay films on faces of peds; very strongly acid; gradual smooth boundary.

Bt2--16 to 33 inches; yellowish brown (10YR 5/6) sandy clay loam; moderate medium subangular blocky structure; friable, slightly sticky, plastic; common fine roots; common fine and medium tubular pores; few faint clay films on faces of peds; very strongly acid; gradual smooth boundary.

Bt3--33 to 41 inches; yellowish brown (10YR 5/6) fine sandy loam; weak medium subangular blocky structure; friable, slightly sticky, nonplastic; few fine roots; common fine tubular pores; few faint clay films on faces of peds; very strongly acid; gradual smooth boundary.

C--41 to 55 inches; yellowish brown (10YR 5/6) fine sandy loam; very friable, slightly sticky, nonplastic; few fine roots; common fine tubular pores; very strongly acid; gradual smooth boundary.

2C--55 to 72 inches; light yellowish brown (2.5YR 6/4) sandy loam; 60 percent fossil shells; massive; friable, nonsticky, nonplastic; moderately alkaline.

Table A: Particle-size distribution* for Emporia complex 2

| Depth | Sand | | | | | Total | Silt | Clay |
|---------------|----------------------------------|---|---|---|----|-------|------|------|
| | VC | C | M | F | VF | | | |
| <u>inches</u> | <u>g kg⁻¹ of soil</u> | | | | | | | |
| 10-30 | - | - | - | - | - | 757 | 38 | 205 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table B. Chemical properties for Emporia complex 2

| Depth | Exchangeable cations | | | | CEC* | BS** |
|---------------|--------------------------------------|------------------|----------------|----------------|-------|----------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| <u>inches</u> | <u>cmol (+) kg⁻¹ soil</u> | | | | | <u>%</u> |
| 60 | 12.20 | 0.11 | 0.06 | 1.60 | 13.97 | 88.55 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.

**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for Emporia complex 2

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|------|--------------------------------------|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 60 | - | 7.90 | 0.00 | 12.37 | 100 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.

**EBS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{ECEC}} \times 100$.

Table F. Chemical properties* for Emporia complex 2

| Depth | OM | pH | Ca ²⁺ | Mg ²⁺ | P | K ⁺ | Zn | Mn |
|---------------|----------|-----|------------------|------------------|----|----------------|-----|-----|
| <u>inches</u> | <u>%</u> | | <u>ppm</u> | | | | | |
| 0-10 | 1.6 | 6.1 | 558 | 4 | 5 | 9 | 0.5 | 0.6 |
| 10-41 | 0.6 | 4.6 | 150 | 8 | 12 | 10 | 0.3 | 0.1 |
| 41-55 | 0.6 | 4.9 | 156 | 20 | 27 | 9 | 0.4 | 1.5 |
| 55-72 | 0.5 | 8.1 | 600 | 10 | 16 | 8 | 0.2 | 1.0 |

*Soil Testing and Plant Analysis Laboratory, Agronomy Department, Va Tech, Blacksburg, VA 24061.

Emporia Complex 3

Emporia complex 3, 25 feet from site 2, near Christenson's Corner, James City County.

A1--0 to 3 inches; brown (10YR 4/3) fine sandy loam; weak fine granular structure; non-sticky, nonplastic; many fine and medium roots; common medium and few coarse tubular pores; strongly acid; abrupt smooth boundary.

E--3 to 6 inches; light yellowish brown (10YR 6/4) fine sandy loam; very friable, nonsticky, nonplastic; many fine and medium roots; common medium and fine tubular pores; strongly acid; clear smooth boundary.

Bt1--6 to 22 inches; yellowish brown (10YR 5/6) sandy clay; moderate medium subangular blocky structure; firm, sticky, plastic; common fine roots; common fine tubular pores; common medium distinct clay films on faces of peds; very strongly acid; clear smooth boundary.

Bt2--22 to 34 inches; yellowish brown (10YR 5/8) sandy clay loam; moderate medium subangular blocky structure; friable, sticky, plastic; common fine roots; few fine distinct clay films on faces of peds; very strongly acid; clear smooth boundary.

Bt3--34 to 42 inches; yellowish brown (10YR 5/6) sandy clay loam; weak medium subangular blocky structure; friable, sticky, plastic; common fine roots; few fine faint clay films on faces of peds; very strongly acid; abrupt wavy boundary.

C--42 to 72 inches; yellowish brown (10YR 5/8) fine sandy loam; massive; very friable, slightly sticky, nonplastic; very strongly acid.

Table A: Particle-size distribution* for Emporia complex 3

| Depth | Sand | | | | | Total | Silt | Clay |
|---------------|----------------------------------|---|---|---|----|-------|------|------|
| | VC | C | M | F | VF | | | |
| <u>inches</u> | <u>g kg⁻¹ of soil</u> | | | | | | | |
| 6-26 | - | - | - | - | - | 468 | 112 | 420 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Table B. Chemical properties for Emporia complex 3

| Depth | Exchangeable cations | | | | CEC* | BS** |
|---------------|--------------------------------------|------------------|----------------|----------------|------|----------|
| | Ca ²⁺ | Mg ²⁺ | K ⁺ | H ⁺ | | |
| <u>inches</u> | <u>cmol (+) kg⁻¹ soil</u> | | | | | <u>%</u> |
| 56 | 0.01 | 0.16 | 0.07 | 4.20 | 4.44 | 5.41 |

*CEC = Ca²⁺ + Mg²⁺ + K⁺ + H⁺.

**BS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100$.

Table C. Chemical properties for Emporia complex 3

| Depth | Organic matter | pH | Al ³⁺ | ECEC* | EBS** |
|---------------|--------------------------|------|--|-------|----------|
| <u>inches</u> | <u>g kg⁻¹</u> | | <u>cmol (+) kg⁻¹ soil</u> | | <u>%</u> |
| 56 | - | 4.65 | 3.05 | 3.29 | 7.29 |

*ECEC = Ca²⁺ + Mg²⁺ + K⁺ + Al³⁺.

**EBS = $\frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{ECEC}} \times 100$.

Table F. Chemical properties* for Emporia complex 3

| Depth | OM | pH | Ca ²⁺ | Mg ²⁺ | P | K ⁺ | Zn | Mn |
|---------------|----------|-----|------------------|------------------|---|----------------|-----|-----|
| <u>inches</u> | <u>%</u> | | <u>ppm</u> | | | | | |
| 0-6 | 2.3 | 5.1 | 186 | 6 | 4 | 9 | 1.1 | 0.9 |
| 6-42 | 0.7 | 4.5 | 78 | 31 | 7 | 19 | 0.6 | 0.1 |
| 42-72 | 0.5 | 4.8 | 24 | 12 | 4 | 6 | 0.4 | 0.1 |

*Soil Testing and Plant Analysis Laboratory, Agronomy Department, Va Tech, Blacksburg, VA 24061.

Emporia Complex 4

Emporia complex 4, 25 to 60 percent slopes, transect 1, York River State Park, 275 yards north of park rangers' hut, James City County.

A1--0 to 3 inches; dark grayish brown (2.5Y 4/2) sandy loam; weak fine granular structure; very friable, slightly sticky, nonplastic; extremely acid; abrupt smooth boundary.

E--3 to 8 inches; yellowish brown (10YR 5/6) sandy loam; weak fine granular structure; very friable, nonsticky, nonplastic; very strongly acid; clear wavy boundary.

AB--8 to 12 inches; yellowish brown (10YR 5/8) sandy loam; weak fine granular and weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; common ironstone fragments 3/4 inch thick, up to 3 inches in diameter; very strongly acid; clear wavy boundary.

Bt1--12 to 29 inches; yellowish brown (10YR 5/6) sandy clay loam; moderate medium subangular blocky structure; friable, sticky, plastic; common fine faint clay films on faces of peds; extremely acid; clear smooth boundary.

Bt2--29 to 38 inches; yellowish brown (10YR 5/8) sandy clay loam; few fine prominent light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; firm, sticky, plastic; common fine distinct clay films on faces of peds; extremely acid; clear wavy boundary.

Cg--38 to 49 inches; light olive gray (5Y 6/2) sandy clay loam; common medium prominent yellowish brown (10YR 5/8) mottles; massive; firm, sticky, plastic; extremely acid; gradual wavy boundary.

C--49 to 72 inches; streaked strong brown, reddish brown, gray and pale brown sandy loam; single grain; slightly sticky, slightly plastic; very strongly acid.

Table A: Particle-size distribution* for Emporia complex 4

| Depth | Sand | | | | | Total | Silt | Clay |
|--------|----------------------------|-----|-----|-----|-----|-------|------|------|
| | VC | C | M | F | VF | | | |
| inches | g kg ⁻¹ of soil | | | | | | | |
| 12-29 | 52 | 56 | 131 | 177 | 111 | 527 | 250 | 223 |
| 29-38 | 61 | 81 | 197 | 174 | 76 | 589 | 143 | 268 |
| 38-49 | 57 | 63 | 147 | 126 | 79 | 472 | 195 | 333 |
| 49-72 | 27 | 134 | 229 | 149 | 48 | 587 | 190 | 223 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Emporia Complex 5

Emporia complex 5, 25 to 60 percent slopes, transect 1, York River State Park, 300 yards north of park rangers' hut, James City County.

A and E--0 to 13 inches; dark grayish brown (2.5Y 4/2) and olive brown (2.5Y 4/4) fine sandy loam; weak fine granular structure; very friable, nonsticky, nonplastic; very strongly acid; clear smooth boundary.

E--13 to 21 inches; light olive brown (2.5Y 5/6) loamy fine sand; weak fine granular structure; very friable, nonsticky, nonplastic; neutral; clear wavy boundary.

C1--21 to 33 inches; light olive brown (2.5Y 5/4) loamy fine sand; single grain; loose; 40 percent weathered fossil shells; moderately alkaline; gradual diffused boundary.

C2--33 to 57 inches; light olive brown (2.5Y 5/4) loamy fine sand; single grain; loose; 20 percent fossil shells; moderately alkaline; gradual diffused boundary.

C3--57 to 72 inches; light olive brown (2.5Y 5/4) loamy fine sand; common medium faint olive brown (2.5Y 4/4) mottles; 10 percent fossil shells; moderately alkaline.

Table A: Particle-size distribution* for Emporia complex 5

| Depth | Sand | | | | | | Silt | Clay |
|--------|----------------------------|----|-----|-----|----|-------|------|------|
| | VC | C | M | F | VF | Total | | |
| inches | g kg ⁻¹ of soil | | | | | | | |
| 0-13 | 5 | 23 | 259 | 489 | 26 | 802 | 108 | 90 |
| 13-21 | 6 | 5 | 85 | 748 | 41 | 885 | 10 | 105 |
| 21-33 | 12 | 20 | 178 | 509 | 68 | 787 | 108 | 105 |
| 33-57 | 8 | 15 | 234 | 551 | 38 | 846 | 74 | 80 |
| 57-72 | - | 3 | 227 | 640 | 39 | 909 | 26 | 65 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Emporia Complex 6

Emporia complex 6, 25 to 60 percent slopes, transect 2, across creek from transect 1, York River State Park, James City County.

A1--0 to 2 inches; dark grayish brown (2.5Y 4/2) fine sandy loam; weak fine granular structure; friable, nonsticky, nonplastic; very strongly acid; abrupt smooth boundary.

E--2 to 7 inches; light yellowish brown (10YR 6/4) fine sandy loam; very strongly acid; clear smooth boundary.

Bt1--7 to 23 inches; strong brown (7.5YR 5/6) sandy clay loam; few fine prominent reddish brown (5YR 5/4), and light gray (N/7) mottles; 5 percent coarse fragments; common fine faint clay films on faces of peds; very strongly acid; clear smooth boundary.

Bt2--23 to 34 inches; yellowish red (5YR 5/6) fine sandy loam; few prominent light olive brown (2.5Y 5/6) mottles; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; few fine faint clay films on faces of peds; very strongly acid; gradual wavy boundary.

C1--34 to 47 inches; yellowish (5YR 4/6) fine sandy loam; common medium distinct strong brown (7.5YR 5/6) mottles; massive; friable; slightly sticky, slightly plastic; very strongly acid; gradual wavy boundary.

C2--47 to 72 inches; mottled strong brown (7.5YR 5/6), light brownish gray (10YR 6/2) and yellowish brown (10YR 5/6) gravelly sandy clay loam; friable; sticky, plastic; 35 percent coarse fragments; extremely acid.

Table A: Particle-size distribution* for Emporia complex 6

| Depth | Sand | | | | | Total | Silt | Clay |
|--------|----------------------------|----|-----|-----|-----|-------|------|------|
| | VC | C | M | F | VF | | | |
| inches | g kg ⁻¹ of soil | | | | | | | |
| 0-2 | 21 | 31 | 56 | 229 | 277 | 614 | 339 | 47 |
| 2-7 | 15 | 38 | 75 | 218 | 288 | 634 | 251 | 115 |
| 7-23 | 45 | 93 | 184 | 122 | 67 | 511 | 165 | 325 |
| 23-34 | 5 | 22 | 133 | 527 | 51 | 738 | 47 | 215 |
| 34-47 | 8 | 40 | 137 | 515 | 63 | 763 | 111 | 126 |
| 47-72 | 29 | 62 | 96 | 271 | 125 | 583 | 193 | 224 |

*Va Tech Soil Survey Laboratory, Blacksburg, VA 24061.

Virginia's Agricultural Experiment Stations

- 1—Blacksburg
Virginia Tech, Main Station
Dairy, Poultry, and all other topics
- 2—Steeles Tavern
Shenandoah Valley Agricultural Experiment Station
Beef, Forages, Fruit, Insect and Pest Control, Sheep
- 3—Orange
Northern Piedmont Agricultural Experiment Station
Alfalfa, Corn, Crops, Small Grains
- 4—Winchester
Winchester Agricultural Experiment Station
Fruit, Insect and Pest Control
- 5—Middleburg
Middleburg Agricultural Experiment Station
Beef, Forages
- 6—Warsaw
Eastern Virginia Agricultural Experiment Station
Field Crops, Insect and Pest Control
- 7—Holland Station, Suffolk
Tidewater Agricultural Experiment Station
Corn, Peanuts, Pest Control, Small Grains, Soybeans, Swine
- 8—Blackstone
Southern Piedmont Agricultural Experiment Station
Forages, Horticulture Crops, Small Grains, Tobacco, Turfgrass
- 9—Critz
Reynolds Homestead Agricultural Experiment Station
Aquaculture, Forestry, Wildlife
- 10—Glade Spring
Southwest Virginia Agricultural Experiment Station
Beef, Burley Tobacco, Sheep
- 11—Hampton
Virginia Seafood Agricultural Experiment Station
Seafood
- 12—Virginia Beach
Hampton Roads Agricultural Experiment Station
Ornamentals, Vegetables, Insect and Pest Control
- 13—Painter
Eastern Shore Agricultural Experiment Station
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