Experimental Data
For Soil Survey
Of Charles City County, Virginia

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SUPPLEMENTAL DATA FOR SOIL SURVEY OF CHARLES CITY COUNTY, VIRGINIA

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COVER PHOTOGRAPH: The manor house on Evelynton Plantation, as seen from Herring Creek, is on Pamunkey soils.
# Table of Contents

Introduction ............................................................................ 1  
Materials and Methods ............................................................. 1  
  Morphological Descriptions .................................................... 1  
  Laboratory Procedures ......................................................... 1  
Classification of the Soils .......................................................... 4  
Literature Cited ......................................................................... 5  
Profile Descriptions and Data .................................................... 7  
Altavista Series ........................................................................ 7  
Augusta Series ........................................................................ 9  
Bethera Series .......................................................................... 12  
Bibb Series ............................................................................. 14  
  Bibb Series - Supplemental profile 1 ...................................... 16  
  Bibb Series - Supplemental profile 2 ...................................... 18  
  Bibb Series - Supplemental profile 3 ...................................... 19  
  Bibb Series - Supplemental profile 4 ...................................... 22  
  Bibb Series - Supplemental profile 5 ...................................... 24  
Bojac Series ........................................................................... 26  
Caroline Series ......................................................................... 27  
Catpoint Series ......................................................................... 30  
Chickahominy Series ................................................................. 31  
  Chickahominy Series - Supplemental profile 1 .................... 33  
Conetoe Series ......................................................................... 35  
Craven Series .......................................................................... 37  
Dragston Series ........................................................................ 41  
  Dragston Series - Supplemental profile 1 ............................. 43  
Emporia Series ......................................................................... 45  
  Emporia Series - Supplemental profile 1 ............................. 48  
  Emporia Series - Supplemental profile 2 ............................. 50  
Izagora Series .......................................................................... 52  
Kempsville Series ................................................................. 54  
  Kempsville Series - Supplemental profile 1 ....................... 57  
  Kempsville Series - Supplemental profile 2 ....................... 59  
  Kempsville Series - Supplemental profile 3 ....................... 62  
Lawnes Series ......................................................................... 63  
  Lawnes Series - Supplemental profile 1 .............................. 65  
Masada Series .......................................................................... 68  
  Masada Series - Supplemental profile 1 .............................. 71  
Mattan Series .......................................................................... 74  
Munden Series .......................................................................... 78  
Nahunta Series ......................................................................... 80  
  Nahunta Series - Supplemental Series 1 ............................ 82  
Nansemond Series .................................................................... 84  
Nawney Series ......................................................................... 87  
Nevare Series .......................................................................... 89  
Newflat Series ......................................................................... 91  
Nimmo Series .......................................................................... 95  

List of Photographs

Photo 1. These native American Indians are walking across a parking area on Craven soils. .............................................. 40
Photo 2. Sherwood Forest Plantation manor house is on Kempsville soils. ............................................................. 68
Photo 3. Lawnes soils along Herring Creek have luxuriant growth of wild rice and other marsh vegetation. .................. 73
Photo 4. Roadbase material for VA-106 near Roxbury were borrowed from Nevarc-Remlik gravelly soils. ................... 94
Photo 5. Shirley, the oldest plantation in Virginia, is on Pamunkey soils. ................................................................. 108
Photo 6. The manor house at Westover, the nation's premier example of Georgian architecture, is on Pamunkey soils. .... 109
Photo 7. Harrison Lake National Fish Hatchery ponds are on Peawick soils. ............................................................ 113
Photo 8. Sand and gravel borrowed from substrata of Pamunkey, Tetotum, and Roanoke soils are excellent construction materials. 129
Introduction

In 1988 the Department of Crop and Soil Environmental Sciences, Virginia Polytechnic Institute and State University, completed the soil survey of Charles City County. Cooperating agencies were the Soil Conservation Service of the United States Department of Agriculture, the Colonial Soil and Water Conservation District, and the Charles City County Board of Supervisors.

The soil survey enables users to determine the kinds of soils and their potential for land use within the county. 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 scientists produce soil maps when they draw boundaries of the kinds of soils observed in the survey area on aerial photographs. These photographs show trees, buildings, fields, roads, and other natural and cultural features that were used to locate soil boundaries. Soil map units are delineations of natural landscape units 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.

Because the published soil survey does not include the laboratory data used to characterize, classify, and interpret the soils within the map units, this supplemental report presents these data. The published soil survey cannot present all possible interpretations for uses of the soils within the survey area because there may be uses of the soils 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 not included in the published soil survey reports.

Materials and Methods

Data for typical and supplemental soil profiles in the map units are presented in the following order:

Morphological Descriptions

Morphology of each soil profile is described according to National Cooperative Soil Survey standards specified by Soil Survey Staff (1951, 1975) and USDA-SCS (1983).

Laboratory Procedures

Data for each soil profile are presented in the following tables:

Table A - Particle-size Distribution
Table A gives the distribution of:

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)

in g kg\(^{-1}\) of soil determined by the hydrometer (Bouyoucos, 1962; Day, 1965) or the pipette (Day, 1965) methods.

Table B - Chemical Properties

Table B gives:

1. Exchangeable Ca\(^{2+}\), Mg\(^{2+}\), and K\(^{+}\) in cmol (+) kg\(^{-1}\) of soil
2. Exchange acidity, H\(^{+}\), in cmol (+) kg\(^{-1}\)
3. Cation exchange capacity, CEC, estimated by:
   \[ \text{CEC} = \text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+} + \text{H}^{+} \text{ in cmol (+) kg}^{-1} \text{ of soil} \]
4. Base saturation, BS, is estimated by:
   \[ \text{BS} = \frac{\text{Ca}^{2+} + \text{Mg}^{2+} + \text{K}^{+}}{\text{CEC}} \times 100 \]

with exchangeable Ca\(^{2+}\), Mg\(^{2+}\) and K\(^{+}\) determined by \( N \) NH\(_4\)OAc, pH 7.0, extraction with quantification by atomic absorption spectroscopy (USDA-SCA, 1972) and with exchange acidity (H\(^{+}\)) determined by the BaCl\(_2\)-TEA, pH 8.2, method (USDA-SCS, 1972; Peech, 1965; Yuan, 1959).

Table C - Chemical Properties

Table C gives:

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

with organic matter content determined by the acid-dichromate digestion method (Allison, 1965), with soil reaction determined for 1-to-1 soil-to-water suspension using a glass electrode, and with exchangeable Al\(^{3+}\) determined by the KCl extraction method (McLean, 1965).

Soil Mineralogy

Samples pretreatment with H\(_2\)O\(_2\) and NaOAc adjusted to pH 5.0 followed by citrate-dithionite-bicarbonate to remove organic matter and oxide coatings (Mehera and Jackson, 1958), respectively. Each sample was separated into sand, silt, and clay. 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). About 250 mg of clay were deposited on a ceramic tile for X-ray diffraction analysis (Rich, 1969; Rich and Barnhisel, 1977). Gibbsite and kaolinite were estimated 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. Amounts 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. Sand was separated by wet sieving. Sand grains that passed the 40-mesh sieve were mounted in Canada balsam on glass sides. Minerals in the sand fraction were determined by the line-count method (Galehouse, 1971) using a Zeiss Universal M polarizing microscope.

**Table D - Clay Mineralogy**

Table D gives estimated amounts of minerals in the clay fraction in g kg⁻¹ of clay.

**Table E - Sand Mineralogy**

Table E gives estimated amounts of minerals in the sand fraction in g kg⁻¹ of sand.

**Table F - Soil Test Data**

Table F gives:

1. pH in -log[H⁺]
2. Ca²⁺, Mg²⁺, P, K⁺, Zn, and Mn in ppm

These properties were determined by procedures used by the Soil Testing Laboratory, Department of Crop and Soil Environmental Sciences, Virginia Tech, Blacksburg, Virginia 24061-0404 (Donohue and McCoy, 1972).

**Table G - Electrical Conductivity**

Table G gives:

1. Electrical conductivity (EC) in dS m⁻¹
2. Water, mineral matter, organic matter, and total S in g kg⁻¹ of dry soil

Electrical conductivities were determined by the method 8A3a, moisture at saturation by method 8A, and mineral matter content by method 8F (USDA-SCS, 1972); organic matter contents by the acid-dichromate digestion method Allison (1965); and total sulfur by the simple turbidimetric method (Tabatabai and Bremner, 1970).

**Table H - Moist Incubation pH**

Table H gives changes in pH that result from the moist incubation method proposed for defining sulfidic soil materials (Van Breemen, 1982).

**Table I - Water Soluble Cations, CEC, SAR**

Table I gives:

1. Ca²⁺, Mg²⁺, K⁺, and Na⁺ in cmol(+) liter⁻¹ of extract
2. Cation exchange capacity (CEC) in cmol(+) kg⁻¹
3. Sodium adsorption ratio (SAR) calculated by:
\[ \text{SAR} = \frac{(\text{Na}^+)}{\sqrt{\text{Ca}^{2+} + \text{Mg}^{2+}}} \]

Water soluble \( \text{Ca}^{2+} \), \( \text{Mg}^{2+} \), \( \text{K}^+ \), and \( \text{Na}^+ \) were determined by methods 6N1, 6Q1, 6P1, and 6Q1, respectively, (USDA-SCS, 1972); and CEC determined by ammonium saturation, displacement, and distillation method (Chapman, 1965).

**Table J - Cationic composition of the saturation extract**

Table J gives the cationic composition of the saturation extract as a percent of the total observed cation.

**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 Survey of Charles City County. Therefore, no interpretations for the map units or data are presented.
Literature Cited


Profile Descriptions and Data

Altavista Series

The Altavista series consists of very deep, moderately well drained soils on stream terraces. They formed in loamy fluvial sediments. Slopes range from 0 to 3 percent.

Altavista fine sandy loam, cultivated, 0 to 2 percent slopes; 1.7 miles northeast of the junction of Highways VA-623 and VA-627, 1.1 miles northwest of the mouth of Parsons Creek, 1.0 mile southwest of the tip of Old Neck marsh; elevation 10 feet.

Ap--0 to 11 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak fine granular structure; friable, slightly sticky, nonplastic; few fine roots; common fine tubular pores; moderately acid; abrupt smooth boundary.

BE--11 to 16 inches; light yellowish brown (10YR 6/4) 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; strongly acid; clear smooth boundary.

Bt1--16 to 28 inches; light olive brown (2.5Y 5/4) loam; moderate 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; very strongly acid; clear smooth boundary.

Bt2--28 to 37 inches; light olive brown (2.5Y 5/4) clay loam; common fine prominent light gray (10YR 6/1) mottles; 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; few fine flakes of mica; very strongly acid; clear smooth boundary.

Bt3--37 to 49 inches; mottled yellowish brown (10YR 5/8), light gray (10YR 6/1), and strong brown (7.5YR 5/6) loam; 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; few fine flakes of mica; very strongly acid; clear smooth boundary.

Btg--49 to 62 inches; light gray (10YR 6/1) sandy clay loam; common medium prominent light olive brown (2.5Y 5/4) and yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable, sticky, plastic; few fine tubular pores; common thick discontinuous clay films along vertical faces of some peds; few fine flakes of mica; extremely acid; clear smooth boundary.

C--62 to 74 inches; streaked and mottled yellowish brown (10YR 5/6) and light gray (10YR 6/1) stratified fine sandy loam, loamy fine sand, and fine sand; single grain; compact in place; friable, slightly sticky, nonplastic; few fine flakes of mica; extremely acid.
Table A: Particle-size distribution

<table>
<thead>
<tr>
<th>Depth</th>
<th>VC</th>
<th>C</th>
<th>M</th>
<th>F</th>
<th>VF</th>
<th>Total</th>
<th>Silt</th>
<th>Clay</th>
</tr>
</thead>
<tbody>
<tr>
<td>inches</td>
<td>g kg$^{-1}$ of soil</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-11</td>
<td>4</td>
<td>11</td>
<td>42</td>
<td>246</td>
<td>211</td>
<td>514</td>
<td>375</td>
<td>111</td>
</tr>
<tr>
<td>11-16</td>
<td>2</td>
<td>10</td>
<td>32</td>
<td>192</td>
<td>220</td>
<td>456</td>
<td>408</td>
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<tr>
<td>16-28</td>
<td>1</td>
<td>3</td>
<td>13</td>
<td>159</td>
<td>201</td>
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<td>5</td>
<td>144</td>
<td>268</td>
<td>418</td>
<td>323</td>
<td>259</td>
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<td>37-49</td>
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<td>1</td>
<td>3</td>
<td>192</td>
<td>268</td>
<td>464</td>
<td>315</td>
<td>221</td>
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<tr>
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<td>4</td>
<td>206</td>
<td>308</td>
<td>519</td>
<td>282</td>
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<td>62-74</td>
<td>0</td>
<td>2</td>
<td>19</td>
<td>600</td>
<td>195</td>
<td>816</td>
<td>83</td>
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Table B: Chemical properties

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<th>Depth</th>
<th>Exchangeable cations</th>
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<tr>
<td>inches</td>
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<tr>
<td>0-11</td>
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<tr>
<td>11-16</td>
<td>1.50</td>
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<tr>
<td>37-49</td>
<td>1.03</td>
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<tr>
<td>49-62</td>
<td>0.80</td>
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<td>62-74</td>
<td>0.43</td>
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<td>66</td>
<td>0.54</td>
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</table>

Table C: Chemical properties

<table>
<thead>
<tr>
<th>Depth</th>
<th>Organic matter</th>
<th>pH</th>
<th>Al</th>
<th>ECEC</th>
<th>EBS</th>
<th></th>
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<tbody>
<tr>
<td>inches</td>
<td>g kg$^{-1}$</td>
<td></td>
<td></td>
<td>cmol (+) kg$^{-1}$</td>
<td>%</td>
<td></td>
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<tr>
<td>0-11</td>
<td>--</td>
<td>5.84</td>
<td>0.05</td>
<td>4.88</td>
<td>98.98</td>
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<td>11-16</td>
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<td>5.53</td>
<td>0.75</td>
<td>2.84</td>
<td>73.59</td>
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<td>39.48</td>
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<td>4.43</td>
<td>3.25</td>
<td>4.04</td>
<td>19.80</td>
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<tr>
<td>66</td>
<td>--</td>
<td>4.45</td>
<td>4.05</td>
<td>5.06</td>
<td>19.60</td>
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Table E: Sand mineralogy

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<tr>
<th>Depth</th>
<th>Quartz</th>
<th>Feldspar</th>
<th>Plagioclase</th>
<th>Mica</th>
<th>Opaque minerals*</th>
<th>Heavy minerals*</th>
</tr>
</thead>
<tbody>
<tr>
<td>inches</td>
<td></td>
<td>g kg(^{-1}) of sand</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16-37</td>
<td>870</td>
<td>95</td>
<td>10</td>
<td>15</td>
<td>0</td>
<td>10</td>
</tr>
</tbody>
</table>

*Opaque minerals are ilmenite, magnetite, hematite, etc.; Heavy minerals are translucent zircon, tourmaline, rutile, epidote, hornblende, etc.; Tr = Trace.

Table F: Chemical properties

<table>
<thead>
<tr>
<th>Depth</th>
<th>pH</th>
<th>Ca</th>
<th>Mg</th>
<th>P</th>
<th>K</th>
<th>Zn</th>
<th>Mn</th>
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</thead>
<tbody>
<tr>
<td>inches</td>
<td></td>
<td>ppm</td>
<td>ppm</td>
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<td>ppm</td>
<td>ppm</td>
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<tr>
<td>0-11</td>
<td>5.9</td>
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<td>81</td>
<td>31</td>
<td>50</td>
<td>--</td>
<td>--</td>
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<tr>
<td>11-16</td>
<td>5.6</td>
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<td>41</td>
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<tr>
<td>16-28</td>
<td>4.9</td>
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<td>39</td>
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<td>11</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>62-74</td>
<td>4.3</td>
<td>72</td>
<td>27</td>
<td>5</td>
<td>6</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

**Augusta Series**

The Augusta series consists of very deep, somewhat poorly drained soils on stream terraces. They formed in loamy fluvial sediments. Slopes range from 0 to 2 percent.

Augusta sandy loam, cultivated, 0 to 2 percent slopes; 0.4 mile east of the junction of Highways VA-614 and VA-155, 30 yards north of Highway VA-614; elevation 35 feet.

Ap--0 to 8 inches; brown (10YR 5/3) sandy loam; weak fine granular structure; friable, slightly sticky, nonplastic; common fine and few coarse and medium roots; common fine and medium tubular pores; 2 percent quartz gravel up to 3/4 inch in diameter; moderately acid; abrupt smooth boundary.

E--8 to 13 inches; pale brown (10YR 6/3) sandy loam; common medium distinct light gray (10YR 6/1) mottles; weak medium granular structure; friable, slightly sticky, slightly plastic; common fine roots; common fine and medium tubular pores; moderately acid; clear smooth boundary.

Bt--13 to 27 inches; light olive brown (2.5Y 5/4) sandy clay loam; few fine prominent light gray (10YR 7/1) mottles; moderate medium subangular blocky structure; friable, sticky, plastic; common fine roots; common fine and me-
dium tubular pores; few faint clay films on faces of peds; very strongly acid; gradual smooth boundary.

BC--27 to 40 inches; mottled olive brown (2.5Y 4/4) and light gray (10YR 7/1) sandy 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; few fine flakes of mica; very strongly acid; gradual smooth boundary.

Cg1--40 to 44 inches; grayish brown (2.5Y 5/2) gravelly loamy sand; common medium distinct light gray (10YR 7/1) mottles; single grain; loose; few fine and medium tubular pores; 23 percent quartz and weathered granite gneiss gravel up to 3/4 inch in diameter; few fine flakes of mica; very strongly acid; abrupt smooth boundary.

C--44 to 51 inches; reddish brown (5YR 4/4) gravelly coarse loamy sand; single grain; loose; few fine flakes of mica; 23 percent quartz and weathered granite gneiss gravel up to 3/4 inch in diameter; very strongly acid; gradual smooth boundary.

Cg2--51 to 72 inches; light brownish gray (10YR 6/2) stratified sand and gravelly sand; many coarse prominent strong brown (7.5YR 4/6) mottles; single grain; loose; 18 percent quartz gravel; strongly acid.

Table A: Particle-size distribution

<table>
<thead>
<tr>
<th>Depth (inches)</th>
<th>VC</th>
<th>C</th>
<th>M</th>
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<th>Clay</th>
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Table C: Chemical properties

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Table E: Sand mineralogy

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<th>Mica</th>
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<th>Heavy minerals*</th>
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*Opaque minerals are ilmenite, magnetite, hematite, etc.; Heavy minerals are translucent zircon, tourmaline, rutile, epidote, hornblende, etc.; Tr = Trace.
Table F: Chemical properties

<table>
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<tr>
<th>Depth</th>
<th>pH</th>
<th>Ca</th>
<th>Mg</th>
<th>P</th>
<th>K</th>
<th>Zn</th>
<th>Mn</th>
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**Bethera Series**

The Bethera series consists of very deep, poorly drained soils on upland flats and depressions. They formed in clayey fluvial and marine sediments. Slopes range from 0 to 2 percent.

Bethera silt loam, woodlands, 0 to 2 percent slopes; 0.6 mile north-northeast of the junction of Highways VA-618 and VA-602, 200 yards west of Highway VA-618; elevation 115 feet.

E1--0 to 4 inches; light gray (5Y 6/1) silt loam; moderate medium and fine granular structure; friable, slightly sticky, slightly plastic; many fine and few coarse roots; extremely acid; abrupt smooth boundary.

E2--4 to 7 inches; light gray (5Y 6/1) silt loam; few fine prominent yellowish brown (10YR 5/6) mottles; moderate fine granular structure; friable, slightly sticky, slightly plastic; common fine and few coarse roots; many very fine tubular pores; extremely acid; clear smooth boundary.

BEg--7 to 12 inches; light gray (5Y 6/1) silt 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 coarse roots; many very fine tubular pores; very strongly acid; clear smooth boundary.

Btgl--12 to 40 inches; light gray (5Y 7/1) clay loam; many fine prominent yellowish brown (10YR 5/8), strong brown (7.5YR 5/6), and yellowish red (5YR 5/6) mottles; strong medium subangular blocky structure; firm, sticky, plastic; few fine and coarse roots; many very fine tubular pores; common distinct clay films on faces of peds and in pores; very strongly acid; gradual smooth boundary.

Btg2--40 to 72 inches; light gray (5Y 7/1) clay loam; few coarse prominent dark yellowish brown (10YR 3/6) and strong brown (7.5YR 5/6) 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; very strongly acid.
Table A: Particle-size distribution

<table>
<thead>
<tr>
<th>Depth</th>
<th>VC</th>
<th>C</th>
<th>M</th>
<th>F</th>
<th>VF</th>
<th>Total</th>
<th>Silt</th>
<th>Clay</th>
</tr>
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<tbody>
<tr>
<td>inches</td>
<td>g kg(^{-1}) of soil</td>
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Table B: Chemical properties

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<td>g cmol (+) kg(^{-1})</td>
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Table C: Chemical properties

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Table D: Clay mineralogy

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<th>Quartz</th>
<th>Mont*</th>
<th>Gibbsite</th>
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*HIV = hydroxy interlayered vermiculite; Verm = vermiculite; Mont = montmorillonite; Misc = miscellaneous; Tr = Trace.

Table F: Chemical properties

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<td>0.2</td>
<td>0.3</td>
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**Bibb Series**

The Bibb series consists of very deep, poorly drained soils on low floodplains. They formed in loamy fluvial sediments. Slopes range from 0 to 2 percent.

Bibb fine sandy loam, woodlands, 0 to 2 percent slopes; 30 yards southeast of Highway VA-607 and West Run; elevation 35 feet.

A--0 to 4 inches; very dark grayish brown (10YR 3/2) fine sandy loam; weak fine granular structure; friable, slightly sticky, nonplastic; common fine and medium roots; extremely acid; abrupt smooth boundary.

Ag--4 to 9 inches; gray (10YR 5/1) fine sandy loam; moderate medium granular structure; friable, slightly sticky, nonplastic; common fine roots; extremely acid; abrupt smooth boundary.

Cg1--9 to 31 inches; light gray (5Y 6/1) fine sandy loam; common medium prominent light olive brown (2.5Y 5/6) mottles; massive; friable, slightly sticky, slightly plastic; few fine roots; extremely acid; gradual smooth boundary.

Cg2--31 to 41 inches; greenish gray (5GY 6/1) fine sandy loam; common medium prominent light olive brown (2.5Y 5/6), strong brown (7.5YR 4/6), and yellowish brown (10YR 5/6) mottles; massive; friable, slightly sticky, slightly plastic; common fine roots; very strongly acid; clear smooth boundary.

Cg3--41 to 55 inches; light greenish gray (5GY 7/1) gravelly coarse loamy sand; single grain; loose; very strongly acid.
### Table A: Particle-size distribution

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<th>Depth</th>
<th>VC</th>
<th>C</th>
<th>M</th>
<th>F</th>
<th>VF</th>
<th>Total</th>
<th>Silt</th>
<th>Clay</th>
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<td>inches</td>
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<td>cmol (kg(^{-1}))</td>
<td>cmol (kg(^{-1}))</td>
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</table>

### Table B: Chemical properties

<table>
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<tr>
<th>Depth</th>
<th>Exchangeable cations</th>
<th>Ca</th>
<th>Mg</th>
<th>K</th>
<th>H</th>
<th>CEC</th>
<th>BS</th>
</tr>
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<tbody>
<tr>
<td>inches</td>
<td>cmol (+) kg(^{-1})</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>0-4</td>
<td>0.17</td>
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<td>0.14</td>
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<td>1.19</td>
<td>0.05</td>
<td>0.03</td>
<td>6.37</td>
<td>7.64</td>
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<td>31-41</td>
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### Table C: Chemical properties

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<th>Al</th>
<th>ECEC</th>
<th>EBS</th>
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<td>cmol (+) kg(^{-1})</td>
<td>cmol (+) kg(^{-1})</td>
<td>%</td>
<td>%</td>
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<td>14.70</td>
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<td>2.18</td>
<td>2.41</td>
<td>9.54</td>
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<td>4.37</td>
<td>2.18</td>
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Table E: Sand mineralogy

<table>
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<tr>
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<th>Quartz</th>
<th>Feldspar</th>
<th>Plagioclase</th>
<th>Mica</th>
<th>Opaque minerals*</th>
<th>Heavy minerals*</th>
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</thead>
<tbody>
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<td>g kg^{-1} of sand</td>
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<td>60</td>
<td>0</td>
<td>0</td>
<td>20</td>
<td>25</td>
</tr>
</tbody>
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*Opaque minerals are ilmenite, magnetite, hematite, etc.; Heavy minerals are translucent zircon, tourmaline, rutile, epidote, hornblende, etc.; Tr = Trace.

Table F: Chemical properties

<table>
<thead>
<tr>
<th>Depth</th>
<th>pH</th>
<th>Ca</th>
<th>Mg</th>
<th>P</th>
<th>K</th>
<th>Zn</th>
<th>Mn</th>
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<td>--</td>
</tr>
<tr>
<td>4-9</td>
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<td>60</td>
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<td>1</td>
<td>15</td>
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<td>--</td>
</tr>
<tr>
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<td>--</td>
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<td>--</td>
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<td>18</td>
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</table>

Bibb Series - Supplemental profile 1

Bibb silty clay loam, woodlands, 0 to 2 percent slopes; 100 yards southeast of Highway VA-607 and West Run; elevation 35 feet.

A--0 to 4 inches; black (5Y 2/1) silty clay loam; weak fine granular structure; friable, slightly sticky, slightly plastic; common fine and medium roots; extremely acid; abrupt smooth boundary.

Cg1--4 to 39 inches; gray (5Y 5/1) clay; common medium prominent yellowish brown (10YR 5/8) mottles; massive; firm, sticky, plastic; common fine and few medium roots; extremely acid; gradual smooth boundary.

Cg2--39 to 51 inches; light gray (5Y 6/1) sandy clay loam; common medium prominent yellowish brown (10YR 5/8) mottles; massive; firm, sticky, plastic; few fine roots; extremely acid; clear wavy boundary.

Cg3--51 to 56 inches; light gray (5Y 6/1) gravelly sandy clay loam; common fine and medium prominent dark yellowish brown (10YR 4/6) mottles; massive; friable, sticky, plastic; common fine roots; 20 percent rounded quartz gravels and cobbles; extremely acid.
Table A: Particle-size distribution

<table>
<thead>
<tr>
<th>Depth</th>
<th>VC</th>
<th>C</th>
<th>M</th>
<th>F</th>
<th>VF</th>
<th>Total</th>
<th>Silt</th>
<th>Clay</th>
</tr>
</thead>
<tbody>
<tr>
<td>inches</td>
<td>g kg(^{-1}) of soil</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>0-4</td>
<td>37</td>
<td>30</td>
<td>32</td>
<td>36</td>
<td>16</td>
<td>152</td>
<td>463</td>
<td>385</td>
</tr>
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<td>4-39</td>
<td>5</td>
<td>10</td>
<td>61</td>
<td>209</td>
<td>66</td>
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<td>23</td>
<td>106</td>
<td>311</td>
<td>85</td>
<td>537</td>
<td>150</td>
<td>313</td>
</tr>
<tr>
<td>51-56</td>
<td>15</td>
<td>21</td>
<td>149</td>
<td>402</td>
<td>100</td>
<td>687</td>
<td>86</td>
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Table B: Chemical properties

<table>
<thead>
<tr>
<th>Depth</th>
<th>Exchangeable cations</th>
<th>Ca</th>
<th>Mg</th>
<th>K</th>
<th>H</th>
<th>CEC</th>
<th>BS</th>
</tr>
</thead>
<tbody>
<tr>
<td>inches</td>
<td>cmol (+) kg(^{-1})</td>
<td>%</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-4</td>
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<td>46.17</td>
<td>48.88</td>
<td>5.54</td>
<td></td>
</tr>
<tr>
<td>4-39</td>
<td>2.96</td>
<td>0.79</td>
<td>0.10</td>
<td>17.91</td>
<td>21.76</td>
<td>17.69</td>
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</tr>
<tr>
<td>39-51</td>
<td>2.50</td>
<td>0.62</td>
<td>0.10</td>
<td>15.12</td>
<td>18.34</td>
<td>17.56</td>
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</tr>
<tr>
<td>51-56</td>
<td>1.69</td>
<td>0.43</td>
<td>0.08</td>
<td>13.33</td>
<td>15.53</td>
<td>14.17</td>
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Table C: Chemical properties

<table>
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<tr>
<th>Depth</th>
<th>Organic matter</th>
<th>pH</th>
<th>Al</th>
<th>ECEC</th>
<th>EBS</th>
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<tr>
<td>inches</td>
<td>g kg(^{-1})</td>
<td>cmol (+) kg(^{-1})</td>
<td>%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-4</td>
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<td>9.46</td>
<td>12.17</td>
<td>22.27</td>
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<td>4-39</td>
<td>9</td>
<td>4.20</td>
<td>8.97</td>
<td>12.82</td>
<td>30.03</td>
</tr>
<tr>
<td>39-51</td>
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<td>4.12</td>
<td>7.32</td>
<td>10.54</td>
<td>30.55</td>
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<td>51-56</td>
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<td>4.12</td>
<td>6.35</td>
<td>8.55</td>
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Table D: Clay mineralogy

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<th>Mica</th>
<th>Verm*</th>
<th>Kaolinite</th>
<th>Quartz</th>
<th>Mont*</th>
<th>Gibbsite</th>
<th>Misc*</th>
</tr>
</thead>
<tbody>
<tr>
<td>inches</td>
<td>g kg(^{-1}) of clay</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4-39</td>
<td>90</td>
<td>80</td>
<td>50</td>
<td>380</td>
<td>20</td>
<td>380</td>
<td>0</td>
<td>Tr</td>
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</table>

*HIV = hydroxy interlayered vermiculite; Verm = vermiculite; Mont = montmorillonite; Misc = miscellaneous; Tr = Trace.
Table F: Chemical properties

<table>
<thead>
<tr>
<th>Depth (inches)</th>
<th>pH</th>
<th>Ca (ppm)</th>
<th>Mg (ppm)</th>
<th>P (ppm)</th>
<th>K (ppm)</th>
<th>Zn (ppm)</th>
<th>Mn (ppm)</th>
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<td>4-39</td>
<td>4.5</td>
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<td>20</td>
<td>--</td>
<td>--</td>
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<td>39-51</td>
<td>4.3</td>
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<td>17</td>
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<td>--</td>
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<td>51-56</td>
<td>4.2</td>
<td>300</td>
<td>48</td>
<td>1</td>
<td>14</td>
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<td>--</td>
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</table>

Bibb Series - Supplemental profile 2

Bibb sandy loam, woodlands, 0 to 2 percent slopes; 170 yards southeast of Highway VA-607 and West Run; elevation 35 feet.

A--0 to 4 inches; dark gray (10YR 4/1) sandy loam; weak fine granular structure; friable, nonsticky, nonplastic; common fine roots; extremely acid; abrupt smooth boundary.

E--4 to 8 inches; olive gray (5Y 5/2) fine sandy loam; common medium prominent yellowish brown (10YR 5/6) mottles; weak fine granular structure; friable, nonsticky, nonplastic; common fine roots; very strongly acid; abrupt smooth boundary.

CB--8 to 20 inches; yellowish brown (10YR 5/6) fine sandy loam; common medium prominent gray (10YR 5/1) mottles; moderate medium granular structure; friable, slightly sticky, nonplastic; few fine roots; extremely acid; clear smooth boundary.

Cg1--20 to 32 inches; mottled gray (10YR 5/1) and yellowish brown (10YR 5/8) sandy loam; massive; friable, nonsticky, nonplastic; few fine roots; very strongly acid; abrupt smooth boundary.

Cg2--32 to 50 inches; greenish gray (5GY 6/1) sandy clay loam; massive; firm, sticky, plastic; few fine roots; strongly acid.

Table A: Particle-size distribution

<table>
<thead>
<tr>
<th>Depth (inches)</th>
<th>Sand VC g kg⁻¹ of soil</th>
<th>Sand C</th>
<th>Sand M</th>
<th>Sand F</th>
<th>Sand VF</th>
<th>Total</th>
<th>Silt</th>
<th>Clay</th>
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<td>0-4</td>
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</tr>
<tr>
<td>4-8</td>
<td>22 50 207 273 51 603 305 92</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8-20</td>
<td>22 55 208 267 53 606 253 141</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20-32</td>
<td>34 90 342 252 28 747 109 144</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>32-50</td>
<td>5 7 23 56 385 477 211 312</td>
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<td></td>
<td></td>
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<td></td>
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</table>
Table B: Chemical properties

<table>
<thead>
<tr>
<th>Depth</th>
<th>Ca</th>
<th>Mg</th>
<th>K</th>
<th>H</th>
<th>CEC</th>
<th>BS</th>
</tr>
</thead>
<tbody>
<tr>
<td>inches</td>
<td>cmol (+) kg⁻¹</td>
<td>%</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-4</td>
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<td>0.15</td>
<td>0.13</td>
<td>8.16</td>
<td>8.74</td>
<td>6.64</td>
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<td>4-8</td>
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<td>0.05</td>
<td>0.05</td>
<td>5.37</td>
<td>5.52</td>
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<td>0.60</td>
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<td>20.87</td>
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</table>

Table C: Chemical properties

<table>
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<th>pH</th>
<th>Al</th>
<th>ECEC</th>
<th>EBS</th>
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<td>cmol (+) kg⁻¹</td>
<td>%</td>
<td></td>
<td></td>
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<td>23.48</td>
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<tr>
<td>4-8</td>
<td>4</td>
<td>4.53</td>
<td>1.41</td>
<td>1.56</td>
<td>9.62</td>
</tr>
<tr>
<td>8-20</td>
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<td>4.43</td>
<td>2.86</td>
<td>2.99</td>
<td>4.35</td>
</tr>
<tr>
<td>20-32</td>
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<td>3.64</td>
<td>3.88</td>
<td>6.19</td>
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<td>5.52</td>
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Table F: Chemical properties

<table>
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<th>pH</th>
<th>Ca</th>
<th>Mg</th>
<th>P</th>
<th>K</th>
<th>Zn</th>
<th>Mn</th>
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<td>27</td>
<td>1</td>
<td>50</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>4-8</td>
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<td>11</td>
<td>0</td>
<td>15</td>
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<tr>
<td>8-20</td>
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<td>0</td>
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<td>12</td>
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<td>32-50</td>
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<td>114</td>
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</tbody>
</table>

Bibb Series - Supplemental profile 3

Bibb silt loam, woodlands, 0 to 2 percent slopes; 1.3 miles north of the junction of Highways VA-106 and VA-603, 30 yards north of the junction of Highway VA-106 and Possum Run; elevation 80 feet.

A--0 to 4 inches; very dark grayish brown (10YR 3/2) silt loam; massive; friable, sticky, plastic; many fine roots; very strongly acid; clear smooth boundary.
Bgl--4 to 8 inches; dark grayish brown (10YR 4/2) silt loam; massive; friable, sticky, plastic; common fine roots; very strongly acid; clear smooth boundary.

Bg2--8 to 24 inches; very dark grayish brown (2.5Y 3/2) loam; massive; friable, sticky, slightly plastic; very strongly acid; abrupt smooth boundary.

Cg--24 to 28 inches; light gray (5Y 6/1) coarse sand; single grain; friable, sticky, nonplastic; very strongly acid; abrupt smooth boundary.

Ab--28 to 32 inches; dark gray (5Y 4/1) loam; massive; friable, sticky, nonplastic; very strongly acid; abrupt smooth boundary.

Bgb--32 to 38 inches; black (5Y 2/2) loam; massive; friable, sticky, slightly plastic; very strongly acid; abrupt wavy boundary.

Cgb--38 to 60 inches; gray (5Y 5/1) coarse sand; single grain; loose; very strongly acid.

Table A: Particle-size distribution

<table>
<thead>
<tr>
<th>Depth</th>
<th>VC</th>
<th>C</th>
<th>M</th>
<th>F</th>
<th>VF</th>
<th>Total</th>
<th>Silt</th>
<th>Clay</th>
</tr>
</thead>
<tbody>
<tr>
<td>inches</td>
<td></td>
<td></td>
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Table B: Chemical properties

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Table C: Chemical properties

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Table E: Sand mineralogy

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<th>Plagioclase</th>
<th>Mica</th>
<th>Opaque minerals*</th>
<th>Heavy minerals*</th>
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*Opaque minerals are ilmenite, magnetite, hematite, etc.; Heavy minerals are translucent zircon, tourmaline, rutile, epidote, hornblende, etc.; Tr = Trace.

Table F: Chemical properties

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Bibb Series - Supplemental profile 4

Bibb loam, woodlands, 0 to 2 percent slopes; 1.5 miles south of the junction of Highway VA-618 and Chickahominy River, 1.3 miles west of the junction of Highways VA-155 and VA-610, 0.2 miles east of the end of Highway VA-610; (This soil was mapped as Johnston mucky sandy loam, but was included with soils of the Bibb series); elevation 50 feet.

A--0 to 9 inches; very dark grayish brown (10YR 3/2) loam; weak fine granular structure; friable, slightly sticky, slightly plastic; common fine and few medium roots; moderately acid; clear smooth boundary.

Bg--9 to 22 inches; dark gray (10YR 4/1) fine sandy loam; weak fine granular structure; friable, slightly sticky, slightly plastic; few fine roots; moderately acid; abrupt smooth boundary.

Cl--22 to 33 inches; olive (5Y 5/4) loamy fine sand; massive; friable, slightly sticky, nonplastic; slightly acid; abrupt smooth boundary.

Cg1--33 to 43 inches; greenish gray (5GY 6/1) fine sandy loam; massive; friable, slightly sticky, slightly plastic; neutral; abrupt smooth boundary.

Cg2--43 to 53 inches; gray (N 5) loamy fine sand; massive; friable, slightly sticky, slightly plastic; slightly acid; abrupt smooth boundary.

Oeb--53 to 59 inches; black (10YR 2/1) sand; massive; abrupt smooth boundary.

Cgb--59 to 72 inches; dark gray (SY 4/1) very gravelly sand; single grain; loose; 50 percent rounded quartz and feldspar gravels; extremely acid.

Table A: Particle-size distribution

<table>
<thead>
<tr>
<th>Depth</th>
<th>VC</th>
<th>C</th>
<th>M</th>
<th>F</th>
<th>VF</th>
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<th>Clay</th>
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Table C: Chemical properties

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Table E: Sand mineralogy

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<th>Heavy minerals*</th>
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*Opaque minerals are ilmenite, magnetite, hematite, etc.; Heavy minerals are translucent zircon, tourmaline, rutile, epidote, hornblende, etc.; Tr = Trace.
Table F: Chemical properties

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Bibb Series - Supplemental profile 5

Bibb loam, woodlands, 0 to 2 percent slopes; 1.5 miles south of the junction of Highway VA-618 and Chickahominy River, 1.3 miles west of the junction of Highways VA-155 and VA-610, 0.2 miles east of the end of Highway VA-610; (This soil was mapped as Mantachie loam, but was included with soils of the Bibb series because of small acreage in Charles City County); elevation 50 feet

A--0 to 6 inches; very dark grayish brown (10YR 3/2) loam; weak fine granular structure; friable, slightly sticky, slightly plastic; many fine and few medium roots; moderately acid; abrupt smooth boundary.

Bg1--6 to 15 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak fine granular structure; friable, slightly sticky, slightly plastic; few fine roots; moderately acid; abrupt smooth boundary.

Bg2--15 to 28 inches; black (10YR 2/1) fine sandy loam; weak fine granular structure; friable, slightly sticky, slightly plastic; few fine and medium roots; few fine flakes of mica; moderately acid; clear smooth boundary.

Cgl--28 to 42 inches; greenish gray (5GY 5/1) fine sandy loam; massive; friable, slightly sticky, slightly plastic; few fine roots; few fine flakes of mica; neutral; abrupt smooth boundary.

Cg2--42 to 64 inches; gray (N 5) loamy fine sand; massive; friable, slightly sticky, slightly plastic; slightly acid; abrupt smooth boundary.

Cg3--64 to 72 inches; fluid sands and highly weathered wood.
### Table A: Particle-size distribution

<table>
<thead>
<tr>
<th>Depth</th>
<th>VC</th>
<th>C</th>
<th>M</th>
<th>F</th>
<th>VF</th>
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<th>Silt</th>
<th>Clay</th>
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### Table B: Chemical properties

<table>
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<tr>
<th>Depth</th>
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<th>K</th>
<th>H</th>
<th>CEC</th>
<th>BS</th>
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<td>%</td>
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<td>19.88</td>
<td>46.68</td>
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### Table C: Chemical properties

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<th>ECEC</th>
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<td>6.65</td>
<td>99.25</td>
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<td>99.20</td>
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<td>42-64</td>
<td>11</td>
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<td>0.05</td>
<td>6.90</td>
<td>99.26</td>
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</table>
Table E: Sand mineralogy

<table>
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<th>Depth (inches)</th>
<th>Quartz (g kg(^{-1}) of sand)</th>
<th>Feldspar</th>
<th>Plagioclase</th>
<th>Mica</th>
<th>Opaque minerals*</th>
<th>Heavy minerals*</th>
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*Opaque minerals are ilmenite, magnetite, hematite, etc.; Heavy minerals are translucent zircon, tourmaline, rutile, epidote, hornblende, etc.; Tr = Trace.

Table F: Chemical properties

<table>
<thead>
<tr>
<th>Depth (inches)</th>
<th>pH</th>
<th>Ca (ppm)</th>
<th>Mg (ppm)</th>
<th>P (ppm)</th>
<th>K (ppm)</th>
<th>Zn (ppm)</th>
<th>Mn (ppm)</th>
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<td>11</td>
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<td>5</td>
<td>25</td>
<td>0.9</td>
<td>1.7</td>
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</table>

**Bojac Series**

The Bojac series consists of very deep, well drained soils on terraces adjacent to major streams. They formed in loamy fluvial sediments. Slopes range from 0 to 6 percent.

Bojac loamy fine sand, cultivated, 0 to 2 percent slopes; 0.7 mile southeast of the end of Highway VA-619, 1.5 miles southwest of the mouth of Kittewan Creek, 1.2 miles northeast of tip of Weyanoke Point; elevation 7 feet.

Ap--0 to 10 inches; dark brown (7.5YR 3/4) loamy fine sand; weak fine granular structure; very friable, nonsticky, nonplastic; common fine roots; common fine and medium tubular pores; few fine flakes of mica; very strongly acid; clear smooth boundary.

Bt--10 to 35 inches; dark brown (7.5YR 4/4) sandy loam; weak coarse subangular blocky structure; very friable, slightly sticky, slightly plastic; few fine roots; common fine and medium tubular pores; many clay coatings on sand grains and many clay bridges between sand grains; few fine flakes of mica; moderately acid; gradual smooth boundary.

C--35 to 70 inches; strong brown (7.5YR 4/6) loamy sand; single grain; loose; common fine and medium tubular pores; common fine flakes of mica; slightly acid.
### Table A: Particle-size distribution

<table>
<thead>
<tr>
<th>Depth</th>
<th>Sand</th>
<th>VC</th>
<th>C</th>
<th>M</th>
<th>F</th>
<th>VF</th>
<th>Total</th>
<th>Silt</th>
<th>Clay</th>
</tr>
</thead>
<tbody>
<tr>
<td>inches</td>
<td>g kg(^{-1}) of soil</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>10-30</td>
<td>5 76 204 277 84 645 213 142</td>
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</table>

### Table B: Chemical properties

<table>
<thead>
<tr>
<th>Depth</th>
<th>Exchangeable cations</th>
<th>Ca</th>
<th>Mg</th>
<th>K</th>
<th>H</th>
<th>CEC</th>
<th>BS</th>
</tr>
</thead>
<tbody>
<tr>
<td>inches</td>
<td>cmol (+) kg(^{-1})</td>
<td>%</td>
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<td></td>
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<td></td>
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<td>74.19</td>
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### Table C: Chemical properties

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<th>Depth</th>
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<th>Al</th>
<th>ECEC</th>
<th>EBS</th>
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<td>g kg(^{-1})</td>
<td>cmol (+) kg(^{-1})</td>
<td>%</td>
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<td></td>
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<tr>
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<td>0 6.14 0.10</td>
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### Table E: Sand mineralogy

<table>
<thead>
<tr>
<th>Depth</th>
<th>Quartz</th>
<th>Feldspar</th>
<th>Plagioclase</th>
<th>Mica</th>
<th>Opaque minerals*</th>
<th>Heavy minerals*</th>
</tr>
</thead>
<tbody>
<tr>
<td>inches</td>
<td>g kg(^{-1}) of sand</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>10-30</td>
<td>865 60 0 10 0</td>
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</tbody>
</table>

*Opaque minerals are ilmenite, magnetite, hematite, etc.; Heavy minerals are translucent zircon, tourmaline, rutile, epidote, hornblende, etc.; Tr = Trace.

### Caroline Series

The Caroline series consists of very deep, well drained soils on uplands. They formed in clayey fluvial and marine sediments. Slopes range from 2 to 10 percent.
Caroline silt loam, in an area of Caroline-Emporia complex, cultivated, 2 to 6 percent slopes; 0.3 mile north of the junction of Highways VA-603 and VA-622, 0.6 mile north of the junction of Highways VA-603 and VA-106, 0.5 mile southwest of crossing of two Virginia Power transmission lines, 50 yards east of Highway VA-106; elevation 152 feet.

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

Bt1--5 to 14 inches; yellowish brown (10YR 5/4) silt loam; weak medium subangular blocky structure; friable, sticky, plastic; common fine and medium and few coarse roots; common fine and medium tubular pores; common distinct clay films on faces of peds; very strongly acid; clear smooth boundary.

Bt2--14 to 29 inches; strong brown (7.5YR 5/6) clay; few medium distinct yellowish red (5YR 5/6) and yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm, sticky, plastic; common fine and medium and few coarse roots; many distinct clay films on faces of peds; very strongly acid; gradual smooth boundary.

Bt3--29 to 52 inches; strong brown (7.5YR 5/6) clay; common medium distinct yellowish red (5YR 5/6) and yellowish brown (10YR 5/6) and common medium prominent red (2.5YR 4/6) mottles; moderate medium subangular blocky structure; firm, sticky, plastic; common fine and few medium roots; common fine tubular pores; many distinct clay films on faces of peds and bridges between sand grains; extremely acid; diffuse smooth boundary.

Bt4--52 to 70 inches; variegated red (2.5YR 4/6), light gray (10YR 6/1), yellowish brown (10YR 5/6), and strong brown (7.5YR 5/6) clay; moderate medium subangular blocky structure; firm, sticky, plastic; few medium roots; few fine tubular pores; many distinct clay films on faces of peds; very strongly acid.

Table A: Particle-size distribution

<table>
<thead>
<tr>
<th>Depth</th>
<th>VC</th>
<th>C</th>
<th>M</th>
<th>F</th>
<th>VF</th>
<th>Total</th>
<th>Silt</th>
<th>Clay</th>
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<tbody>
<tr>
<td>inches</td>
<td>g kg⁻¹ of soil</td>
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<td></td>
<td></td>
<td></td>
</tr>
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<td>34</td>
<td>157</td>
<td>140</td>
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<td>75</td>
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<td>337</td>
<td>487</td>
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<td>11</td>
<td>96</td>
<td>89</td>
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<td>351</td>
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28
### Table B: Chemical properties

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<td>inches</td>
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<td>Mg</td>
<td>K</td>
<td>H</td>
<td>CEC</td>
<td>BS</td>
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### Table C: Chemical properties

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<th>EBS</th>
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### Table E: Sand mineralogy

<table>
<thead>
<tr>
<th>Depth</th>
<th>Quartz</th>
<th>Feldspar</th>
<th>Plagioclase</th>
<th>Mica</th>
<th>Opaque minerals*</th>
<th>Heavy minerals*</th>
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*Opaque minerals are ilmenite, magnetite, hematite, etc.; Heavy minerals are translucent zircon, tourmaline, rutile, epidote, hornblende, etc.; Tr = Trace.

### Table F: Chemical properties

<table>
<thead>
<tr>
<th>Depth</th>
<th>pH</th>
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<th>Mg</th>
<th>P</th>
<th>K</th>
<th>Zn</th>
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<td>1</td>
<td>8</td>
<td>0.2</td>
<td>0.2</td>
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</table>
Catpoint Series

The Catpoint series consists of very deep, somewhat excessively drained soils on stream terraces. They formed in sandy fluvial and marine sediments. Slopes range from 0 to 4 percent.

Catpoint loamy sand, woodlands, 0 to 4 percent slopes; 1.1 miles east-northeast of Highway VA-614 and Collins Run on Virginia Division of Forestry fire trail 1501, 0.8 mile northeast of junction Highway VA-614 and Virginia Division of Forestry fire trail 1501, 0.2 mile south of Chickahominy River; elevation 25 feet.

A--0 to 8 inches; dark brown (10YR 3/3) loamy sand; weak fine granular structure; very friable, nonsticky, nonplastic; common fine, medium, and coarse tree roots; common medium discontinuous tubular pores; very strongly acid; clear wavy boundary.

E--8 to 24 inches; yellowish brown (10YR 5/6) fine sand; single grain; loose; few fine and medium tree roots; common medium discontinuous tubular pores; very strongly acid; gradual smooth boundary.

E and Bt1--24 to 41 inches; light yellowish brown (10YR 6/4) loamy sand; single grain; loose; yellowish brown (10YR 5/6) loamy fine sand; weak fine granular structure; very friable lamellae; common fine and medium roots; common fine discontinuous pores; very strongly acid; clear smooth boundary.

E and Bt2--41 to 66 inches; light yellowish brown (10YR 6/4) fine sand; single grain; loose; strong brown (7.5YR 5/6) loamy sand lamellae; weak fine granular structure; very friable; common fine and few coarse tree roots; common medium discontinuous tubular pores; strongly acid.

Table A: Particle-size distribution

<table>
<thead>
<tr>
<th>Depth inches</th>
<th>VC</th>
<th>C</th>
<th>M</th>
<th>F</th>
<th>VF</th>
<th>Total</th>
<th>Silt</th>
<th>Clay</th>
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<td>647</td>
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Table B: Chemical properties

<table>
<thead>
<tr>
<th>Depth</th>
<th>Ca</th>
<th>Mg</th>
<th>K</th>
<th>H</th>
<th>CEC</th>
<th>BS</th>
</tr>
</thead>
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<tr>
<td>inches</td>
<td>cmol (+) kg⁻¹</td>
<td>%</td>
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Table C: Chemical properties

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<th>Al</th>
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<th>EBS</th>
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Table E: Sand mineralogy

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<th>Plagioclase</th>
<th>Mica</th>
<th>Opaque minerals*</th>
<th>Heavy minerals*</th>
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<td>inches</td>
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*Opaque minerals are ilmenite, magnetite, hematite, etc.; Heavy minerals are translucent zircon, tourmaline, rutile, epidote, hornblende, etc.; Tr = Trace.

**Chickahominy Series**

The Chickahominy series consists of very deep, poorly drained soils on stream terraces and flats along the Chickahominy and James Rivers. They formed in clayey fluvial sediments. Slopes range from 0 to 2 percent.

Chickahominy loam, woodlands, 0 to 2 percent slopes; 1.2 miles northwest of Highway VA-5 bridge and Chickahominy River, 30 yards south of Highway VA-5, 1.3 miles north of mouth of Tomahund Creek, 0.9 mile southwest of mouth of Morris Creek; elevation 38 feet.
A--0 to 2 inches; dark grayish brown (2.5Y 4/2) 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 5 inches; dark grayish brown (10YR 4/2) loam; common fine prominent light olive brown (2.5Y 5/4) mottles; moderate medium granular structure; friable, sticky, plastic; many fine, medium, and coarse roots; common very fine tubular pores; extremely acid; clear smooth boundary.

Btg1--5 to 35 inches; grayish brown (10YR 5/2) clay; common fine prominent yellowish brown (10YR 5/6) mottles; strong medium and fine subangular blocky structure; firm, sticky, plastic; few fine roots; many distinct clay films on faces of peds; few fine flakes of mica; extremely acid; gradual smooth boundary.

Btg2--35 to 50 inches; gray (10YR 5/1) clay; many coarse prominent yellowish brown (10YR 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 wavy boundary.

Btg3--50 to 64 inches; light gray (10YR 6/1) clay; common medium prominent yellowish brown (10YR 5/6) mottles; moderate medium subangular and angular blocky structure; firm, sticky, plastic; many distinct clay films on faces of peds; very strongly acid.

Table A: Particle-size distribution

<table>
<thead>
<tr>
<th>Depth</th>
<th>VC</th>
<th>C</th>
<th>M</th>
<th>F</th>
<th>VF</th>
<th>Total</th>
<th>Silt</th>
<th>Clay</th>
</tr>
</thead>
<tbody>
<tr>
<td>inches</td>
<td>g kg⁻¹ of soil</td>
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<td></td>
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<td></td>
<td></td>
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<td></td>
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<td>4</td>
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Table B: Chemical properties

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<th>BS</th>
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<td>Mg</td>
<td>K</td>
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Table C: Chemical properties

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<th>Al</th>
<th>ECEC</th>
<th>EBS</th>
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<td>cmol (+) kg⁻¹</td>
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<td></td>
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Table D: Clay mineralogy

<table>
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<tr>
<th>Depth</th>
<th>HIV⁺</th>
<th>Mica</th>
<th>Verm⁺</th>
<th>Kaolinite</th>
<th>Quartz</th>
<th>Mont⁺</th>
<th>Gibbsite</th>
<th>Misc⁺</th>
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<tbody>
<tr>
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<td></td>
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</table>

*HIV⁺ = hydroxy interlayered vermiculite; Verm⁺ = vermiculite; Mont⁺ = montmorillonite; Misc⁺ = miscellaneous; Tr = Trace.

Chickahominy Series - Supplemental profile 1

Chickahominy loam, ponded, woodlands, 0 to 2 percent slopes; 1.3 miles south of the junction of Highways VA-623 and VA-627, 0.2 mile southwest of the junction of Highways VA-621 and VA-623, 170 yards west of Highway VA-623; elevation 32 feet

A--0 to 4 inches; black (5Y 2/1) loam; weak fine granular structure; friable, sticky, slightly plastic; common fine roots; few fine tubular pores; extremely acid; abrupt smooth boundary.

BAg--4 to 8 inches; dark gray (5Y 4/1) loam; few fine and coarse prominent dark yellowish brown (10YR 4/6) mottles; moderate medium subangular blocky structure; friable, sticky, plastic; few fine roots; common very fine tubular pores; extremely acid; abrupt smooth boundary.

Btg1--8 to 25 inches; dark gray (N 4) clay; common medium prominent olive yellow (2.5Y 6/8) 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.

Btg2--25 to 47 inches; light gray (5Y 6/1) clay; common medium prominent yellowish brown (10YR 5/8) mottles; strong medium angular and subangular blocky structure; firm, sticky, plastic; few fine roots; many distinct clay films on faces of peds; very strongly acid; gradual smooth boundary.

BCg--47 to 64 inches; light gray (5Y 7/1) clay loam; many medium prominent yellowish brown (10YR 5/8) mottles; weak medium subangular blocky structure; friable, sticky, plastic; many distinct clay films on faces of peds; very strongly acid; gradual smooth boundary.
Cg--64 to 72 inches; mottled light gray (5Y 7/1), yellowish brown (10YR 5/8), and strong brown (7.5YR 5/6) fine sandy loam; massive; friable, sticky, plastic; very strongly acid.

**Table A: Particle-size distribution**

<table>
<thead>
<tr>
<th>Depth</th>
<th>VC</th>
<th>C</th>
<th>M</th>
<th>F</th>
<th>VF</th>
<th>Total</th>
<th>Silt</th>
<th>Clay</th>
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<tbody>
<tr>
<td>inches</td>
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<td>355</td>
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**Table C: Chemical properties**

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<td>7.05</td>
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Table D: Clay mineralogy

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<th>Verm*</th>
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<th>Quartz</th>
<th>Mont*</th>
<th>Gibbsite</th>
<th>Misc*</th>
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*HIV = hydroxy interlayered vermiculite; Verm = vermiculite; Mont = montmorillonite; Misc = miscellaneous; Tr = Trace.

Table F: Chemical properties

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<th>P</th>
<th>K</th>
<th>Zn</th>
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<td>1.7</td>
<td>0.4</td>
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</table>

**Conetoe Series**

The Conetoe series consists of very deep, well drained soils on stream terraces. They formed in fluvial sediments. Slopes range from 0 to 4 percent.

Conetoe loamy sand, woodlands, 0 to 4 percent slopes; 2.2 miles west of Walkers Dam on Virginia Department of Forestry fire trail 1501, 0.8 mile west-southwest of Cypress Bank Landing, 0.5 mile southwest of center line of Chickahominy River; elevation 25 feet.

A--0 to 5 inches; very dark grayish brown (10YR 3/2) loamy sand; weak fine granular structure; very friable; many medium and few fine tree roots; common medium discontinuous tubular pores; extremely acid; gradual smooth boundary.

E--5 to 22 inches; light yellowish brown (10YR 6/4) loamy sand; single grain; very friable; common medium and fine tree roots; common medium discontinuous tubular pores; very strongly acid; gradual smooth boundary.

Bt1--22 to 42 inches; strong brown (7.5YR 5/6) sandy loam; weak fine granular structure; friable; few fine and medium tree roots; few medium discontinuous tubular pores; few fine flakes of mica; strongly acid; gradual smooth boundary.

Bt2--42 to 50 inches; yellowish brown (10YR 5/6) loamy fine sand; single grain and weak fine granular structure; loose and very friable; common fine and medium tree roots; common medium discontinuous tubular pores; few fine flakes of mica; strongly acid; gradual smooth boundary.
C--50 to 72 inches; very pale brown (10YR 7/3) sand; thin lamellae of yellowish brown (10YR 5/6) loamy sand; single grain; loose; few fine tree roots; common medium discontinuous tubular pores; few fine flakes of mica; strongly acid.

Table A: Particle-size distribution

<table>
<thead>
<tr>
<th>Depth</th>
<th>VC</th>
<th>C</th>
<th>M</th>
<th>F</th>
<th>VF</th>
<th>Total</th>
<th>Silt</th>
<th>Clay</th>
</tr>
</thead>
<tbody>
<tr>
<td>inches</td>
<td>g kg(^{-1}) of soil</td>
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<td></td>
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<td></td>
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<td>862</td>
<td>74</td>
<td>64</td>
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<td>373</td>
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<td>839</td>
<td>94</td>
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<td>330</td>
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Table B: Chemical properties

<table>
<thead>
<tr>
<th>Depth</th>
<th>Exchangeable cations</th>
<th>Ca</th>
<th>Mg</th>
<th>K</th>
<th>H</th>
<th>CEC</th>
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Table C: Chemical properties

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Table E: Sand mineralogy

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<th>Mica</th>
<th>Opaque minerals*</th>
<th>Heavy minerals*</th>
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*Opaque minerals are ilmenite, magnetite, hematite, etc.; Heavy minerals are translucent zircon, tourmaline, rutile, epidote, hornblende, etc.; Tr = Trace.

**Craven Series**

The Craven series consists of very deep, moderately well drained soils on uplands. They formed in clayey fluvial and marine sediments. Slopes range from 2 to 10 percent.

Craven loam, cultivated, 2 to 6 percent slopes; 70 yards south of Nance Shop Historic Marker on Highway VA-603, 0.6 mile west-southwest of the junction of Highways VA-603 and VA-609 at the communication tower, 1.0 mile east-northeast of the junction of Highways VA-603 and VA-605; elevation 130 feet.

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

Bt1--10 to 22 inches; strong brown (7.5YR 5/6) clay; common fine prominent red (2.5YR 5/8) and common fine distinct yellowish brown (10YR 5/6) mottles; strong fine angular blocky structure; firm, sticky, plastic; few medium and coarse roots; few fine tubular pores; many distinct clay films on faces of peds; common fine flakes of mica; strongly acid; clear smooth boundary.

Bt2--22 to 36 inches; mottled strong brown (7.5YR 5/8), light gray (10YR 7/1), red (2.5YR 5/8), yellowish red (5YR 5/8), and yellowish brown (10YR 5/6) clay; strong fine angular blocky structure; firm, sticky, plastic; common fine and few medium roots; many distinct clay films on faces of peds; few fine flakes of mica; very strongly acid; gradual smooth boundary.

Bt3--36 to 45 inches; mottled strong brown (7.5YR 5/8), light gray (10YR 6/1), reddish brown (2.5YR 5/4), and yellowish red (5YR 5/8) clay; strong medium angular blocky structure; firm, sticky, plastic; few fine roots; few distinct clay films on faces of peds; few fine flakes of mica; extremely acid; gradual smooth boundary.

BCg--45 to 70 inches; mottled and streaked light gray (10YR 7/1), reddish brown (2.5YR 5/4), and strong brown (7.5YR 5/8) stratified clay and clay loam; moderate coarse angular blocky structure in Bt part and massive in C part; friable, sticky, plastic; few fine roots; few fine flakes of mica; extremely acid.
### Table A: Particle-size distribution

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<tr>
<th>Depth</th>
<th>Sand</th>
<th>VC</th>
<th>C</th>
<th>M</th>
<th>F</th>
<th>VF</th>
<th>Total</th>
<th>Silt</th>
<th>Clay</th>
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</tr>
<tr>
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<td>4 8 8 56 91 168 320 512</td>
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</tr>
<tr>
<td>45-70</td>
<td>12 16 11 100 137 276 370 354</td>
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### Table B: Chemical properties

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### Table C: Chemical properties

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<th>Al</th>
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Table D: Clay mineralogy

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<th>Verm*</th>
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<th>Quartz</th>
<th>Mont*</th>
<th>Gibbsite</th>
<th>Misc*</th>
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*HIV = hydroxy interlayered vermiculite; Verm = vermiculite; Mont = montmorillonite; Misc = miscellaneous; Tr = Trace.

Table F: Chemical properties

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<th>Depth</th>
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<th>Mg</th>
<th>P</th>
<th>K</th>
<th>Zn</th>
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Photo 1. These native American Indians are walking across a parking area on Craven soils. About 600 Chickahominy Indians, an integral part of Charles City County, are current residents.
**Dogue Series**

The Dogue series consists of very deep, moderately well drained soils on stream terraces. They formed in clayey fluvial sediments. Slopes range from 0 to 10 percent.

Dogue silt loam, cultivated, 0 to 2 percent slopes; 0.6 mile south of the junction of Highways VA-618 and VA-5, 120 yards southwest of the junction of Highway VA-618 and farm lane, 20 yards west of farm lane; elevation 40 feet.

Ap--0 to 12 inches; grayish brown (10YR 5/2) silt loam; moderate medium granular structure; friable, slightly sticky, slightly plastic; few fine roots; common fine tubular pores; slightly acid; abrupt smooth boundary.

Bt1--12 to 24 inches; yellowish brown (10YR 5/8) clay; common medium distinct light yellowish brown (10YR 6/4) and strong brown (7.5YR 5/8) mottles; 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; very strongly acid; clear smooth boundary.

Bt2--24 to 36 inches; mottled yellowish brown (10YR 5/8), light yellowish brown (10YR 6/4), red (2.5YR 4/8), and light gray (N 6) clay; 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; extremely acid; clear smooth boundary.

Bt3--36 to 52 inches; mottled red (2.5YR 4/8), yellowish brown (10YR 5/8), light yellowish brown (10YR 6/4), strong brown (7.5YR 5/6), and light gray (N 6) clay; moderate medium and fine subangular and angular blocky structure; firm, sticky, plastic; few fine roots; common fine tubular pores; common distinct clay films on faces of peds; few fine flakes of mica; extremely acid; clear smooth boundary.

BCg--52 to 72 inches; mottled light gray (N 6), strong brown (7.5YR 5/8), yellowish brown (10YR 5/6), light yellowish brown (10YR 6/4), and red (2.5YR 4/8) clay loam; weak medium subangular blocky structure; friable, sticky, plastic; common fine flakes of mica; extremely acid.

Table A: Particle-size distribution

<table>
<thead>
<tr>
<th>Depth</th>
<th>Sand</th>
<th>VC</th>
<th>C</th>
<th>M</th>
<th>F</th>
<th>VF</th>
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<th>Clay</th>
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### Table B: Chemical properties

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### Table C: Chemical properties

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### Table F: Chemical properties

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Dogue Series - Supplemental profile 1

Dogue loam, cultivated, 0 to 2 percent slopes; 0.6 mile southwest of the junction of Highways VA-5 and VA-632, 0.8 mile southeast of Sherwood Forest Plantation, 0.7 mile north of the mouth of Tyler Creek; elevation 35 feet.

Ap--0 to 9 inches; brown (10YR 4/3) loam; moderate medium granular structure; friable, slightly sticky, slightly plastic; few fine roots; common fine tubular pores; slightly acid; abrupt smooth boundary.

Bt1--9 to 23 inches; yellowish brown (10YR 5/6) clay loam; few fine distinct light yellowish brown (10YR 6/4) and common medium prominent very dark grayish brown (10YR 3/2) mottles; 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; common fine flakes of mica; moderately acid; clear smooth boundary.

Bt2--23 to 35 inches; mottled light brownish gray (10YR 6/2), yellowish brown (10YR 5/8), pale brown (10YR 6/3), and strong brown (7.5YR 5/6) sandy clay loam; moderate medium subangular blocky structure; friable, sticky, plastic; common fine and medium tubular pores; common faint clay films on faces of peds; common fine flakes of mica; very strongly acid; clear smooth boundary.

Bt3--35 to 51 inches; mottled light brownish gray (10YR 6/2), yellowish brown (10YR 5/8), light yellowish brown (10YR 6/4), strong brown (7.5YR 5/6), dark brown (7.5YR 3/2), and brown (7.5YR 4/4) sandy clay loam; weak medium subangular blocky structure; friable, sticky, plastic; common fine tubular pores; common distinct clay films on faces of peds; common fine flakes of mica; very strongly acid; clear smooth boundary.

BCg--51 to 64 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; common fine flakes of mica; very strongly acid; gradual smooth boundary.

Cg--64 to 72 inches; mottled light gray (10YR 6/1), yellowish brown (10YR 5/6), and strong brown (7.5YR 5/6) loam; massive; friable, sticky, plastic; common fine flakes of mica; very strongly acid.
### Table A: Particle-size distribution

<table>
<thead>
<tr>
<th>Depth</th>
<th>VC</th>
<th>C</th>
<th>M</th>
<th>F</th>
<th>VF</th>
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<th>Clay</th>
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### Table C: Chemical properties

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**Table D: Clay mineralogy**

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<th>Quartz</th>
<th>Mont*</th>
<th>Gibbsite</th>
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*HIV = hydroxy interlayered vermiculite; Verm = vermiculite; Mont = montmorillonite; Misc = miscellaneous; Tr = Trace.

**Table F: Chemical properties**

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**Dragston Series**

The Dragston series consists of very deep, somewhat poorly drained soils on low stream terraces. They formed in loamy fluvial sediments. Slopes range from 0 to 3 percent.

Dragston fine sandy loam, woodlands, 0 to 2 percent slopes; 0.2 mile southwest of borrow pit on Highway VA-618, 0.4 mile south-southwest of crossing of Virginia Power transmission line and Highway VA-618, 0.5 mile south-southwest of gauging station on Chickahominy River, 50 yards west of Highway VA-618; elevation 22 feet.

A--0 to 4 inches; very dark grayish brown (10YR 3/2) 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; very strongly acid; abrupt smooth boundary.

E1--4 to 8 inches; pale brown (10YR 6/3) fine sandy loam; common medium distinct light gray (10YR 6/1) mottles; weak medium and fine granular structure; friable, slightly sticky, slightly plastic; many fine, medium, and coarse roots; common fine and medium tubular pores; very strongly acid; abrupt smooth boundary.

E2--8 to 12 inches; mottled light brownish gray (10YR 6/2) and yellowish brown (10YR 5/6) fine sandy loam; weak fine granular structure; friable, slightly
sticky, slightly plastic; few fine roots; common medium and fine tubular pores; very strongly acid; clear smooth boundary.

Btg--12 to 25 inches; light gray (10YR 6/1) fine sandy loam; many coarse prominent yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable, sticky, slightly plastic; few fine and medium roots; common fine, medium, and coarse tubular pores; very strongly acid; gradual smooth boundary.

BC--25 to 35 inches; mottled yellowish brown (10YR 5/6), brownish yellow (10YR 6/6), and light gray (10YR 6/1) loamy fine sand; massive; friable, slightly sticky, slightly plastic; few fine and medium roots; common fine, medium, and coarse tubular pores; few fine flakes of mica; few faint clay films and clay bridges on sand grains; slightly acid; gradual smooth boundary.

Cg1--35 to 45 inches; light brownish gray (10YR 6/2) sand; common medium prominent yellowish brown (10YR 5/6) mottles; single grain; loose; common fine and very fine black mineral grains; slightly acid; clear smooth boundary.

C1--45 to 54 inches; dark yellowish brown (10YR 4/4) sand; common medium distinct brown (10YR 5/3) mottles; single grain; loose; many fine and very fine black mineral grains; neutral; clear smooth boundary.

C2--54 to 64 inches; mottled grayish brown (10YR 5/2) and yellowish brown (10YR 5/4) sand; single grain; loose; slightly acid; clear smooth boundary.

C3--64 to 72 inches; dark yellowish brown (10YR 4/6) sandy loam; massive; friable, sticky, plastic; neutral; clear smooth boundary.

Cg2--72 to 75 inches; greenish gray (5BG 6/1) sandy clay loam; massive; friable, sticky, plastic; neutral.

Table A: Particle-size distribution

<table>
<thead>
<tr>
<th>Depth</th>
<th>VC</th>
<th>C</th>
<th>M</th>
<th>F</th>
<th>VF</th>
<th>Total</th>
<th>Silt</th>
<th>Clay</th>
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<td>inches</td>
<td>g kg⁻¹ of soil</td>
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Table C: Chemical properties

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Table E: Sand mineralogy

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*Opaque minerals are ilmenite, magnetite, hematite, etc.; Heavy minerals are translucent zircon, tourmaline, rutile, epidote, hornblende, etc.; Tr = Trace.
### Table F: Chemical properties

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### Dragston Series - Supplemental profile 1

Dragston fine sandy loam, woodlands, 0 to 2 percent slopes; 0.3 mile southwest-southwest of the junction of Highway VA-618 and Virginia Power transmission line, 170 yards southwest of borrowpit on Highway VA-618; elevation 22 feet.

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

E--4 to 8 inches; dark brown (10YR 4/3) fine sandy loam; weak fine granular structure; friable, nonsticky, nonplastic; common fine roots; common fine and medium tubular pores; extremely acid; clear smooth boundary.

Btg1--8 to 16 inches; mottled very dark grayish brown (10YR 3/2), grayish brown (10YR 5/2), and yellowish brown (10YR 5/6) fine sandy loam; weak medium granular blocky structure; friable, nonsticky, nonplastic; few fine roots; common fine, medium, and coarse tubular pores; extremely acid; clear smooth boundary.

Cg1--16 to 26 inches; light gray (10YR 7/2) loamy fine sand; common coarse prominent yellowish brown (10YR 5/6) mottles; single grain; loose; very strongly acid; clear smooth boundary.

Cg2--26 to 50 inches; mottled light brownish gray (10YR 6/2) and very dark grayish brown (10YR 3/2) loamy sand; single grain; loose; strongly acid; gradual smooth boundary.

Cg3--50 to 70 inches; mottled light gray (10YR 6/1) and very dark grayish brown (10YR 3/2) sand; single grain; loose; common medium flakes of mica; moderately acid.
Table A: Particle-size distribution

<table>
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<tr>
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<th>M</th>
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Table B: Chemical properties

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Table C: Chemical properties

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Table E: Sand mineralogy

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<th>Opaque minerals*</th>
<th>Heavy minerals*</th>
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<td>0</td>
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*Opaque minerals are ilmenite, magnetite, hematite, etc.; Heavy minerals are translucent zircon, tourmaline, rutile, epidote, hornblende, etc.; Tr = Trace.

**Emporia Series**

The Emporia series consists of very deep, well drained soils on uplands. They formed in stratified loamy and clayey fluvial and marine sediments. Slopes range from 2 to 6 percent.

Emporia fine sandy loam, woodlands, 2 to 6 percent slopes; 0.7 mile south of the junction of Highways VA-620 and VA-609, 0.3 mile north of Virginia Power transmission line and East Run, 0.2 mile south-southwest of Highway VA-620, 330 yards east of Virginia Power transmission lines; elevation 83 feet.

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

E--4 to 11 inches; brown (10YR 5/3) fine sandy loam; weak fine granular structure; friable, slightly sticky, nonplastic; few fine roots; many fine and medium vesicular pores; very strongly acid; abrupt smooth boundary.

Bt1--11 to 22 inches; yellowish brown (10YR 5/6) loam; moderate medium subangular blocky structure; friable, sticky, plastic; few fine and medium roots; few fine and medium tubular pores; common distinct clay films on faces of peds; very strongly acid; gradual smooth boundary.

Bt2--22 to 31 inches; yellowish brown (10YR 5/6) clay loam; common medium prominent yellowish red (5YR 5/8) and strong brown (7.5YR 5/8) mottles; weak 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; clear smooth boundary.

Bt3--31 to 40 inches; yellowish brown (10YR 5/6) clay; common medium prominent yellowish red (5YR 5/6) and common medium distinct strong brown (7.5YR 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; very strongly acid; gradual smooth boundary.

Bt4--40 to 52 inches; mottled yellowish red (5YR 5/6), strong brown (7.5YR 5/8), and light gray (10YR 6/1) clay; moderate coarse subangular blocky structure; firm, sticky, plastic; few fine roots; few fine tubular pores; common distinct clay films on faces of peds; very strongly acid; gradual smooth boundary.
BC--52 to 60 inches; mottled red (2.5YR 5/6), yellowish brown (10YR 5/6), and
light gray (10YR 6/1) sandy clay loam; friable, sticky, plastic; very strongly
acid; clear smooth boundary.

C--60 to 72 inches; mottled yellowish red (5YR 5/6) and light gray (10YR 6/1)
sandy loam; massive; sticky, plastic; very strongly acid.

Table A: Particle-size distribution

<table>
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<th>Depth</th>
<th>VC</th>
<th>C</th>
<th>M</th>
<th>F</th>
<th>VF</th>
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**Emporia Series - Supplemental profile 1**

Emporia loamy sand, cultivated, 0 to 2 percent slopes, in an area of Emporia-Kempsville complex; 1.6 miles northwest of the junction of Highway VA-650 and Virginia Division of Forestry Fire Trail 1557, 0.6 mile north of the junction of Highways VA-604 and VA-605; elevation 132 feet.

A--0 to 9 inches; brown (10YR 5/3) loamy sand; weak fine granular structure; friable, nonsticky, nonplastic; few fine roots; many fine and medium vesicular pores; moderately acid; abrupt smooth boundary.

E--9 to 15 inches; light yellowish brown (10YR 6/4) fine sandy loam; moderate, medium, platy structure; friable and brittle, nonsticky, nonplastic; few fine roots; many fine and medium vesicular pores; moderately acid; abrupt smooth boundary.
Bt1--15 to 35 inches; strong brown (7.5YR 4/6) fine sandy loam; weak medium subangular blocky structure; friable, sticky, plastic; few fine and medium tubular pores; common distinct clay films on faces of peds; strongly acid; gradual smooth boundary.

Bt2--35 to 47 inches; strong brown (7.5YR 5/8) sandy clay loam; common medium distinct yellowish red (5YR 5/8) mottles; weak medium subangular blocky structure; friable, sticky, plastic; few fine tubular pores; common distinct clay films on faces of peds; strongly acid; gradual smooth boundary.

Bt3--47 to 56 inches; mottled strong brown (7.5YR 5/6) and yellowish red (5YR 5/6) sandy clay loam; weak medium subangular blocky structure; friable, sticky, plastic; few fine tubular pores; common distinct clay films on faces of peds; very strongly acid; abrupt smooth boundary.

Bt4--56 to 70 inches; mottled yellowish red (5YR 5/8), strong brown (7.5YR 5/8), red (2.5YR 4/8), and light gray (10YR 6/1) sandy clay; weak medium subangular blocky structure; firm, sticky, plastic; few fine tubular pores; common distinct clay films on faces of peds; very strongly acid.

Table A: Particle-size distribution

<table>
<thead>
<tr>
<th>Depth</th>
<th>VC</th>
<th>C</th>
<th>M</th>
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Table B: Chemical properties

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Table E: Sand mineralogy

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<th>Plagioclase</th>
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*Opaque minerals are ilmenite, magnetite, hematite, etc.; Heavy minerals are translucent zircon, tourmaline, rutile, epidote, hornblende, etc.; Tr = Trace.

Table F: Chemical properties

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Emporia Series - Supplemental profile 2

Emporia loam, woodlands, 2 to 6 percent slopes; 0.7 mile south of the junction of Highways VA-603 and VA-609, 0.5 mile north of the junction of Highways VA-602 and VA-609, 15 yards east of farm lane; elevation 135 feet.

Ap--0 to 4 inches; dark grayish brown (10YR 4/2) loam; weak fine granular structure; friable, slightly sticky, nonplastic; common fine roots; many fine and medium vesicular pores; extremely acid; abrupt smooth boundary.
E--4 to 10 inches; pale brown (10YR 6/3) loam; moderate medium granular structure; friable, slightly sticky, slightly plastic; few fine and medium roots; many fine and medium vesicular pores; very strongly acid; abrupt smooth boundary.

BA--10 to 14 inches; light yellowish brown (10YR 6/4) loam; weak medium subangular blocky structure; friable, sticky, plastic; few fine roots; few fine and medium tubular pores; common distinct clay films on faces of peds; very strongly acid; clear smooth boundary.

Bt1--14 to 29 inches; yellowish brown (10YR 5/6) loam; moderate medium subangular blocky structure; friable, sticky, plastic; common fine roots; few fine and medium tubular pores; common distinct clay films on faces of peds; very strongly acid; gradual smooth boundary.

Bt2--29 to 44 inches; yellowish brown (10YR 5/6) clay loam; common medium prominent yellowish red (5YR 5/8) and strong brown (7.5YR 5/8) 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.

Bt3--44 to 56 inches; yellowish brown (10YR 5/8) clay loam; many medium distinct strong brown (7.5YR 5/8) and many medium prominent yellowish red (5YR 5/8) and light gray (10YR 7/2) mottles; weak coarse subangular blocky structure; firm, sticky, plastic; few fine roots; few fine tubular pores; common distinct clay films on faces of peds; very strongly acid; gradual smooth boundary.

Bt4--56 to 72 inches; mottled light gray (10YR 6/1), yellowish red (5YR 5/8), strong brown (7.5YR 5/8), yellowish brown (10YR 5/8), and red (2.5YR 4/8) clay; weak medium subangular blocky structure; firm, sticky, plastic; few fine roots; few fine tubular pores; common distinct clay films on faces of peds; very strongly acid.

Table A: Particle-size distribution

<table>
<thead>
<tr>
<th>Depth</th>
<th>VC</th>
<th>C</th>
<th>M</th>
<th>F</th>
<th>VF</th>
<th>Total</th>
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<th>Clay</th>
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Table E: Sand mineralogy

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<th>Plagioclase</th>
<th>Mica</th>
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*Opaque minerals are ilmenite, magnetite, hematite, etc.; Heavy minerals are translucent zircon, tourmaline, rutile, epidote, hornblende, etc.; Tr = Trace.
Table F: Chemical properties

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**Izagora Series**

The Izagora series consists of very deep, moderately well drained soils on stream terraces. They formed in loamy fluvial sediments. Slopes range from 0 to 4 percent.

Izagora silt loam, cultivated, 0 to 2 percent slopes; 0.5 mile southwest of the junction of Highways VA-619 and VA-638, 1.2 miles east of Olds Point, 1.9 miles northwest of the mouth of Kittewan Creek; elevation 67 feet.

Ap--0 to 10 inches; grayish brown (10YR 5/2) silt loam; weak fine granular and subangular blocky structure; friable, slightly sticky, nonplastic; common fine roots; common fine tubular pores; slightly acid; clear smooth boundary.

AB--10 to 18 inches; pale brown (10YR 6/3) silt loam; weak fine granular and moderate medium subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; common fine tubular and few fine vesicular pores; slightly acid; clear smooth boundary.

Bt1--18 to 26 inches; yellowish brown (10YR 5/6) clay loam; common fine distinct pale brown (10YR 6/3) mottles; 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; moderately acid; clear smooth boundary.

Bt2--26 to 35 inches; yellowish brown (10YR 5/6) clay loam; common fine distinct light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; friable, sticky, plastic; common fine roots; common fine tubular pores; common distinct clay films on faces of peds; strongly acid; clear smooth boundary.

Bt3--35 to 43 inches; mottled yellowish brown (10YR 5/6), light brownish gray (10YR 6/2), and strong brown (7.5YR 5/6) clay loam; moderate medium subangular blocky structure; friable, sticky, plastic; common fine roots; common fine and medium tubular pores; common faint clay films on faces of peds; very strongly acid; clear smooth boundary.
Bt4--43 to 59 inches; mottled yellowish brown (10YR 5/6), light gray (10YR 6/1), strong brown (7.5YR 5/6), and yellowish red (5YR 5/6) clay loam; moderate medium subangular blocky structure; firm, sticky, plastic; few fine tubular pores; common thick discontinuous clay films along vertical faces of some peds; extremely acid; gradual smooth boundary.

BC--59 to 72 inches; mottled yellowish brown (10YR 5/6), strong brown (7.5YR 5/6), yellowish red (5YR 5/6), and light gray (10YR 6/1) clay; weak medium subangular blocky structure; firm, sticky, plastic; very strongly acid.

Table A: Particle-size distribution

<table>
<thead>
<tr>
<th>Depth (inches)</th>
<th>VC</th>
<th>C</th>
<th>M</th>
<th>F</th>
<th>VF</th>
<th>Total</th>
<th>Silt</th>
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Table B: Chemical properties

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Table C: Chemical properties

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**Kempsville Series**

The Kempsville series consists of very deep, well drained soils on uplands. They formed in loamy fluvial and marine sediments. Slopes range from 2 to 6 percent.

Kempsville loamy sand, cultivated, 2 to 6 percent slopes; 1.9 miles south-southeast of the mouth of Tonyham Swamp, 1.4 miles southwest of Cypress Banks Landing, 1.6 miles southwest of Binns Bar, 1.2 miles north of Highway VA-615; elevation 106 feet.

Ap--0 to 8 inches; brown (10YR 5/3) loamy sand; weak fine granular structure; very friable, nonsticky, nonplastic; few fine roots; common fine and few medium tubular pores; strongly acid; abrupt smooth boundary.

E--8 to 12 inches; pale brown (10YR 6/3) sandy loam; weak fine granular structure; very friable, slightly sticky, nonplastic; few fine roots; common fine and medium tubular pores; moderately acid; abrupt smooth boundary.

BE--12 to 19 inches; yellowish brown (10YR 5/4) sandy loam; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; few fine
roots; few fine and coarse tubular pores; few faint clay films on faces of peds and clay bridges between sand grains; slightly acid; abrupt smooth boundary.

Bt1--19 to 31 inches; strong brown (7.5YR 5/6) sandy loam; moderate medium subangular blocky structure; friable, sticky, plastic; few fine roots; common fine and medium tubular pores; many distinct clay films on faces of peds and clay bridges between sand grains; 5 percent rock fragments; slightly acid; gradual smooth boundary.

Bt2--31 to 40 inches; strong brown (7.5YR 5/6) sandy loam; common medium prominent pale brown (10YR 6/3) mottles; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; common fine vesicular pores; many distinct clay bridges between sand grains; slightly acid; clear smooth boundary.

Bt3--40 to 45 inches; strong brown (7.5YR 5/6) sandy clay loam; weak fine subangular blocky structure; friable, sticky, plastic; few fine and medium tubular pores; many distinct clay films on faces of peds and bridges between sand grains; slightly acid; clear smooth boundary.

Bt4--45 to 64 inches; strong brown (7.5YR 5/6) sandy clay loam; common medium distinct yellowish red (5YR 5/6) and few medium prominent yellowish brown (10YR 5/8) mottles; moderate medium subangular blocky structure; friable, sticky, plastic; few fine and medium tubular pores; common distinct clay films on faces of peds; common clay bridges between sand grains; strongly acid; gradual smooth boundary.

BC--64 to 72 inches; strong brown (7.5YR 5/6) sandy clay loam; common medium prominent yellowish brown (10YR 5/8) and yellowish red (5YR 5/8) mottles; weak fine subangular blocky structure; friable, sticky, plastic; few fine faint clay films on faces of peds; common clay bridges between sand grains; very strongly acid.

Table A: Particle-size distribution

<table>
<thead>
<tr>
<th>Depth</th>
<th>VC</th>
<th>C</th>
<th>M</th>
<th>F</th>
<th>VF</th>
<th>Total</th>
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<th>Clay</th>
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Table C: Chemical properties

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Table F: Chemical properties

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Kempsville Series - Supplemental profile 1

Kempsville sandy loam, cultivated, 2 to 6 percent slopes; 1.3 miles northwest of the junction of Highway VA-650 and Virginia Division of Forestry Fire Trail 1557, 0.6 mile northeast of the junction of Highways VA-604 and VA-605; elevation 120 feet.

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

E--11 to 17 inches; dark yellowish brown (10YR 4/4) sandy loam; weak fine granular structure; friable, slightly sticky, slightly plastic; few fine roots; common fine and medium tubular pores; slightly acid; clear smooth boundary.

Bt1--17 to 27 inches; yellowish brown (10YR 5/4) sandy loam; weak medium subangular blocky structure; friable, sticky, plastic; few fine roots; few fine and coarse tubular pores; few faint clay films on faces of peds and clay bridges between sand grains; slightly acid; gradual smooth boundary.

Bt2--27 to 42 inches; strong brown (7.5YR 5/6) sandy loam; moderate medium subangular blocky structure; friable, sticky, plastic; common fine and medium tubular pores; many distinct clay films on faces of peds and clay bridges between sand grains; 5 percent rock fragments; moderately acid; gradual smooth boundary.

2Bt3--42 to 56 inches; strong brown (7.5YR 4/6) sandy loam; common medium prominent light yellowish brown (10YR 6/4) and yellowish red (5YR 4/6) mottles; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; common fine tubular pores; many distinct clay bridges between sand grains; 20 percent rock fragments; moderately acid; gradual smooth boundary.

2Bt4--56 to 70 inches; red (2.5YR 4/6) sandy clay loam; weak fine subangular blocky structure; friable, sticky, plastic; few fine and medium tubular pores; many distinct clay films on faces of peds and bridges between sand grains; 20 percent rock fragments; moderately acid.

Table A: Particle-size distribution

<table>
<thead>
<tr>
<th>Depth (inches)</th>
<th>VC</th>
<th>C</th>
<th>M</th>
<th>F</th>
<th>VF</th>
<th>Total</th>
<th>Silt</th>
<th>Clay</th>
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<td>0-11</td>
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<th>K</th>
<th>H</th>
<th>CEC</th>
<th>BS</th>
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<tr>
<td>inches</td>
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</tr>
<tr>
<td>11-17</td>
<td>0.91</td>
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<td>0.16</td>
<td>0.20</td>
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<td>87.26</td>
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<tr>
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<td>0.16</td>
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</tr>
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<td>0.13</td>
<td>3.00</td>
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<td>48.10</td>
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<tr>
<td>42-56</td>
<td>1.23</td>
<td>0.52</td>
<td>0.06</td>
<td>1.80</td>
<td>3.61</td>
<td>50.14</td>
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<td>0.09</td>
<td>4.80</td>
<td>8.20</td>
<td>41.46</td>
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### Table C: Chemical properties

<table>
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<tr>
<th>Depth</th>
<th>Organic matter</th>
<th>pH</th>
<th>Al</th>
<th>ECEC</th>
<th>EBS</th>
</tr>
</thead>
<tbody>
<tr>
<td>inches</td>
<td>g kg⁻¹</td>
<td>cmol (+) kg⁻¹</td>
<td>%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-11</td>
<td>6.30</td>
<td>0.05</td>
<td>2.28</td>
<td>97.81</td>
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</tr>
<tr>
<td>11-17</td>
<td>6.23</td>
<td>0.05</td>
<td>1.41</td>
<td>96.48</td>
<td></td>
</tr>
<tr>
<td>17-27</td>
<td>6.13</td>
<td>0.05</td>
<td>1.98</td>
<td>97.47</td>
<td></td>
</tr>
<tr>
<td>27-42</td>
<td>5.95</td>
<td>0.05</td>
<td>2.83</td>
<td>98.23</td>
<td></td>
</tr>
<tr>
<td>42-56</td>
<td>5.90</td>
<td>0.05</td>
<td>1.86</td>
<td>97.31</td>
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<tr>
<td>56-70</td>
<td>5.62</td>
<td>0.25</td>
<td>3.65</td>
<td>93.15</td>
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### Table E: Sand mineralogy

<table>
<thead>
<tr>
<th>Depth</th>
<th>Quartz</th>
<th>Feldspar</th>
<th>Plagioclase</th>
<th>Mica</th>
<th>Opaque minerals*</th>
<th>Heavy minerals*</th>
</tr>
</thead>
<tbody>
<tr>
<td>inches</td>
<td>g kg⁻¹ of sand</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<td>17-42</td>
<td>940</td>
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<td>0</td>
<td>0</td>
<td>0</td>
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</table>

*Opaque minerals are ilmenite, magnetite, hematite, etc.; Heavy minerals are translucent zircon, tourmaline, rutile, epidote, hornblende, etc.; Tr = Trace.

**Kempsville Series - Supplemental profile 2**

Kempsville sandy loam, cultivated, 2 to 6 percent slopes; 0.6 mile northeast of Roaches Corner, 0.2 mile southeast of Highway VA-155 and Collins Run, 250 yards east of Highway VA-155; (This soil was mapped as Suffolk sandy loam, but was included with soils of the Kempsville series because of small acreage in Charles City County); elevation 100 feet.
Ap--0 to 10 inches; brown (7.5YR 5/4) 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--10 to 16 inches; brown (7.5YR 4/4) sandy loam; weak fine subangular blocky structure; friable, sticky, plastic; few fine roots; common fine and medium tubular pores; common distinct clay films on faces of peds; moderately acid; clear smooth boundary.

Bt1--16 to 41 inches; yellowish red (5YR 4/6) sandy clay loam; weak medium subangular blocky structure; friable, sticky, plastic; few fine roots; few fine and coarse tubular pores; common distinct clay films on faces of peds; moderately acid; gradual smooth boundary.

Bt2--41 to 55 inches; yellowish red (5YR 4/6) sandy loam; moderate medium subangular blocky structure; friable, sticky, plastic; common fine and medium tubular pores; many distinct clay films on faces of peds; moderately acid; gradual smooth boundary.

BC--55 to 70 inches; yellowish red (5YR 4/6) sandy loam; weak medium granular and subangular blocky structure; friable, slightly sticky, slightly plastic; common fine tubular pores; many distinct clay bridges between sand grains; strongly acid.

Table A: Particle-size distribution

<table>
<thead>
<tr>
<th>Depth (inches)</th>
<th>VC</th>
<th>C</th>
<th>M</th>
<th>F</th>
<th>VF</th>
<th>Total</th>
<th>Silt</th>
<th>Clay</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-10</td>
<td>12</td>
<td>114</td>
<td>321</td>
<td>225</td>
<td>43</td>
<td>715</td>
<td>174</td>
<td>111</td>
</tr>
<tr>
<td>10-16</td>
<td>7</td>
<td>89</td>
<td>263</td>
<td>200</td>
<td>44</td>
<td>603</td>
<td>216</td>
<td>181</td>
</tr>
<tr>
<td>16-41</td>
<td>14</td>
<td>114</td>
<td>260</td>
<td>162</td>
<td>35</td>
<td>585</td>
<td>172</td>
<td>243</td>
</tr>
<tr>
<td>41-55</td>
<td>28</td>
<td>115</td>
<td>296</td>
<td>219</td>
<td>53</td>
<td>711</td>
<td>91</td>
<td>198</td>
</tr>
<tr>
<td>55-70</td>
<td>29</td>
<td>118</td>
<td>310</td>
<td>231</td>
<td>47</td>
<td>735</td>
<td>101</td>
<td>164</td>
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</table>

Table B: Chemical properties

<table>
<thead>
<tr>
<th>Depth (inches)</th>
<th>Ca</th>
<th>Mg</th>
<th>K</th>
<th>H</th>
<th>CEC</th>
<th>BS</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-10</td>
<td>0.98</td>
<td>0.33</td>
<td>0.21</td>
<td>1.60</td>
<td>3.12</td>
<td>48.72</td>
</tr>
<tr>
<td>10-16</td>
<td>1.35</td>
<td>0.66</td>
<td>0.16</td>
<td>2.60</td>
<td>4.77</td>
<td>45.49</td>
</tr>
<tr>
<td>16-41</td>
<td>2.41</td>
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<td>2.00</td>
<td>5.75</td>
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<td>2.20</td>
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<td>55-70</td>
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<td>0.08</td>
<td>2.60</td>
<td>4.24</td>
<td>38.68</td>
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</table>
Table C: Chemical properties

<table>
<thead>
<tr>
<th>Depth</th>
<th>Organic matter</th>
<th>pH</th>
<th>Al</th>
<th>ECEC</th>
<th>EBS</th>
</tr>
</thead>
<tbody>
<tr>
<td>inches</td>
<td>g kg⁻¹</td>
<td></td>
<td>cmol (+) kg⁻¹</td>
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<td>%</td>
</tr>
<tr>
<td>0-10</td>
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<td>5.32</td>
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<td>1.87</td>
<td>81.28</td>
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<td>5.66</td>
<td>0.25</td>
<td>2.42</td>
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<td>96.15</td>
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<td>5.56</td>
<td>0.25</td>
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<td>90.20</td>
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<td>55-70</td>
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<td>5.30</td>
<td>0.40</td>
<td>2.04</td>
<td>80.39</td>
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</table>

Table E: Sand mineralogy

<table>
<thead>
<tr>
<th>Depth</th>
<th>Quartz</th>
<th>Feldspar</th>
<th>Plagioclase</th>
<th>Mica</th>
<th>Opaque minerals*</th>
<th>Heavy minerals*</th>
</tr>
</thead>
<tbody>
<tr>
<td>inches</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
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</tr>
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*Opaque minerals are ilmenite, magnetite, hematite, etc.; Heavy minerals are translucent zircon, tourmaline, rutile, epidote, hornblende, etc.; Tr = Trace.

Table F: Chemical properties

<table>
<thead>
<tr>
<th>Depth</th>
<th>pH</th>
<th>Ca</th>
<th>Mg</th>
<th>P</th>
<th>K</th>
<th>Zn</th>
<th>Mn</th>
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<tr>
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<td></td>
<td></td>
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<td>--</td>
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<tr>
<td>10-16</td>
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<td>55</td>
<td>3</td>
<td>48</td>
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<td>--</td>
</tr>
<tr>
<td>16-41</td>
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<td>3</td>
<td>17</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>55-70</td>
<td>5.1</td>
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<td>113</td>
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<td>18</td>
<td>--</td>
<td>--</td>
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</table>

Kempsville Series - Supplemental profile 3

Kempsville sandy loam, cultivated, 2 to 6 percent slopes; 1.1 miles northwest of the junction of Highway VA-650 and Virginia Division of Forestry Fire Trail-1557, 0.5 mile northeast of the junction of Highways VA-604 and VA-605; (This soil was mapped as Orangeburg sandy loam, but was included with soils of the Kempsville series because of small acreage in Charles City County); elevation 125 feet.

Ap--0 to 10 inches; brown (10YR 4/3) sandy loam; weak fine granular structure; friable, nonsticky, nonplastic; few fine roots; common fine and few medium tubular pores; neutral; abrupt smooth boundary.
Bt1--10 to 17 inches; dark yellowish brown (10YR 4/6) sandy loam; weak fine and medium subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; common fine and medium tubular pores; few fine clay films on faces of peds and bridges between sand grains; neutral; clear smooth boundary.

Bt2--17 to 30 inches; yellowish red (5YR 4/6) sandy clay loam; weak medium subangular blocky structure; friable, sticky, plastic; few fine roots; few fine and coarse tubular pores; many distinct clay films on faces of peds and bridges between sand grains; slightly acid; diffuse smooth boundary.

Bt3--30 to 48 inches; red (2.5YR 4/6) sandy clay loam; weak medium subangular blocky structure; friable, sticky, plastic; common fine and medium tubular pores; many distinct clay films on faces of peds and bridges between sand grains; strongly acid; diffuse smooth boundary.

Bt4--48 to 70 inches; red (2.5YR 4/6) sandy clay loam; weak medium subangular blocky structure; friable, sticky, plastic; common fine tubular pores; many distinct clay films on faces of peds and bridges between sand grains; 5 percent coarse fragments; very strongly acid.

Table A: Particle-size distribution

<table>
<thead>
<tr>
<th>Depth</th>
<th>VC</th>
<th>C</th>
<th>M</th>
<th>F</th>
<th>VF</th>
<th>Total</th>
<th>Silt</th>
<th>Clay</th>
</tr>
</thead>
<tbody>
<tr>
<td>inches</td>
<td>g kg(^{-1}) of soil</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-10</td>
<td>32</td>
<td>129</td>
<td>249</td>
<td>213</td>
<td>77</td>
<td>701</td>
<td>228</td>
<td>71</td>
</tr>
<tr>
<td>10-17</td>
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<td>110</td>
<td>207</td>
<td>191</td>
<td>64</td>
<td>606</td>
<td>295</td>
<td>99</td>
</tr>
<tr>
<td>17-30</td>
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<td>106</td>
<td>161</td>
<td>174</td>
<td>69</td>
<td>547</td>
<td>241</td>
<td>212</td>
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<td>30-48</td>
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<td>149</td>
<td>45</td>
<td>541</td>
<td>166</td>
<td>293</td>
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<tr>
<td>48-70</td>
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<td>118</td>
<td>155</td>
<td>140</td>
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Table B: Chemical properties

<table>
<thead>
<tr>
<th>Depth</th>
<th>Ca</th>
<th>Mg</th>
<th>K</th>
<th>H</th>
<th>CEC</th>
<th>BS</th>
</tr>
</thead>
<tbody>
<tr>
<td>inches</td>
<td>cmol (+) kg(^{-1})</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-10</td>
<td>1.64</td>
<td>0.40</td>
<td>0.20</td>
<td>1.20</td>
<td>3.44</td>
<td>65.12</td>
</tr>
<tr>
<td>10-17</td>
<td>1.38</td>
<td>0.47</td>
<td>0.16</td>
<td>2.60</td>
<td>4.61</td>
<td>43.60</td>
</tr>
<tr>
<td>17-30</td>
<td>2.04</td>
<td>1.19</td>
<td>0.21</td>
<td>5.20</td>
<td>8.64</td>
<td>39.81</td>
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<tr>
<td>30-48</td>
<td>1.90</td>
<td>0.80</td>
<td>0.08</td>
<td>8.20</td>
<td>10.98</td>
<td>25.32</td>
</tr>
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<td>48-70</td>
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<td>0.09</td>
<td>9.40</td>
<td>10.85</td>
<td>13.36</td>
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</tbody>
</table>
Table C: Chemical properties

<table>
<thead>
<tr>
<th>Depth inches</th>
<th>Organic matter g kg(^{-1})</th>
<th>pH</th>
<th>Al cmol (+) kg(^{-1})</th>
<th>ECEC</th>
<th>EBS %</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-10</td>
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<td>6.68</td>
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<td>2.25</td>
<td>97.78</td>
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<td>6.76</td>
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<td>2.06</td>
<td>97.57</td>
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<td>6.45</td>
<td>0.05</td>
<td>3.49</td>
<td>98.57</td>
</tr>
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<td>5.11</td>
<td>1.25</td>
<td>4.03</td>
<td>68.98</td>
</tr>
<tr>
<td>48-70</td>
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<td>4.56</td>
<td>2.85</td>
<td>4.30</td>
<td>68.97</td>
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</tbody>
</table>

Table E: Sand mineralogy

<table>
<thead>
<tr>
<th>Depth inches</th>
<th>Quartz g kg(^{-1}) of sand</th>
<th>Feldspar</th>
<th>Plagioclase</th>
<th>Mica</th>
<th>Opaque minerals*</th>
<th>Heavy minerals*</th>
</tr>
</thead>
<tbody>
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<td>955</td>
<td>25</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>20</td>
</tr>
</tbody>
</table>

*Opaque minerals are ilmenite, magnetite, hematite, etc.; Heavy minerals are translucent zircon, tourmaline, rutile, epidote, hornblende, etc.; Tr = Trace.

Table F: Chemical properties

<table>
<thead>
<tr>
<th>Depth inches</th>
<th>pH</th>
<th>Ca ppm</th>
<th>Mg ppm</th>
<th>P ppm</th>
<th>K ppm</th>
<th>Zn ppm</th>
<th>Mn ppm</th>
</tr>
</thead>
<tbody>
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<td>71</td>
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<td>61</td>
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</tr>
<tr>
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<td>--</td>
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<tr>
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<td>18</td>
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<td>--</td>
</tr>
<tr>
<td>48-70</td>
<td>4.5</td>
<td>180</td>
<td>51</td>
<td>1</td>
<td>17</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>
Photo 2. The Sherwood Forest Plantation manor house, the longest frame house in the United States, is on Kempsville soils. Sherwood Forest is the home of William Henry Harrison and John Tyler, 9th and 10th Presidents of the United States.
**Lawnes Series**

The Lawnes series consists of very deep, very poorly drained soils in fresh to slightly brackish water in marshes, creeks, and rivers that are inundated daily by fresh water and by slightly brackish water during periods of drought. They formed in herbaceous organic materials over loamy fluvial sediments. Slopes are less than 1 percent.

Lawnes muck, frequently flooded, marsh, 0 to 1 percent slopes; Old Neck Marsh, 2.2 miles northeast of Highways VA-615 and VA-627, 2.8 miles east of the junction of Highways VA-624 and VA-615 at Holdcroft; elevation 1 foot.

A--0 to 13 inches; dark gray (10YR 4/1) muck; 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; n-value > 1; moderate sulfur odor; strongly acid; clear smooth boundary.

Cg1--13 to 26 inches; dark gray (10YR 4/1) loam; about 5 percent fibers rubbed; massive; slightly sticky, slightly plastic; flows easily between fingers when squeezed; common fine roots and fibers; n-value > 1; weak sulfur odor; common lenses and pockets of clay loam; strongly acid; diffuse smooth boundary.

Cg2--26 to 40 inches; very dark gray (10YR 3/1) loam; 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; n-value > 1; weak sulfur odor; strongly acid; diffuse smooth boundary.

Cg3--40 to 55 inches; very dark gray (10YR 3/1) loam; massive; slightly sticky, slightly plastic; flows easily between fingers when squeezed; few fine and medium roots; n-value > 1; weak sulfur odor; strongly acid; gradual smooth boundary.

Cg4--55 to 60 inches; very dark gray (10YR 3/1) sand; single grain; loose; n-value < 1; strongly acid.

Table A: Particle-size distribution

<table>
<thead>
<tr>
<th>Depth (inches)</th>
<th>VC</th>
<th>C</th>
<th>M</th>
<th>F</th>
<th>VF</th>
<th>Total</th>
<th>Silt</th>
<th>Clay</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-40</td>
<td>5</td>
<td>35</td>
<td>110</td>
<td>192</td>
<td>50</td>
<td>392</td>
<td>462</td>
<td>146</td>
</tr>
</tbody>
</table>
Table G: Electrical conductivity (EC), water, mineral and organic matter, and sulfur

<table>
<thead>
<tr>
<th>Depth (inches)</th>
<th>EC dS m⁻¹</th>
<th>Water g kg⁻¹ of soil</th>
<th>Mineral matter g kg⁻¹ of soil</th>
<th>Organic matter g kg⁻¹ of soil</th>
<th>Total S g kg⁻¹ of soil</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-13</td>
<td>0.74</td>
<td>4365</td>
<td>750</td>
<td>260</td>
<td>10.5</td>
</tr>
<tr>
<td>13-26</td>
<td>0.96</td>
<td>2874</td>
<td>883</td>
<td>148</td>
<td>5.0</td>
</tr>
<tr>
<td>26-40</td>
<td>0.84</td>
<td>4190</td>
<td>813</td>
<td>149</td>
<td>10.9</td>
</tr>
</tbody>
</table>

Table H. pH for moist soil as a function of time with moist incubation

<table>
<thead>
<tr>
<th>Depth (inches)</th>
<th>Initial pH</th>
<th>8-days pH</th>
<th>15-days pH</th>
<th>22-days pH</th>
<th>30-days pH</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-13</td>
<td>5.5</td>
<td>4.7</td>
<td>4.0</td>
<td>3.7</td>
<td>3.6</td>
</tr>
<tr>
<td>13-26</td>
<td>5.2</td>
<td>3.9</td>
<td>3.3</td>
<td>2.8</td>
<td>2.8</td>
</tr>
<tr>
<td>26-40</td>
<td>5.4</td>
<td>4.1</td>
<td>3.7</td>
<td>3.2</td>
<td>3.1</td>
</tr>
</tbody>
</table>

Table I. Water soluble cations; NH₄OAc, pH 7; cation-exchange capacity (CEC); and sodium adsorption ratio (SAR)

<table>
<thead>
<tr>
<th>Depth (inches)</th>
<th>Ca²⁺ cmol(+) liter⁻¹</th>
<th>Mg²⁺ cmol(+) liter⁻¹</th>
<th>K⁺ cmol(+) liter⁻¹</th>
<th>Na⁺ cmol(+) liter⁻¹</th>
<th>CEC cmol(+) kg⁻¹ of soil</th>
<th>SAR cmol(+) kg⁻¹ of soil</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-13</td>
<td>1.1</td>
<td>1.6</td>
<td>0.1</td>
<td>3.2</td>
<td>62.2</td>
<td>2.8</td>
</tr>
<tr>
<td>13-26</td>
<td>1.5</td>
<td>2.5</td>
<td>0.1</td>
<td>3.5</td>
<td>48.6</td>
<td>2.5</td>
</tr>
<tr>
<td>26-40</td>
<td>1.3</td>
<td>2.5</td>
<td>0.1</td>
<td>3.8</td>
<td>46.0</td>
<td>2.8</td>
</tr>
</tbody>
</table>

*cmol (+) kg⁻¹ of soil

Table J. Percentage cationic composition of the saturation extract

<table>
<thead>
<tr>
<th>Depth (inches)</th>
<th>Ca²⁺ %</th>
<th>Mg²⁺ %</th>
<th>K⁺ %</th>
<th>Na⁺ %</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-13</td>
<td>18.3</td>
<td>26.7</td>
<td>1.7</td>
<td>53.3</td>
</tr>
<tr>
<td>13-26</td>
<td>19.7</td>
<td>32.9</td>
<td>1.3</td>
<td>46.1</td>
</tr>
<tr>
<td>26-40</td>
<td>16.9</td>
<td>32.5</td>
<td>1.3</td>
<td>49.4</td>
</tr>
</tbody>
</table>
Lawnes Series - Supplemental profile 1

Lawnes silty clay loam, frequently flooded, marsh, 0 to 1 percent slopes; Herring Creek Marsh, 0.9 mile southeast of the junction of Highways VA-609 and VA-5, 2.3 miles east of the junction of Highways VA-5 and VA-658; elevation 1 foot.

A--0 to 13 inches; dark gray (5Y 4/1) silty clay loam; weak medium granular structure; slightly sticky, slightly plastic; few fine and medium roots; n-value > 1; moderate sulfur odor; strongly acid; clear smooth boundary.

Cg1--13 to 26 inches; gray (5Y 5/1) silty clay loam; massive; slightly sticky, slightly plastic; few fine and medium roots; n-value > 1; weak sulfur odor; strongly acid; diffuse smooth boundary.

Cg2--26 to 40 inches; dark gray (5Y 4/1) silty clay loam; massive; slightly sticky, slightly plastic; few fine and medium roots; n-value > 1; weak sulfur odor; very strongly acid; diffuse smooth boundary.

Cg3--40 to 60 inches; gray (5Y 5/1) silty clay loam; massive; slightly sticky, slightly plastic; few fine and medium roots; n-value > 1; weak sulfur odor; very strongly acid.

Table A: Particle-size distribution

<table>
<thead>
<tr>
<th>Depth</th>
<th>Sand</th>
<th>Silt</th>
<th>Clay</th>
</tr>
</thead>
<tbody>
<tr>
<td>inches</td>
<td>VC C M F VF Total</td>
<td>g kg(^{-1}) of soil</td>
<td></td>
</tr>
<tr>
<td>0-40</td>
<td>10 37 33 32 18 130 484 386</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table G: Electrical conductivity (EC), water, mineral and organic matter, and sulfur

<table>
<thead>
<tr>
<th>Depth</th>
<th>EC</th>
<th>Water</th>
<th>Mineral matter</th>
<th>Organic matter</th>
<th>Total S</th>
</tr>
</thead>
<tbody>
<tr>
<td>inches</td>
<td>dS m(^{-1})</td>
<td>g kg(^{-1}) of soil</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-13</td>
<td>0.17</td>
<td>3201</td>
<td>840</td>
<td>171</td>
<td>5.5</td>
</tr>
<tr>
<td>13-26</td>
<td>0.20</td>
<td>7509</td>
<td>861</td>
<td>146</td>
<td>3.7</td>
</tr>
<tr>
<td>26-40</td>
<td>0.08</td>
<td>3559</td>
<td>846</td>
<td>120</td>
<td>2.7</td>
</tr>
</tbody>
</table>
Table H. pH for moist soil as a function of time with moist incubation

<table>
<thead>
<tr>
<th>Depth</th>
<th>Initial</th>
<th>8-days</th>
<th>15-days</th>
<th>22-days</th>
<th>30-days</th>
</tr>
</thead>
<tbody>
<tr>
<td>inches</td>
<td>pH</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-13</td>
<td>5.3</td>
<td>4.4</td>
<td>4.1</td>
<td>3.7</td>
<td>3.5</td>
</tr>
<tr>
<td>13-26</td>
<td>5.1</td>
<td>5.0</td>
<td>4.8</td>
<td>4.5</td>
<td>4.2</td>
</tr>
<tr>
<td>26-40</td>
<td>5.0</td>
<td>4.5</td>
<td>4.6</td>
<td>4.3</td>
<td>4.1</td>
</tr>
</tbody>
</table>

Table I. Water soluble cations; NH₄OAc, pH 7; cation-exchange capacity (CEC); and sodium adsorption ratio (SAR)

<table>
<thead>
<tr>
<th>Depth</th>
<th>Ca²⁺</th>
<th>Mg²⁺</th>
<th>K⁺</th>
<th>Na⁺</th>
<th>CEC</th>
<th>SAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>inches</td>
<td>cmol( + ) liter⁻¹</td>
<td></td>
<td></td>
<td></td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>0-13</td>
<td>0.3</td>
<td>0.2</td>
<td>0.0</td>
<td>0.9</td>
<td>49.4</td>
<td>1.8</td>
</tr>
<tr>
<td>13-26</td>
<td>0.3</td>
<td>0.1</td>
<td>0.0</td>
<td>1.2</td>
<td>52.8</td>
<td>2.7</td>
</tr>
<tr>
<td>26-40</td>
<td>0.2</td>
<td>0.0</td>
<td>0.0</td>
<td>0.3</td>
<td>45.1</td>
<td>1.0</td>
</tr>
</tbody>
</table>

*cmol ( + ) kg⁻¹ of soil

Table J. Percentage cationic composition of the saturation extract

<table>
<thead>
<tr>
<th>Depth</th>
<th>Ca²⁺</th>
<th>Mg²⁺</th>
<th>K⁺</th>
<th>Na⁺</th>
</tr>
</thead>
<tbody>
<tr>
<td>inches</td>
<td>%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-13</td>
<td>21.4</td>
<td>14.3</td>
<td>0.0</td>
<td>64.3</td>
</tr>
<tr>
<td>13-26</td>
<td>18.8</td>
<td>6.3</td>
<td>0.0</td>
<td>75.0</td>
</tr>
<tr>
<td>26-40</td>
<td>40.0</td>
<td>0.0</td>
<td>0.0</td>
<td>60.0</td>
</tr>
</tbody>
</table>
Photo 3. Lawnes soils along Herring Creek have luxuriant growth of wild rice and other marsh vegetation.
**Masada Series**

The Masada series consists of very deep, well drained soils on high stream terraces. They formed in clayey fluvial sediments. Slopes range from 2 to 6 percent.

Masada loam, cultivated, 2 to 6 percent slopes; 0.5 mile southwest of the junction of Highways VA-618 and VA-5, 250 yards southwest of air beacon, 0.7 mile north-northwest of mouth of Buckland Creek, 50 yards west of farm lane leading to grain bins on Glen Cove farm; elevation 65 feet.

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

Bt1--10 to 24 inches; yellowish red (5YR 4/6) clay; 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; few fine flakes of mica; moderately acid; clear smooth boundary.

Bt2--24 to 45 inches; yellowish red (5YR 4/6) clay; common medium prominent yellowish brown (10YR 5/6) mottles; moderate medium subangular and angular blocky structure; friable, sticky, plastic; few medium roots; few fine tubular pores; common distinct clay films on faces of peds; few fine flakes of mica; very strongly acid; clear smooth boundary.

Bt3--45 to 62 inches; red (2.5YR 4/6) clay; common medium prominent yellowish brown (10YR 5/6) and very pale brown (10YR 7/3) mottles; moderate medium subangular blocky structure; friable, sticky, plastic; few fine tubular pores; many distinct clay films on faces of peds; few fine flakes of mica; extremely acid; gradual smooth boundary.

C--62 to 70 inches; red (2.5YR 4/6) sandy clay loam; massive; friable, sticky, plastic; common fine flakes of mica; extremely acid.

**Table A: Particle-size distribution**

<table>
<thead>
<tr>
<th>Depth</th>
<th>VC</th>
<th>C</th>
<th>M</th>
<th>F</th>
<th>VF</th>
<th>Total</th>
<th>Silt</th>
<th>Clay</th>
</tr>
</thead>
<tbody>
<tr>
<td>inches</td>
<td>g kg$^{-1}$ of soil</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-10</td>
<td>6</td>
<td>30</td>
<td>75</td>
<td>227</td>
<td>126</td>
<td>465</td>
<td>468</td>
<td>67</td>
</tr>
<tr>
<td>10-24</td>
<td>13</td>
<td>15</td>
<td>36</td>
<td>102</td>
<td>60</td>
<td>226</td>
<td>326</td>
<td>448</td>
</tr>
<tr>
<td>24-45</td>
<td>22</td>
<td>30</td>
<td>50</td>
<td>104</td>
<td>61</td>
<td>266</td>
<td>255</td>
<td>479</td>
</tr>
<tr>
<td>45-62</td>
<td>4</td>
<td>14</td>
<td>28</td>
<td>142</td>
<td>113</td>
<td>301</td>
<td>294</td>
<td>405</td>
</tr>
<tr>
<td>62-70</td>
<td>1</td>
<td>3</td>
<td>32</td>
<td>326</td>
<td>114</td>
<td>476</td>
<td>168</td>
<td>356</td>
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</table>
Table B: Chemical properties

<table>
<thead>
<tr>
<th>Depth</th>
<th>Ca</th>
<th>Mg</th>
<th>K</th>
<th>H</th>
<th>CEC</th>
<th>BS</th>
</tr>
</thead>
<tbody>
<tr>
<td>inches</td>
<td>cmol (+) kg⁻¹</td>
<td></td>
<td>%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-10</td>
<td>3.11</td>
<td>0.63</td>
<td>0.20</td>
<td>2.60</td>
<td>6.54</td>
<td>60.24</td>
</tr>
<tr>
<td>10-24</td>
<td>4.42</td>
<td>1.40</td>
<td>0.19</td>
<td>6.60</td>
<td>12.61</td>
<td>47.66</td>
</tr>
<tr>
<td>24-45</td>
<td>1.34</td>
<td>1.26</td>
<td>0.17</td>
<td>13.40</td>
<td>16.17</td>
<td>17.13</td>
</tr>
<tr>
<td>45-62</td>
<td>0.29</td>
<td>0.88</td>
<td>0.15</td>
<td>15.60</td>
<td>16.92</td>
<td>7.80</td>
</tr>
<tr>
<td>62-70</td>
<td>0.19</td>
<td>0.74</td>
<td>0.12</td>
<td>8.60</td>
<td>9.65</td>
<td>10.88</td>
</tr>
</tbody>
</table>

Table C: Chemical properties

<table>
<thead>
<tr>
<th>Depth</th>
<th>Organic matter</th>
<th>pH</th>
<th>Al</th>
<th>ECEC</th>
<th>EBS</th>
</tr>
</thead>
<tbody>
<tr>
<td>inches</td>
<td>g kg⁻¹</td>
<td>cmol (+) kg⁻¹</td>
<td>%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-10</td>
<td>--</td>
<td>6.39</td>
<td>0.05</td>
<td>3.99</td>
<td>98.75</td>
</tr>
<tr>
<td>10-24</td>
<td>--</td>
<td>5.73</td>
<td>0.45</td>
<td>6.45</td>
<td>93.03</td>
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<td>24-45</td>
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<td>4.80</td>
<td>5.25</td>
<td>8.02</td>
<td>34.54</td>
</tr>
<tr>
<td>45-62</td>
<td>--</td>
<td>4.42</td>
<td>6.55</td>
<td>7.87</td>
<td>16.77</td>
</tr>
<tr>
<td>62-70</td>
<td>--</td>
<td>4.50</td>
<td>5.15</td>
<td>6.20</td>
<td>16.94</td>
</tr>
</tbody>
</table>

Table D: Clay mineralogy

<table>
<thead>
<tr>
<th>Depth</th>
<th>HIV*</th>
<th>Mica</th>
<th>Verm*</th>
<th>Kaolinite</th>
<th>Quartz</th>
<th>Mont*</th>
<th>Gibbsite</th>
<th>Misc*</th>
</tr>
</thead>
<tbody>
<tr>
<td>inches</td>
<td>g kg⁻¹ of clay</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10-40</td>
<td>230</td>
<td>120</td>
<td>50</td>
<td>480</td>
<td>20</td>
<td>80</td>
<td>Tr</td>
<td>Tr</td>
</tr>
</tbody>
</table>

*HIV = hydroxy interlayered vermiculite; Verm = vermiculite; Mont = montmorillonite; Misc = miscellaneous; Tr = Trace.

Table F: Chemical properties

<table>
<thead>
<tr>
<th>Depth</th>
<th>pH</th>
<th>Ca</th>
<th>Mg</th>
<th>P</th>
<th>K</th>
<th>Zn</th>
<th>Mn</th>
</tr>
</thead>
<tbody>
<tr>
<td>inches</td>
<td>ppm</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<td>0-10</td>
<td>6.6</td>
<td>600</td>
<td>84</td>
<td>14</td>
<td>77</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>10-24</td>
<td>5.6</td>
<td>672</td>
<td>120</td>
<td>2</td>
<td>23</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>24-45</td>
<td>4.6</td>
<td>252</td>
<td>120</td>
<td>1</td>
<td>33</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>45-62</td>
<td>4.4</td>
<td>72</td>
<td>83</td>
<td>1</td>
<td>28</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>62-70</td>
<td>4.4</td>
<td>48</td>
<td>67</td>
<td>1</td>
<td>22</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>
Masada Series - Supplemental profile 1

Masada loam, cultivated, 2 to 6 percent slopes; 1.6 miles south-southwest of the junction of Highways VA-5 and VA-619, 1.0 mile southwest of junction of Highways VA-619 and VA-658, 30 yards north of Highway VA-619; elevation 80 feet.

Ap--0 to 10 inches; dark brown (7.5YR 3/4) loam; weak medium granular structure; friable, slightly sticky, slightly plastic; many fine and medium and few coarse roots; common fine and medium tubular pores; moderately acid; abrupt smooth boundary.

Bt1--10 to 20 inches; reddish brown (5YR 4/4) clay loam; weak medium subangular blocky structure; friable, sticky, slightly plastic; common fine and few medium roots; common fine tubular pores; many distinct clay films on faces of peds; slightly acid; gradual smooth boundary.

Bt2--20 to 40 inches; red (2.5YR 4/6) clay; moderate medium subangular blocky structure; friable, sticky, plastic; few fine tubular pores; many distinct clay films on faces of peds; moderately acid; diffuse smooth boundary.

Bt3--40 to 60 inches; red (2.5YR 4/6) clay; common fine prominent very dark grayish brown (10YR 3/2) mineral stains; moderate medium subangular blocky structure; friable, sticky, plastic; few fine tubular pores; many distinct clay films on faces of peds; very strongly acid; diffuse smooth boundary.

Bt4--60 to 70 inches; red (2.5YR 4/6) clay; moderate medium subangular blocky structure; friable, sticky, plastic; many distinct clay films on faces of peds; very strongly acid.

Table A: Particle-size distribution

<table>
<thead>
<tr>
<th>Depth</th>
<th>VC</th>
<th>C</th>
<th>M</th>
<th>F</th>
<th>VF</th>
<th>Total</th>
<th>Silt</th>
<th>Clay</th>
</tr>
</thead>
<tbody>
<tr>
<td>inches</td>
<td>g kg$^{-1}$ of soil</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-10</td>
<td>3</td>
<td>18</td>
<td>97</td>
<td>153</td>
<td>60</td>
<td>332</td>
<td>450</td>
<td>218</td>
</tr>
<tr>
<td>10-20</td>
<td>4</td>
<td>11</td>
<td>79</td>
<td>119</td>
<td>62</td>
<td>275</td>
<td>377</td>
<td>348</td>
</tr>
<tr>
<td>20-40</td>
<td>5</td>
<td>14</td>
<td>68</td>
<td>121</td>
<td>55</td>
<td>264</td>
<td>311</td>
<td>425</td>
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<td>40-60</td>
<td>3</td>
<td>10</td>
<td>69</td>
<td>125</td>
<td>68</td>
<td>275</td>
<td>252</td>
<td>473</td>
</tr>
<tr>
<td>60-70</td>
<td>2</td>
<td>10</td>
<td>76</td>
<td>137</td>
<td>57</td>
<td>282</td>
<td>231</td>
<td>487</td>
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Table B: Chemical properties

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<th>Depth</th>
<th>Ca (cmol (+) kg⁻¹)</th>
<th>Mg (cmol (+) kg⁻¹)</th>
<th>K (cmol (+) kg⁻¹)</th>
<th>H (cmol (+) kg⁻¹)</th>
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<th>BS (%)</th>
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Table C: Chemical properties

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Table E: Sand mineralogy

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<th>Quartz</th>
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<th>Plagioclase</th>
<th>Mica</th>
<th>Opaque minerals</th>
<th>Heavy minerals</th>
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*Opaque minerals are ilmenite, magnetite, hematite, etc.; Heavy minerals are translucent zircon, tourmaline, rutile, epidote, hornblende, etc.; Tr = Trace.
Table F: Chemical properties

<table>
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<tr>
<th>Depth</th>
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<th>Mg</th>
<th>P</th>
<th>K</th>
<th>Zn</th>
<th>Mn</th>
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**Mattan Series**

The Mattan series consists of very deep, very poorly drained soils along fresh water creeks and rivers in backwater swamps that are ponded and/or flooded daily. These waters become brackish along the streams during long drought periods. They are formed in organic materials over loamy fluvial sediments. Slopes are less than 1 percent.

Mattan mucky sandy loam, frequently flooded, swamps, 0 to 1 percent slopes; 1.4 miles south of Walker’s Dam, 1.2 miles northeast on private road and Highway VA-615, 0.2 mile west of the Chickahominy River; elevation 2 feet.

A--0 to 12 inches; gray (5Y 5/1) mucky sandy loam; single grain; loose, nonsticky, nonplastic; very strongly acid; abrupt smooth boundary.

Oa--12 to 39 inches; very dark grayish brown (10YR 3/2) muck (sapric material); 10 percent fibers rubbed; massive; many fine roots; flows easily between the fingers when squeezed; no sulfur odor; extremely acid; gradual smooth boundary.

Cg1--39 to 60 inches; very dark brown (10YR 2/2) mucky fine sandy loam (sapric material); 10 percent fibers rubbed; massive; many fine roots; flows easily between the fingers when squeezed; no sulfur odor; extremely acid; gradual smooth boundary.

Cg2--60 to 70 inches; gray (10YR 5/1) loamy sand; massive; sticky, nonplastic; fluid fine sands.
Table A: Particle-size distribution

<table>
<thead>
<tr>
<th>Depth</th>
<th>VC</th>
<th>C</th>
<th>M</th>
<th>F</th>
<th>VF</th>
<th>Total</th>
<th>Silt</th>
<th>Clay</th>
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<tbody>
<tr>
<td>inches</td>
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<td>709</td>
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<td>858</td>
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<td>12-39</td>
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<td>480</td>
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<td>17</td>
<td>95</td>
<td>571</td>
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Table B: Chemical properties

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<th>CEC</th>
<th>BS</th>
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</thead>
<tbody>
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<td>inches</td>
<td>cmol (+) kg(^{-1})</td>
<td>%</td>
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<td></td>
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Table C: Chemical properties

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<th>Al</th>
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<th>EBS</th>
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Table F: Chemical properties

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Munden Series

The Munden series consists of very deep, moderately well drained soils on stream terraces. They formed in loamy fluvial sediments. Slopes range from 0 to 2 percent.

Munden loamy sand, woodlands, 0 to 2 percent slopes; 1.0 miles west-southwest of Walker’s Dam, 170 yards southeast of Binns Bar on the Chickahominy River, 1.7 miles north-northeast of Highway VA-615 on a private road to Walker’s Dam, 70 yards north of farm lane; elevation 25 feet.

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

E--6 to 14 inches; grayish brown (10YR 5/2) fine sandy loam; weak fine and medium granular structure; very friable, nonsticky, nonplastic; few fine and medium roots; common fine, medium, and coarse tubular pores; very strongly acid; clear smooth boundary.

Bt1--14 to 27 inches; light yellowish brown (10YR 6/4) fine sandy loam; weak fine and medium subangular blocky structure; very friable, slightly sticky, slightly plastic; few fine and medium roots; common fine, medium, and coarse tubular pores; few faint clay films on faces of peds; common bridges between sand grains; few fine flakes of mica; very strongly acid; clear smooth boundary.

Bt2--27 to 38 inches; light olive brown (2.5Y 5/6) fine sandy loam; common medium prominent light gray (10YR 7/1) mottles; weak coarse and medium subangular blocky structure; very friable, sticky, plastic; few fine and medium roots; common fine, medium, and coarse tubular pores; few faint clay films on faces of peds; common bridges between sand grains; few fine flakes of mica; very strongly acid; clear smooth boundary.

CB--38 to 50 inches; light yellowish brown (2.5Y 6/4) loamy sand; single grain; loose; few fine flakes of mica; very strongly acid; clear smooth boundary.

Cg1--50 to 61 inches; light gray (10YR 7/1) sand; single grain; loose; common fine mica flakes; strongly acid; clear smooth boundary.

C--61 to 70 inches; mottled yellowish brown (10YR 5/6), light yellowish brown (10YR 6/4), and light gray (10YR 7/1) sand; single grain; loose; common fine flakes of mica; very strongly acid; clear wavy boundary.

2Cg2--70 to 74 inches; light gray (10YR 7/1) loamy coarse sand; common medium distinct light yellowish brown (10YR 6/4) mottles; single grain; loose; common fine flakes of mica.
### Table A: Particle-size distribution

<table>
<thead>
<tr>
<th>Depth</th>
<th>VC</th>
<th>C</th>
<th>M</th>
<th>F</th>
<th>VF</th>
<th>Total</th>
<th>Silt</th>
<th>Clay</th>
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<tbody>
<tr>
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### Table B: Chemical properties

<table>
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<tr>
<th>Depth</th>
<th>Ca</th>
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<th>K</th>
<th>H</th>
<th>CEC</th>
<th>BS</th>
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<td>%</td>
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### Table C: Chemical properties

<table>
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<th>Al</th>
<th>ECEC</th>
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Table E: Sand mineralogy

<table>
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<tr>
<th>Depth (inches)</th>
<th>Quartz (g kg(^{-1}) of sand)</th>
<th>Feldspar</th>
<th>Plagioclase</th>
<th>Mica</th>
<th>Opaque minerals*</th>
<th>Heavy minerals*</th>
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*Opaque minerals are ilmenite, magnetite, hematite, etc.; Heavy minerals are translucent zircon, tourmaline, rutile, epidote, hornblende, etc.; Tr = Trace.

Table F: Chemical properties

<table>
<thead>
<tr>
<th>Depth (inches)</th>
<th>pH</th>
<th>Ca</th>
<th>Mg</th>
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**Nahunta Series**

The Nahunta series consists of very deep, somewhat poorly drained soils on low-lying uplands. They formed in loamy fluvial and marine sediments. Slopes range from 0 to 3 percent.

Nahunta silt loam, woodlands, 0 to 3 percent slopes; 130 yards north of the junction of Highways VA-620 and VA-609, 100 yards northwest of Highway VA-609; elevation 110 feet.

A--0 to 4 inches; dark olive gray (5Y 3/2) silt loam; weak fine granular structure; friable, slightly sticky, slightly plastic; many fine roots; common fine tubular pores; extremely acid; abrupt smooth boundary.

E--4 to 12 inches; grayish brown (10YR 5/2) silt loam; few fine prominent yellowish brown (10YR 5/8) mottles; moderate medium granular structure; friable, slightly sticky, slightly plastic; common fine roots; common fine and very fine tubular pores; extremely acid; gradual smooth boundary.

Btg1--18 to 35 inches; mottled light gray (10YR 6/1) and yellowish brown (10YR 5/8) silt loam; moderate medium subangular blocky structure; friable, sticky,
plastic; few fine roots; few fine tubular pores; common thin continuous clay films on faces of peds; very strongly acid; clear smooth boundary.

Btg2--35 to 42 inches; mottled light gray (10YR 6/1) and yellowish brown (10YR 5/8) silt loam; weak medium subangular blocky structure; friable, sticky, plastic; few fine roots; few very fine tubular pores; thin discontinuous clay films on faces of peds; very strongly acid; clear smooth boundary.

BCg--42 to 48 inches; mottled light gray (10YR 6/1), yellowish brown (10YR 5/8), light brownish gray (2.5Y 6/2), and red (2.5YR 4/8) clay loam; weak medium subangular blocky structure; friable, sticky, plastic; few fine roots; few very fine tubular pores; thin discontinuous clay films on faces of peds; very strongly acid; clear smooth boundary.

C--48 to 72 inches; mottled red (2.5YR 4/8), light gray (10YR 6/1), light yellowish brown (2.5Y 6/4), and yellowish brown (10YR 5/8) clay loam; massive; friable, sticky, plastic; few fine roots; very strongly acid.

Table A: Particle-size distribution

<table>
<thead>
<tr>
<th>Depth inches</th>
<th>VC</th>
<th>C</th>
<th>M</th>
<th>F</th>
<th>VF</th>
<th>Total g kg(^{-1}) of soil</th>
<th>Silt</th>
<th>Clay</th>
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<tbody>
<tr>
<td>0-4</td>
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<td>95</td>
<td>64</td>
<td>272</td>
<td>621</td>
<td>107</td>
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<td>4-12</td>
<td>6</td>
<td>13</td>
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<td>113</td>
<td>105</td>
<td>270</td>
<td>623</td>
<td>107</td>
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<td>73</td>
<td>87</td>
<td>186</td>
<td>591</td>
<td>223</td>
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<td>19</td>
<td>85</td>
<td>96</td>
<td>104</td>
<td>578</td>
<td>218</td>
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<tr>
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<td>5</td>
<td>21</td>
<td>81</td>
<td>100</td>
<td>210</td>
<td>545</td>
<td>245</td>
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<tr>
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Table B: Chemical properties

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<th>Mg cmol (+) kg(^{-1})</th>
<th>K cmol (+) kg(^{-1})</th>
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Table C: Chemical properties

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<th>EBS</th>
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</thead>
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<td>g kg⁻¹</td>
<td>cmol (+) kg⁻¹</td>
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Table E: Sand mineralogy

<table>
<thead>
<tr>
<th>Depth</th>
<th>Quartz</th>
<th>Feldspar</th>
<th>Plagioclase</th>
<th>Mica</th>
<th>Opaque minerals*</th>
<th>Heavy minerals*</th>
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</thead>
<tbody>
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<td>inches</td>
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*Opaque minerals are ilmenite, magnetite, hematite, etc.; Heavy minerals are translucent zircon, tourmaline, rutile, epidote, hornblende, etc.; Tr = Trace.

Table F: Chemical properties

<table>
<thead>
<tr>
<th>Depth</th>
<th>pH</th>
<th>Ca</th>
<th>Mg</th>
<th>P</th>
<th>K</th>
<th>Zn</th>
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</table>

Nahunta Series - Supplemental profile 1

Nahunta loam, woodlands, 0 to 2 percent slopes; 150 yards north of the junction of Highways VA-5 and VA-609, 50 yards west of Highway VA-609; elevation 63 feet.
A--0 to 4 inches; grayish brown (2.5Y 5/2) loam; moderate fine and medium granular structure; friable, slightly sticky, slightly plastic; common fine and medium and few coarse roots; common fine tubular pores; extremely acid; abrupt smooth boundary.

BA--4 to 8 inches; mottled light brownish gray (2.5Y 6/2) and grayish brown (2.5Y 5/2) loam; weak medium granular and weak medium subangular blocky structure; friable, sticky, slightly plastic; common fine roots; common fine and very fine tubular pores; very strongly acid; clear smooth boundary.

Bt--8 to 18 inches; light olive brown (2.5Y 5/4) loam; common fine prominent yellowish brown (10YR 5/8) mottles; moderate medium subangular blocky structure; friable, sticky, plastic; common fine roots; common fine and very fine tubular pores; few thin discontinuous clay films on faces of peds; very strongly acid; gradual smooth boundary.

Btg--18 to 29 inches; light brownish gray (2.5Y 6/2) clay loam; common coarse prominent yellowish brown (10YR 5/8) and common coarse distinct light gray (5Y 6/1) mottles; moderate medium subangular blocky structure; friable, sticky, plastic; few fine roots; few fine tubular pores; common thin continuous clay films on faces of peds; very strongly acid; gradual smooth boundary.

BCg--29 to 55 inches; light gray (5Y 7/1) sandy clay loam; weak medium subangular blocky structure; friable, sticky, plastic; few fine and medium roots; few very fine tubular pores; thin discontinuous clay films on faces of peds; very strongly acid; gradual smooth boundary.

Cg--55 to 70 inches; light gray (5Y 6/1) sandy clay loam; few medium prominent yellowish brown (10YR 5/6) mottles; massive; friable, sticky, plastic; few fine and medium roots; extremely acid.

Table A: Particle-size distribution

<table>
<thead>
<tr>
<th>Depth</th>
<th>VC</th>
<th>C</th>
<th>M</th>
<th>F</th>
<th>VF</th>
<th>Total</th>
<th>Silt</th>
<th>Clay</th>
</tr>
</thead>
<tbody>
<tr>
<td>inches</td>
<td>g kg(^{-1}) of soil</td>
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<td></td>
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<td></td>
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<td>156</td>
<td>504</td>
<td>397</td>
<td>99</td>
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<td>26</td>
<td>231</td>
<td>131</td>
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<td>450</td>
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<td>18-29</td>
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<td>209</td>
<td>119</td>
<td>360</td>
<td>310</td>
<td>330</td>
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<td>29-55</td>
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<td>282</td>
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<td>495</td>
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85
### Table B: Chemical properties

<table>
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<th>Ca</th>
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<th>K</th>
<th>H</th>
<th>CEC</th>
<th>BS</th>
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<td>inches</td>
<td>cmol (+) kg⁻¹</td>
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### Table C: Chemical properties

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<th>Organic matter</th>
<th>pH</th>
<th>Al</th>
<th>ECEC</th>
<th>EBS</th>
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<tbody>
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<td>g kg⁻¹</td>
<td>cmol (+) kg⁻¹</td>
<td>%</td>
<td></td>
<td></td>
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### Table E: Sand mineralogy

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<th>Plagioclase</th>
<th>Mica</th>
<th>Opaque minerals*</th>
<th>Heavy minerals*</th>
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*Opaque minerals are ilmenite, magnetite, hematite, etc.; Heavy minerals are translucent zircon, tourmaline, rutile, epidote, hornblende, etc.; Tr = Trace.
**Table F: Chemical properties**

<table>
<thead>
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<th>pH</th>
<th>Ca</th>
<th>Mg</th>
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**Nansemond Series**

The Nansemond series consists of very deep, moderately well drained soils on footslopes. They formed in loamy sediments. Slopes range from 0 to 4 percent.

Nansemond loamy sand, cultivated, 2 to 6 percent slopes; 0.2 mile northeast of junction of Highways VA-155 and VA-614; elevation 35 feet.

Ap--0 to 9 inches; dark grayish brown (10YR 4/2) loamy sand; weak fine granular structure; very friable, nonsticky, nonplastic; few fine roots; moderately acid; clear smooth boundary.

E1--9 to 15 inches; grayish brown (10YR 5/2) loamy sand; weak fine granular structure; very friable, nonsticky, nonplastic; few fine roots; moderately acid; abrupt smooth boundary.

E2--15 to 19 inches; light yellowish brown (10YR 6/4) loamy sand; weak fine granular structure; very friable, nonsticky, nonplastic; few fine roots; strongly acid; clear smooth boundary.

Bt1--19 to 30 inches; light yellowish brown (10YR 6/4) gravelly fine sandy loam; common medium prominent yellowish brown (10YR 6/8) mottles; moderate medium granular structure; very friable, nonsticky, nonplastic; few fine roots; 20 percent gravel; very strongly acid; gradual smooth boundary.

Bt2--30 to 43 inches; yellowish brown (10YR 5/8) gravelly fine sandy loam; common medium prominent light brownish gray (10YR 6/2) mottles; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; 20 percent gravel; very strongly acid; gradual wavy boundary.

C1--43 to 60 inches; mottled yellowish brown (10YR 5/8) and strong brown (7.5YR 5/8) gravelly loamy sand; single grain; loose; 20 percent gravel; very strongly acid; gradual wavy boundary.

C2--60 to 70 inches; yellowish brown (10YR 5/8) sandy loam; massive; friable, slightly sticky, nonplastic; very strongly acid.
Table A: Particle-size distribution

<table>
<thead>
<tr>
<th>Depth</th>
<th>VC</th>
<th>C</th>
<th>M</th>
<th>F</th>
<th>VF</th>
<th>Total</th>
<th>Silt</th>
<th>Clay</th>
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Table B: Chemical properties

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Table E: Sand mineralogy

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*Opaque minerals are ilmenite, magnetite, hematite, etc.; Heavy minerals are translucent zircon, tourmaline, rutile, epidote, hornblende, etc.; Tr = Trace.

Table F: Chemical properties

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Nawney Series

The Nawney series consists of very deep, very poorly drained soils on narrow to broad floodplains and basins. They formed in loamy fluvial sediments. Slopes range from 0 to 2 percent.

Nawney silt loam, woodlands, 0 to 2 percent slopes, ponded; 250 yards west of the junction of Highway VA-609 and abandoned part of Highway VA-600, 225 yards east of abandoned Highway VA-600 and C & O Railroad, 350 yards south of Chickahominy River; elevation 35 feet.

A--0 to 14 inches; dark gray (10YR 4/1) silt loam; moderate medium granular structure; friable, sticky, plastic; many fine, medium, and coarse roots; few fine flakes of mica; very strongly acid; clear smooth boundary.

Cg1--14 to 28 inches; dark gray (5Y 4/1) loam; massive; friable, sticky, plastic; common fine and medium roots; few fine flakes of mica; very strongly acid; clear smooth boundary.

Cg2--28 to 55 inches; greenish gray (5G 5/1) sandy clay loam; many coarse prominent yellowish red (5YR 4/6) mottles; massive; friable, sticky, plastic; common fine and medium roots; few fine flakes of mica; very strongly acid; gradual smooth boundary.
Cg3--55 to 72 inches; bluish gray (5B 6/1) fine sandy loam; massive; friable, sticky, plastic; few fine, medium, and coarse roots; few fine flakes of mica; very strongly acid.

Table A: Particle-size distribution

<table>
<thead>
<tr>
<th>Depth</th>
<th>VC</th>
<th>C</th>
<th>M</th>
<th>F</th>
<th>VF</th>
<th>Total</th>
<th>Silt</th>
<th>Clay</th>
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<tr>
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<td>4</td>
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Table B: Chemical properties

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<th>Clay</th>
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Table C: Chemical properties

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Table E: Sand mineralogy

<table>
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<th>Depth</th>
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<th>Plagioclase</th>
<th>Mica</th>
<th>Opaque minerals*</th>
<th>Heavy minerals*</th>
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*Opaque minerals are ilmenite, magnetite, hematite, etc.; Heavy minerals are translucent zircon, tourmaline, rutile, epidote, hornblende, etc.; Tr = Trace.

Nevarc Series

The Nevarc series consists of very deep, moderately well drained soils on sideslopes. They formed in clayey fluvial and marine sediments. Slopes range from 10 to 60 percent.

Nevarc sandy loam, in a unit of Nevarc-Remlik complex, woodlands, 25 to 60 percent slopes; 2.9 miles southeast of the junction of Highways VA-623 and VA-621, 150 yards northwest of north boat landing in the Chickahominy Wildlife Management Area; elevation 80 feet.

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

E--5 to 11 inches; pale brown (10YR 6/3) loam; moderate medium granular structure; friable, slightly sticky, slightly plastic; common fine and medium and few coarse roots; common fine and medium pores; extremely acid; abrupt smooth boundary.

Bt1--11 to 26 inches; yellowish brown (10YR 5/4) clay; strong fine and medium subangular and angular blocky structure; firm, sticky, plastic; common fine and medium and few coarse roots; common fine tubular pores; many distinct clay films on faces of peds; extremely acid; gradual smooth boundary.

Bt2--26 to 42 inches; yellowish brown (10YR 5/4) clay; common medium prominent yellowish red (5YR 5/8) and strong brown (7.5YR 5/8) and common medium distinct grayish brown (10YR 5/2) mottles; moderate 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; very strongly acid; gradual smooth boundary.

BC--42 to 54 inches; yellowish brown (10YR 5/6) sandy clay loam; weak medium subangular blocky structure; friable, sticky, plastic; few fine roots; common fine and medium tubular pores; common distinct clay films on faces of peds; extremely acid; gradual smooth boundary.

C--54 to 72 inches; yellowish brown (10YR 5/6) fine sandy loam; massive; friable, slightly sticky, slightly plastic; few fine tubular pores; very strongly acid.
Table A: Particle-size distribution

<table>
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<th>Depth</th>
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<th>C</th>
<th>M</th>
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Table C: Chemical properties

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<th>EBS</th>
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<td>Mg</td>
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Photo 4. Roadbase materials for VA-106 near Roxbury were borrowed from Nevarec-Remlik gravelly soils.
Newflat Series

The Newflat series consists of very deep, somewhat poorly drained soils on stream terraces and flats along the Chickahominy and James Rivers. They formed in fluvial sediments. Slopes range from 0 to 2 percent.

Newflat silt loam, woodlands, 0 to 2 percent slopes; 0.7 mile east-southeast of the junction of Highways VA-621 and VA-623 on Highway VA-621, 0.9 mile southeast of junction of Highways VA-623 and VA-627, 1.8 miles southwest of mouth of Parsons Creek; elevation 35 feet.

A--0 to 2 inches; gray (10YR 5/1) silt loam; weak fine and medium granular structure; friable, slightly sticky, slightly plastic; many fine, medium, and coarse roots; very strongly acid; abrupt smooth boundary.

E--2 to 6 inches; pale brown (10YR 6/3) silt loam; common medium distinct light gray (10YR 6/1) mottles; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; many fine, medium, and coarse roots; very strongly acid; clear smooth boundary.

Bt--6 to 14 inches; brown (10YR 5/3) silty clay; common medium faint grayish brown (10YR 5/2) mottles; strong fine angular blocky structure; firm, sticky, plastic; many fine and medium and few coarse roots; common distinct clay films on faces of peds; few fine flakes of mica; very strongly acid; clear smooth boundary.

Btg1--14 to 24 inches; light gray (5Y 6/1) silty clay; common medium prominent strong brown (7.5YR 5/6) mottles; massive; firm, sticky, plastic; common fine and medium roots; few fine flakes of mica; very strongly acid; gradual smooth boundary.

Btg2--24 to 64 inches; gray (5Y 5/1) silty clay; common medium prominent strong brown (7.5YR 4/6) mottles; massive; firm, very sticky, very plastic; very strongly acid.

Table A: Particle-size distribution

<table>
<thead>
<tr>
<th>Depth</th>
<th>Sand</th>
<th>VC</th>
<th>C</th>
<th>M</th>
<th>F</th>
<th>VF</th>
<th>Total</th>
<th>Silt</th>
<th>Clay</th>
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<td>507</td>
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<td>3</td>
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### Table B: Chemical properties

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<th>H</th>
<th>CEC</th>
<th>BS</th>
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</thead>
<tbody>
<tr>
<td>inches</td>
<td>cmol (+) kg(^{-1})</td>
<td>%</td>
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### Table C: Chemical properties

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<td>cmol (+) kg(^{-1})</td>
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### Table E: Sand mineralogy

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<tr>
<th>Depth</th>
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<th>Feldspar</th>
<th>Plagioclase</th>
<th>Mica</th>
<th>Opaque minerals*</th>
<th>Heavy minerals*</th>
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<td>10</td>
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<td>10</td>
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*Opaque minerals are ilmenite, magnetite, hematite, etc.; Heavy minerals are translucent zircon, tourmaline, rutile, epidote, hornblende, etc.; Tr = Trace.
Table F: Chemical properties

<table>
<thead>
<tr>
<th>Depth</th>
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<th>Ca</th>
<th>Mg</th>
<th>P</th>
<th>K</th>
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<th>Mn</th>
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*Nimmo Series*

The Nimmo series consists of very deep, poorly drained soils on low-lying flats and natural drains. They formed in loamy fluvial sediments overlying sandy sediments. Slopes range from 0 to 2 percent.

Nimmo sandy loam, woodlands, 0 to 2 percent slopes; 30 yards south of the junction of Highways VA-600 and VA-106, 225 yards south-southwest of C & O Railroad; elevation 38 feet.

A--0 to 4 inches; black (5Y 2/1) sandy loam; weak fine granular structure; friable, slightly sticky, slightly plastic; many fine roots; common fine and medium and few coarse tubular pores; very strongly acid; abrupt smooth boundary.

E1--4 to 10 inches; dark gray (5Y 4/1) sandy loam; common fine prominent yelowish brown (10YR 5/8) mottles; weak fine granular structure; very friable, slightly sticky, slightly plastic; common fine roots; common fine, medium, and coarse tubular pores; very strongly acid; abrupt smooth boundary.

E2--10 to 14 inches; dark gray (10YR 4/1) loamy sand; weak fine granular structure; very friable, slightly sticky, slightly plastic; few fine, medium, and coarse roots; common fine, medium, and coarse tubular pores; very strongly acid; abrupt smooth boundary.

Btg--14 to 32 inches; gray (10YR 5/1) fine sandy loam; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; common fine, medium, and coarse tubular pores; few faint clay films on faces of peds and clay bridges between sand grains; few fine black mineral grains; few feldspar grains; very strongly acid; gradual smooth boundary.

Cg1--32 to 40 inches; light gray (10YR 6/1) sand; common fine prominent yellowish brown (10YR 5/8) mottles; weak fine and medium subangular blocky structure; friable, slightly sticky, slightly plastic; few fine and coarse roots; few fine, medium, and coarse tubular pores; many faint clay films and bridges between sand grains; common faint clay films on faces of peds; few sand-sized feldspar grains; discontinuous sandy clay loam layers; very strongly acid; clear smooth boundary.
Cg2--40 to 48 inches; light gray (10YR 6/1) coarse sand; massive; very friable, slightly sticky, slightly plastic; few fine black mineral grains; 2 percent rounded quartz gravel; strongly acid; clear smooth boundary.

Cg3--48 to 64 inches; gray (10YR 5/1) coarse sand; single grain; loose; strongly acid.

Table A: Particle-size distribution

<table>
<thead>
<tr>
<th>Depth (inches)</th>
<th>VC</th>
<th>C</th>
<th>M</th>
<th>F</th>
<th>VF</th>
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<th>Silt</th>
<th>Clay</th>
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Table B: Chemical properties

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Table C: Chemical properties

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Table E: Sand mineralogy

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<th>Mica</th>
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<th>Heavy minerals*</th>
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*Opaque minerals are ilmenite, magnetite, hematite, etc.; Heavy minerals are translucent zircon, tourmaline, rutile, epidote, hornblende, etc.; Tr = Trace.

Table F: Chemical properties

<table>
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<tr>
<th>Depth</th>
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<td>1.6</td>
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Pamunkey Series

The Pamunkey series consists of very deep, well drained soils on stream terraces. They formed in loamy fluvial sediments. Slopes range from 0 to 10 percent.
Pamunkey loam, cultivated, 2 to 6 percent slopes; 2.3 miles southeast of the end of Highway VA-640, 1.0 mile south of Highway VA-5, 70 yards east of barn on Westover Plantation; elevation 27 feet.

Ap--0 to 10 inches; dark brown (10YR 4/3) loam; weak fine and medium granular structure; very friable, slightly sticky, slightly plastic; many fine roots; common fine and medium tubular pores; clear smooth boundary.

Bt1--10 to 16 inches; dark yellowish brown (10YR 4/4) loam; common fine prominent very dark grayish brown (10YR 3/2) mineral stains; 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 between sand grains; moderately acid; clear smooth boundary.

Bt2--16 to 40 inches; dark brown (7.5YR 4/4) clay loam; common fine prominent very dark grayish brown (10YR 3/2) mineral stains; 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; clear smooth boundary.

Bt3--40 to 60 inches; brown (7.5YR 5/4) clay loam; common fine prominent very dark grayish brown (10YR 3/2) mineral stains; 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; moderately acid.

Table A: Particle-size distribution

<table>
<thead>
<tr>
<th>Depth</th>
<th>Sand</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th>Total</th>
<th>Silt</th>
<th>Clay</th>
</tr>
</thead>
<tbody>
<tr>
<td>inches</td>
<td>g kg⁻¹ of soil</td>
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<tr>
<td>10-30</td>
<td>1 10 28 181 114 334 344 322</td>
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Table B: Chemical properties

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<th></th>
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<tbody>
<tr>
<td>inches</td>
<td></td>
<td>Ca</td>
<td>Mg</td>
<td>K</td>
<td>H</td>
<td>CEC</td>
<td>BS</td>
<td>%</td>
</tr>
<tr>
<td>10-30</td>
<td></td>
<td>3.89</td>
<td>1.93</td>
<td>0.19</td>
<td>3.96</td>
<td>9.97</td>
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<tr>
<td>60</td>
<td></td>
<td>2.48</td>
<td>3.40</td>
<td>0.21</td>
<td>3.96</td>
<td>10.05</td>
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Table C: Chemical properties

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<th>Depth</th>
<th>Organic matter</th>
<th>pH</th>
<th>Al</th>
<th>ECEC</th>
<th>EBS</th>
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</thead>
<tbody>
<tr>
<td>inches</td>
<td>g kg(^{-1})</td>
<td>cmol (+) kg(^{-1})</td>
<td>%</td>
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<td></td>
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<tr>
<td>10-30</td>
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<td>0.05</td>
<td>6.14</td>
<td>99.19</td>
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Table E: Sand mineralogy

<table>
<thead>
<tr>
<th>Depth</th>
<th>Quartz</th>
<th>Feldspar</th>
<th>Plagioclase</th>
<th>Mica</th>
<th>Opaque minerals*</th>
<th>Heavy minerals*</th>
</tr>
</thead>
<tbody>
<tr>
<td>inches</td>
<td>g kg(^{-1}) of sand</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10-30</td>
<td>820</td>
<td>95</td>
<td>10</td>
<td>15</td>
<td>0</td>
<td>60</td>
</tr>
</tbody>
</table>

*Opaque minerals are ilmenite, magnetite, hematite, etc.; Heavy minerals are translucent zircon, tourmaline, rutile, epidote, hornblende, etc.; Tr = Trace.

**Pamunkey Series - Supplemental profile 1**

Pamunkey loam, cultivated, 2 to 6 percent slopes; 1.2 miles southeast of Shirley Plantation, 0.8 mile east-northeast of upland and marsh boundary on Eppes Island; elevation 12 feet.

Ap--0 to 8 inches; dark brown (10YR 4/4) fine sandy loam; weak fine granular structure; very friable, slightly sticky, slightly plastic; many fine roots; common fine and medium tubular pores; clear smooth boundary.

Bt--8 to 34 inches; strong brown (7.5YR 4/6) sandy clay 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 between sand grains; moderately acid; clear smooth boundary.

BC--34 to 44 inches; strong brown (7.5YR 4/6) fine sandy loam; common fine prominent very dark grayish brown (10YR 3/2) mineral stains; single grain; loose; common fine and medium tubular pores; common fine and medium flakes of mica; moderately acid.
Table A: Particle-size distribution

<table>
<thead>
<tr>
<th>Depth</th>
<th>VC</th>
<th>C</th>
<th>M</th>
<th>F</th>
<th>VF</th>
<th>Total</th>
<th>Silt</th>
<th>Clay</th>
</tr>
</thead>
<tbody>
<tr>
<td>inches</td>
<td></td>
<td></td>
<td>g kg(^{-1}) of soil</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8-28</td>
<td>1</td>
<td>14</td>
<td>56</td>
<td>313</td>
<td>157</td>
<td>541</td>
<td>249</td>
<td>210</td>
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Table B: Chemical properties

<table>
<thead>
<tr>
<th>Depth</th>
<th>Ca</th>
<th>Mg</th>
<th>K</th>
<th>H</th>
<th>CEC</th>
<th>BS</th>
</tr>
</thead>
<tbody>
<tr>
<td>inches</td>
<td>cmol (+) kg(^{-1})</td>
<td>%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8-28</td>
<td>3.04</td>
<td>1.60</td>
<td>0.50</td>
<td>1.78</td>
<td>6.92</td>
<td>74.28</td>
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<td>1.75</td>
<td>0.83</td>
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Table C: Chemical properties

<table>
<thead>
<tr>
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<th>Organic matter</th>
<th>pH</th>
<th>Al</th>
<th>ECEC</th>
<th>EBS</th>
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<tbody>
<tr>
<td>inches</td>
<td>g kg(^{-1})</td>
<td>cmol (+) kg(^{-1})</td>
<td>%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8-28</td>
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<td>0.05</td>
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<td>99.04</td>
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<td>5.93</td>
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<td>98.32</td>
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Table E: Sand mineralogy

<table>
<thead>
<tr>
<th>Depth</th>
<th>Quartz</th>
<th>Feldspar</th>
<th>Plagioclase</th>
<th>Mica</th>
<th>Opaque minerals(^*)</th>
<th>Heavy minerals(^*)</th>
</tr>
</thead>
<tbody>
<tr>
<td>inches</td>
<td>g kg(^{-1}) of sand</td>
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<td></td>
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<td></td>
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</tr>
<tr>
<td>8-28</td>
<td>840</td>
<td>55</td>
<td>0</td>
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<td>0</td>
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</tbody>
</table>

*Opaque minerals are ilmenite, magnetite, hematite, etc.; Heavy minerals are translucent zircon, tourmaline, rutile, epidote, hornblende, etc.; Tr = Trace.

Pamunkey Series - Supplemental profile 2

Pamunkey loam, cultivated, 2 to 6 percent slopes; 1.6 miles west-southwest of During Point, 0.9 mile northwest of Dancing Point; elevation 15 feet.
Ap--0 to 10 inches; dark brown (10YR 3/3) loam; weak fine granular structure; friable, slightly sticky, plastic; many fine roots; common fine and medium tubular pores; abrupt smooth boundary.

Bt1--10 to 40 inches; dark yellowish brown (10YR 4/6) silty clay loam; moderate medium subangular blocky structure; friable, 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 between sand grains; slightly acid; clear smooth boundary.

Bt2--40 to 50 inches; dark yellowish brown (10YR 4/6) sandy clay loam; common fine distinct light yellowish brown (10YR 6/4) mottles; moderate medium subangular blocky structure; friable, sticky, plastic; few fine roots; common fine and medium tubular pores; common fine flakes of mica; clear smooth boundary.

BC--50 to 60 inches; dark yellowish brown (10YR 4/6) fine sandy loam; common fine distinct light yellowish brown (10YR 6/4) mottles; weak medium subangular blocky structure; friable, sticky, slightly plastic; common fine and medium tubular pores; common fine and medium flakes of mica; strongly acid.

Table A: Particle-size distribution

<table>
<thead>
<tr>
<th>Depth (inches)</th>
<th>VC</th>
<th>C</th>
<th>M</th>
<th>F</th>
<th>VF</th>
<th>Total</th>
<th>Silt</th>
<th>Clay</th>
</tr>
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<tbody>
<tr>
<td>10-30</td>
<td>0</td>
<td>4</td>
<td>5</td>
<td>45</td>
<td>79</td>
<td>135</td>
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Table B: Chemical properties

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<tr>
<th>Depth (inches)</th>
<th>Ca</th>
<th>Mg</th>
<th>K</th>
<th>H</th>
<th>CEC</th>
<th>BS</th>
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<tr>
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<td>11.31</td>
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<td>0.14</td>
<td>3.56</td>
<td>8.16</td>
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Table C: Chemical properties

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<th>Organic matter</th>
<th>pH</th>
<th>Al</th>
<th>ECEC</th>
<th>EBS</th>
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</thead>
<tbody>
<tr>
<td>inches</td>
<td>g kg(^{-1})</td>
<td></td>
<td>cmol (+) kg(^{-1})</td>
<td></td>
<td>%</td>
</tr>
<tr>
<td>10-30</td>
<td>4</td>
<td>6.40</td>
<td>0.10</td>
<td>8.40</td>
<td>98.76</td>
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<td>5.30</td>
<td>0.55</td>
<td>5.15</td>
<td>89.32</td>
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Table E: Sand mineralogy

<table>
<thead>
<tr>
<th>Depth</th>
<th>Quartz</th>
<th>Feldspar</th>
<th>Plagioclase</th>
<th>Mica</th>
<th>Opaque minerals*</th>
<th>Heavy minerals*</th>
</tr>
</thead>
<tbody>
<tr>
<td>inches</td>
<td>g kg(^{-1}) of sand</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td>0</td>
<td>80</td>
<td>0</td>
<td>35</td>
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</table>

*Opaque minerals are ilmenite, magnetite, hematite, etc.; Heavy minerals are translucent zircon, tourmaline, rutile, epidote, hornblende, etc.; Tr = Trace.

**Pamunkey Series - Supplemental profile 3**

Pamunkey loam, woodland, 2 to 6 percent slopes; 1.1 miles northwest of Westover Mansion, 0.8 mile northeast of Harrison Landing on Westover Plantation; elevation 42 feet.

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

BA--4 to 6 inches; strong brown (7.5YR 4/6) loam; few fine distinct very dark gray (10YR 3/1) mineral stains; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; common fine roots; common fine and medium tubular pores; common fine flakes of mica; clear smooth boundary.

Bt1--6 to 22 inches; strong brown (7.5YR 4/6) silty clay; few fine distinct very dark gray (10YR 3/1) mineral stains; 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 between sand grains; extremely acid; clear smooth boundary.

Bt2--22 to 35 inches; strong brown (7.5YR 5/6) clay loam; few fine distinct very dark gray (10YR 3/1) mineral stains and pale brown (10YR 6/3) mottles; moderate medium subangular blocky structure; friable, sticky, plastic; few fine roots; common fine and medium tubular pores; common fine flakes of mica; gradual smooth boundary.
Bt3--35 to 45 inches; strong brown (7.5YR 5/6) clay loam; common fine distinct very dark gray (10YR 3/1) mineral stains and pale brown (10YR 6/3) mottles; moderate medium subangular blocky structure; friable, sticky, plastic; few fine roots; common fine and medium tubular pores; common fine flakes of mica; clear smooth boundary.

BC--45 to 60 inches; strong brown (7.5YR 5/6) silty clay loam; common medium prominent very dark gray (10YR 3/1) mineral stains and light gray (10YR 6/1) mottles; weak medium subangular blocky structure; friable, sticky, plastic; common fine and medium tubular pores; common fine and medium flakes of mica; extremely acid.

Table A: Particle-size distribution

<table>
<thead>
<tr>
<th>Depth (inches)</th>
<th>Sand VC g kg⁻¹ of soil</th>
<th>C</th>
<th>M</th>
<th>F</th>
<th>VF</th>
<th>Total</th>
<th>Silt</th>
<th>Clay</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-26</td>
<td>0</td>
<td>2</td>
<td>5</td>
<td>40</td>
<td>94</td>
<td>141</td>
<td>445</td>
<td>414</td>
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Table B: Chemical properties

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<tr>
<th>Depth (inches)</th>
<th>Exchangeable cations</th>
<th>Ca cmol (+) kg⁻¹</th>
<th>Mg</th>
<th>K</th>
<th>H</th>
<th>CEC cmol (+) kg⁻¹</th>
<th>BS %</th>
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<tbody>
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<td>0.39</td>
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<tr>
<td>56</td>
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<td>2.80</td>
<td>0.45</td>
<td>11.37</td>
<td>14.88</td>
<td>23.59</td>
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Table C: Chemical properties

<table>
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<tr>
<th>Depth (inches)</th>
<th>Organic matter g kg⁻¹</th>
<th>pH</th>
<th>Al cmol (+) kg⁻¹</th>
<th>ECEC cmol (+) kg⁻¹</th>
<th>EBS %</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-26</td>
<td>--</td>
<td>4.00</td>
<td>2.15</td>
<td>6.48</td>
<td>66.32</td>
</tr>
<tr>
<td>56</td>
<td>--</td>
<td>3.90</td>
<td>5.35</td>
<td>8.86</td>
<td>39.62</td>
</tr>
</tbody>
</table>
Pamunkey Series - Supplemental profile 4

Pamunkey loam, cultivated, 2 to 6 percent slopes; 1.2 miles west-northwest of the junction of Highways VA-5, VA-106, and VA-156, 0.4 mile west-southwest of the junction of Highways VA-5, VA-156, and VA-608, 70 yards north of fence row on Shirley Plantation; elevation 48 feet.

Ap--0 to 10 inches; dark brown (10YR 4/3) loam; weak fine and medium granular structure; very friable, slightly sticky, slightly plastic; many fine roots; common fine and medium tubular pores; clear smooth boundary.

Bt--10 to 35 inches; strong brown (7.5YR 4/6) clay loam; few fine prominent very dark grayish brown (10YR 3/2) mineral stains; 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 between sand grains; slightly acid; clear smooth boundary.

BC--35 to 45 inches; strong brown (7.5YR 5/6) sandy clay loam; few fine prominent very dark grayish brown (10YR 6/3) mottles; weak 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; clear smooth boundary.

C--45 to 65 inches; strong brown (7.5YR 5/6) sandy loam; massive; friable, slightly sticky, slightly plastic; common fine and medium flakes of mica; neutral.

Table A: Particle-size distribution

<table>
<thead>
<tr>
<th>Depth</th>
<th>Sand VC</th>
<th>C</th>
<th>M</th>
<th>F</th>
<th>VF</th>
<th>Total</th>
<th>Silt</th>
<th>Clay</th>
</tr>
</thead>
<tbody>
<tr>
<td>inches</td>
<td>g kg⁻¹ of soil</td>
<td>10-30</td>
<td>0</td>
<td>2</td>
<td>22</td>
<td>220</td>
<td>150</td>
<td>394</td>
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</table>

Table B: Chemical properties

<table>
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<th>Depth</th>
<th>Exchangeable cations</th>
<th>Ca</th>
<th>Mg</th>
<th>K</th>
<th>H</th>
<th>CEC</th>
<th>BS</th>
</tr>
</thead>
<tbody>
<tr>
<td>inches</td>
<td>cmol (+) kg⁻¹</td>
<td>10-30</td>
<td>5.34</td>
<td>1.45</td>
<td>0.18</td>
<td>2.38</td>
<td>9.35</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>60</td>
<td>4.26</td>
<td>0.24</td>
<td>0.09</td>
<td>0.99</td>
<td>5.58</td>
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</table>
Table C: Chemical properties

<table>
<thead>
<tr>
<th>Depth</th>
<th>Organic matter</th>
<th>pH</th>
<th>Al</th>
<th>ECEC</th>
<th>EBS</th>
</tr>
</thead>
<tbody>
<tr>
<td>inches</td>
<td>g kg⁻¹</td>
<td>cmol (+) kg⁻¹</td>
<td>%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10-30</td>
<td>1</td>
<td>6.50</td>
<td>0.15</td>
<td>7.12</td>
<td>97.89</td>
</tr>
<tr>
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Table E: Sand mineralogy

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<tr>
<th>Depth</th>
<th>Quartz</th>
<th>Feldspar</th>
<th>Plagioclase</th>
<th>Mica</th>
<th>Opaque minerals*</th>
<th>Heavy minerals*</th>
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<tr>
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<td>g kg⁻¹ of sand</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>10-30</td>
<td>785</td>
<td>100</td>
<td>20</td>
<td>35</td>
<td>0</td>
<td>60</td>
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</tbody>
</table>

*Opaque minerals are ilmenite, magnetite, hematite, etc.; Heavy minerals are translucent zircon, tourmaline, rutile, epidote, hornblende, etc.; Tr = Trace.
Photo 5. Shirley, settled in 1613, is the oldest plantation in Virginia. The plantation's longevity results from the Pamunkey soils favorable properties for plant growth.
Photo 6. The manor house at Westover, built by Colonel William Byrd in 1730 on Pamunkey soils, is the nation's premier example of Georgian architecture.
Peawick Series

The Peawick series consists of very deep, moderately well drained soils on stream terraces. They formed in clayey fluvial sediments. Slopes range from 0 to 6 percent.

Peawick silt loam, woodlands, 0 to 2 percent slopes; 1.2 miles south of the junction of Highways VA-5 and VA-623 on Highway VA-623, 1.1 miles northeast of the junction of Highways VA-613 and VA-623, 0.3 mile southwest of Highway VA-623 and Tomahund Creek; elevation 33 feet.

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

E--2 to 5 inches; light yellowish brown (10YR 6/4) silt loam; moderate medium granular structure; friable, sticky, plastic; many fine and medium and few coarse roots; extremely acid; clear smooth boundary.

Bt1--5 to 24 inches; yellowish brown (10YR 5/6) silty clay loam; common fine prominent strong brown (7.5YR 5/8) mottles; moderate medium and fine angular and subangular blocky structure; firm, sticky, plastic; common fine and medium roots; common fine tubular pores; common distinct clay films on faces of peds; common fine flakes of mica; extremely acid; clear smooth boundary.

Bt2--24 to 36 inches; yellowish brown (10YR 5/8) silty clay; common fine distinct strong brown (7.5YR 5/8) and common fine prominent light gray (10YR 6/1) mottles; strong medium and fine angular and subangular blocky structure; firm, sticky, plastic; few fine roots; many distinct clay films on faces of peds; common fine flakes of mica; extremely acid; clear smooth boundary.

Btgl--36 to 58 inches; mottled light gray (10YR 6/1) and yellowish brown (10YR 5/8) clay; strong coarse and medium angular blocky structure; firm, sticky, plastic; few fine roots; many prominent clay films on faces of peds; common fine flakes of mica; extremely acid; gradual smooth boundary.

Btg2--58 to 64 inches; light gray (10YR 6/1) clay; common medium prominent yellowish brown (10YR 5/6) mottles; weak medium prismatic parting to strong coarse and medium angular blocky structure; very firm, very sticky, very plastic; few fine roots; many prominent clay films on faces of peds; few fine flakes of mica; extremely acid.

Table A: Particle-size distribution

<table>
<thead>
<tr>
<th>Depth</th>
<th>VC</th>
<th>C</th>
<th>M</th>
<th>F</th>
<th>VF</th>
<th>Total</th>
<th>Silt</th>
<th>Clay</th>
</tr>
</thead>
<tbody>
<tr>
<td>inches</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5-25</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>7</td>
<td>16</td>
<td>28</td>
<td>484</td>
<td>488</td>
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110
Table B: Chemical properties

<table>
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<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Ca</td>
<td>Mg</td>
<td>K</td>
<td>H</td>
<td>CEC</td>
<td>BS</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>5-25</td>
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<td>24.75</td>
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Table C: Chemical properties

<table>
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<th>Organic matter</th>
<th>pH</th>
<th>Al</th>
<th>ECEC</th>
<th>EBS</th>
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</thead>
<tbody>
<tr>
<td>inches</td>
<td>g kg⁻¹</td>
<td></td>
<td></td>
<td>cmol (+) kg⁻¹</td>
<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5-25</td>
<td>--</td>
<td>4.50</td>
<td>10.45</td>
<td>12.21</td>
<td>14.41</td>
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<tr>
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<td>4.16</td>
<td>18.85</td>
<td>21.35</td>
<td>11.71</td>
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Table D: Clay mineralogy

<table>
<thead>
<tr>
<th>Depth</th>
<th>HIV*</th>
<th>Mica</th>
<th>Verm*</th>
<th>Kaolinite</th>
<th>Quartz</th>
<th>Mont*</th>
<th>Gibbsite</th>
<th>Misc*</th>
</tr>
</thead>
<tbody>
<tr>
<td>inches</td>
<td>g kg⁻¹ of clay</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>5-25</td>
<td>100</td>
<td>350</td>
<td>0</td>
<td>270</td>
<td>40</td>
<td>120</td>
<td>Tr</td>
<td>0</td>
</tr>
</tbody>
</table>

*HIV = hydroxy interlayered vermiculite; Verm = vermiculite; Mont = montmorillonite; Misc = miscellaneous; Tr = Trace.

Peawick Series - Supplemental profile 1

Peawick silt loam, woodlands, 0 to 2 percent slopes; 100 yards east of St. John Baptist Church across Highway VA-106; elevation 86 feet.

AE--0 to 6 inches; grayish brown (10YR 5/2) silt loam; moderate medium and fine granular structure; friable, slightly sticky, slightly plastic; many medium and fine roots; clear smooth boundary.

Bt1--6 to 26 inches; mottled yellowish brown (10YR 5/6) and light olive brown (2.5Y 5/4) clay; moderate medium subangular blocky structure; firm, sticky, plastic; common fine and medium roots; common fine tubular pores; common distinct clay films on faces of peds; common fine flakes of mica; extremely acid; clear smooth boundary.

Bt2--26 to 40 inches; mottled yellowish brown (10YR 5/6) and light olive brown (2.5Y 5/4) moderate medium angular and subangular blocky structure; firm, sticky, plastic; common fine and medium roots; common fine tubular pores;
common distinct clay films on faces of peds; common fine flakes of mica; extremely acid; clear smooth boundary.

Bt3--40 to 60 inches; mottled yellowish brown (10YR 5/8), yellowish red (5YR 5/8), red (2.5YR 4/8), and light gray (10YR 6/1) clay; strong medium and fine angular and subangular blocky structure; firm, sticky, plastic; many distinct clay films on faces of peds; common fine flakes of mica; extremely acid.

Table A: Particle-size distribution

<table>
<thead>
<tr>
<th>Depth</th>
<th>Sand</th>
</tr>
</thead>
<tbody>
<tr>
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<td>VC</td>
</tr>
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<td>inches</td>
<td>g kg(^{-1}) of soil</td>
</tr>
<tr>
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Table B: Chemical properties

<table>
<thead>
<tr>
<th>Depth</th>
<th>Exchangeable cations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ca</td>
</tr>
<tr>
<td>inches</td>
<td>cmol (+) kg(^{-1})</td>
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<td>6-26</td>
<td>0.23</td>
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<tr>
<td>56</td>
<td>2.10</td>
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Table C: Chemical properties

<table>
<thead>
<tr>
<th>Depth</th>
<th>Organic matter</th>
<th>pH</th>
<th>Al</th>
<th>ECEC</th>
<th>EBS</th>
</tr>
</thead>
<tbody>
<tr>
<td>inches</td>
<td>g kg(^{-1})</td>
<td>cmol (+) kg(^{-1})</td>
<td>%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6-26</td>
<td>3</td>
<td>4.40</td>
<td>8.15</td>
<td>8.68</td>
<td>6.11</td>
</tr>
<tr>
<td>56</td>
<td>2</td>
<td>4.80</td>
<td>3.45</td>
<td>8.69</td>
<td>60.30</td>
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</table>

Table D: Clay mineralogy

<table>
<thead>
<tr>
<th>Depth</th>
<th>HIV*</th>
<th>Mica</th>
<th>Verm*</th>
<th>Kaolinite Quartz</th>
<th>Mont*</th>
<th>Gibbsite</th>
<th>Misc*</th>
</tr>
</thead>
<tbody>
<tr>
<td>inches</td>
<td>g kg(^{-1}) of clay</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6-26</td>
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<td>190</td>
<td>80</td>
<td>400</td>
<td>30</td>
<td>Tr</td>
<td>50</td>
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</table>

\*HIV = hydroxy interlayered vermiculite; Verm = vermiculite; Mont = montmorillonite; Misc = miscellaneous; Tr = Trace.
Photo 7. Harrison Lake National Fish Hatchery ponds are on Peawick soils.
**Remlik Series**

The Remlik series consists of very deep, well drained soils on sideslopes. They formed in sandy and loamy sediments. Slopes range from 10 to 60 percent.

Remlik sand, in a unit of Nevarc-Remlik complex, woodlands, 25 to 60 percent slopes; 2.9 miles southeast of the junction of Highways VA-621 and VA-623, 350 yards north-northwest of the north boat landing in the Chickahominy River Wildlife Management Area; elevation 60 feet.

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

E1--4 to 14 inches; yellowish brown (10YR 5/4) sand; single grain; loose, nonsticky, nonplastic; common fine roots; common fine and few medium tubular pores; very strongly acid; clear smooth boundary.

E2--14 to 29 inches; light yellowish brown (10YR 6/4) sand; single grain; loose, nonsticky, nonplastic; common fine and few medium roots; common fine and medium tubular pores; very strongly acid; clear smooth boundary.

Bt--29 to 44 inches; brownish yellow (10YR 6/6) fine sandy loam; weak fine and medium subangular blocky and moderate medium granular structure; very friable, slightly sticky, slightly plastic; common fine and few medium roots; common fine, medium, and coarse tubular pores; few faint clay films on faces of peds and clay bridges between sand grains; extremely acid; clear smooth boundary.

BC--44 to 50 inches; light yellowish brown (10YR 6/4) fine sandy loam; weak fine granular structure; friable, slightly sticky, slightly plastic; very strongly acid; clear smooth boundary.

C--50 to 72 inches; olive yellow (2.5Y 6/6) fine sandy loam; massive; friable, slightly sticky, slightly plastic; very strongly acid.

**Table A: Particle-size distribution**

<table>
<thead>
<tr>
<th>Depth</th>
<th>VC</th>
<th>C</th>
<th>M</th>
<th>F</th>
<th>VF</th>
<th>Total</th>
<th>Silt</th>
<th>Clay</th>
</tr>
</thead>
<tbody>
<tr>
<td>inches</td>
<td>g kg⁻¹ of soil</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-4</td>
<td>18</td>
<td>53</td>
<td>180</td>
<td>482</td>
<td>138</td>
<td>871</td>
<td>91</td>
<td>38</td>
</tr>
<tr>
<td>4-14</td>
<td>10</td>
<td>43</td>
<td>153</td>
<td>517</td>
<td>163</td>
<td>886</td>
<td>77</td>
<td>37</td>
</tr>
<tr>
<td>14-29</td>
<td>7</td>
<td>34</td>
<td>120</td>
<td>544</td>
<td>198</td>
<td>904</td>
<td>53</td>
<td>43</td>
</tr>
<tr>
<td>29-44</td>
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<td>3</td>
<td>16</td>
<td>422</td>
<td>310</td>
<td>753</td>
<td>64</td>
<td>183</td>
</tr>
<tr>
<td>44-50</td>
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<td>1</td>
<td>4</td>
<td>423</td>
<td>355</td>
<td>783</td>
<td>63</td>
<td>154</td>
</tr>
<tr>
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<td>2</td>
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<td>378</td>
<td>792</td>
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### Table B: Chemical properties

<table>
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<th>Depth</th>
<th>Exchangeable cations</th>
<th>Ca (cmol (+) kg(^{-1}))</th>
<th>Mg (cmol (+) kg(^{-1}))</th>
<th>K (cmol (+) kg(^{-1}))</th>
<th>H (cmol (+) kg(^{-1}))</th>
<th>CEC</th>
<th>BS</th>
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<td>5.75</td>
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### Table C: Chemical properties

<table>
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<th>Organic matter</th>
<th>pH</th>
<th>Al (cmol (+) kg(^{-1}))</th>
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<td>1.75</td>
<td>2.32</td>
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<td>4.64</td>
<td>1.55</td>
<td>1.73</td>
<td>10.40</td>
</tr>
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<td>14-29</td>
<td>--</td>
<td>4.60</td>
<td>1.65</td>
<td>1.73</td>
<td>4.62</td>
</tr>
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<td>29-44</td>
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<td>4.95</td>
<td>5.58</td>
<td>11.29</td>
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<td>4.56</td>
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<td>3.75</td>
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### Table F: Chemical properties

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<th>Mg (ppm)</th>
<th>P (ppm)</th>
<th>K (ppm)</th>
<th>Zn (ppm)</th>
<th>Mn (ppm)</th>
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<td>--</td>
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<tr>
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<td>72</td>
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<td>44-50</td>
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<td>50-72</td>
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<td>114</td>
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<td>40</td>
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<td>--</td>
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</table>
Roanoke Series

The Roanoke series consists of very deep, poorly drained soils on low and intermediate river terraces along the Chickahominy and James Rivers. They formed in clayey fluvial sediments. Slopes range from 0 to 2 percent.

Roanoke silt loam, woodlands, 0 to 2 percent slopes; 1.0 mile north of Benjamin Harrison Bridge, 50 yards northwest of Highways VA-156 and VA-106; elevation 40 feet.

Ag--0 to 5 inches; gray (10YR 5/1) silt loam; weak fine subangular blocky and moderate fine granular structure; friable, sticky, plastic; many fine, medium, and coarse roots; common fine and medium tubular pores; very strongly acid; clear smooth boundary.

Btg1--5 to 25 inches; light gray (N 6/) silty clay loam; common medium prominent yellowish brown (10YR 5/8) and light olive brown (2.5Y 5/6) mottles; weak coarse prismatic parting to strong coarse angular and subangular blocky structure; firm, sticky, plastic; many fine and medium roots; continuous prominent clay films on faces of peds; common fine flakes of mica; very strongly acid; gradual smooth boundary.

Btg2--25 to 40 inches; dark gray (N 4/) clay; common medium prominent yellowish brown (10YR 5/8) and light olive brown (2.5Y 5/6) mottles; weak coarse prismatic parting to strong coarse subangular and angular blocky structure; firm, sticky, plastic; many fine and medium roots; continuous prominent clay films on faces of peds; common fine flakes of mica; very strongly acid; gradual smooth boundary.

BCg--40 to 55 inches; gray (N 5/) clay loam; many coarse prominent yellowish brown (10YR 5/8) mottles; weak coarse prismatic parting to strong coarse subangular and angular blocky structure; firm, sticky, plastic; few fine roots; continuous prominent clay films on faces of peds; many fine flakes of mica; strongly acid; gradual wavy boundary.

Cg--55 to 75 inches; light gray (2.5Y 6/1) stratified sandy loam and sandy clay loam; common medium prominent yellowish brown (10YR 5/8) mottles; massive; friable, sticky, plastic; common fine flakes of mica; strongly acid.

Table A: Particle-size distribution

<table>
<thead>
<tr>
<th>Depth</th>
<th>VC</th>
<th>C</th>
<th>M</th>
<th>F</th>
<th>VF</th>
<th>Total</th>
<th>Silt</th>
<th>Clay</th>
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<tr>
<td>inches</td>
<td>kg</td>
<td>kg</td>
<td>kg</td>
<td>kg</td>
<td>kg</td>
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<td>kg</td>
</tr>
<tr>
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<td>31</td>
<td>72</td>
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### Table B: Chemical properties

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### Table C: Chemical properties

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**Roanoke Series - Supplemental profile 1**

Roanoke silt loam, woodlands, 0 to 2 percent slopes; 0.2 mile south of the junction of Highways VA-613 and VA-623, 50 yards east of Highway VA-613; elevation 15 feet.
AE--0 to 12 inches; grayish brown (2.5Y 5/2) silt loam; weak fine granular structure; friable, slightly sticky, nonplastic; many fine, medium, and coarse roots; common fine and medium tubular pores; clear smooth boundary.

Btg1--12 to 40 inches; gray (10YR 5/1) silty clay; common fine prominent yellowish brown (10YR 5/8); weak coarse prismatic parting to strong coarse angular and subangular blocky structure; firm, sticky, plastic; many fine and medium roots; continuous prominent clay films on faces of peds; common fine flakes of mica; very strongly acid; gradual smooth boundary.

Btg2--40 to 64 inches; gray (N 5) silty clay; weak coarse prismatic parting to strong coarse angular and subangular blocky structure; firm, sticky, plastic; common fine and medium roots; continuous prominent clay films on faces of peds; common fine flakes of mica; very strongly acid.

Table A: Particle-size distribution

<table>
<thead>
<tr>
<th>Depth</th>
<th>VC</th>
<th>C</th>
<th>M</th>
<th>F</th>
<th>VF</th>
<th>Total</th>
<th>Silt</th>
<th>Clay</th>
</tr>
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<tr>
<td>inches</td>
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<td>g kg⁻¹ of soil</td>
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Table B: Chemical properties

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<th>CEC</th>
<th>BS</th>
<th>%</th>
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</thead>
<tbody>
<tr>
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Table C: Chemical properties

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<th>Al</th>
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<td>cmol (+) kg⁻¹</td>
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Table D: Clay mineralogy

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<th>Verm*</th>
<th>Kaolinite</th>
<th>Quartz</th>
<th>Mont*</th>
<th>Gibbsite</th>
<th>Misc*</th>
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*HIV = hydroxy interlayered vermiculite; Verm = vermiculite; Mont = montmorillonite; Misc = miscellaneous; Tr = Trace.

**Seabrook Series**

The Seabrook series consists of very deep, moderately well drained soils on low stream terraces. They formed in sandy fluvial sediments. Slopes range from 0 to 4 percent.

Seabrook loamy sand, cultivated, 0 to 2 percent slopes; 0.3 mile east-northeast of junction of Highways VA-600 and VA-622, 0.4 mile west-northwest of Highway VA-600 and C & O Railroad crossing, 175 yards south of C & O Railroad along farm lane; elevation 44 feet.

Ap--0 to 9 inches; dark grayish brown (10YR 4/2) loamy sand; weak fine granular structure; very friable; common fine and medium roots; many fine tubular pores; moderately acid; gradual smooth boundary.

C1--9 to 20 inches; light yellowish brown (10YR 6/4) loamy sand; single grain; loose; common fine and medium roots; many fine tubular pores; moderately acid; clear smooth boundary.

C2--20 to 26 inches; yellowish brown (10YR 5/4) loamy sand; single grain; loose; common medium roots; common fine tubular pores; very strongly acid; clear smooth boundary.

C3--26 to 40 inches; yellowish brown (10YR 5/4) loamy sand; common medium prominent strong brown (7.5YR 5/6) and common medium prominent light gray (10YR 7/2) mottles; single grain; loose; few fine and medium roots; few fine tubular pores; few fine flakes of mica; very strongly acid; clear smooth boundary.

C4--40 to 53 inches; mottled yellowish brown (10YR 5/4) and light gray (10YR 7/2) loamy sand; single grain; loose; few fine flakes of mica; very strongly acid; clear wavy boundary.

Cg--53 to 60 inches; light gray (10YR 7/1) loamy sand; common coarse prominent yellowish brown (10YR 5/4) mottles; single grain; loose; few fine flakes of mica; approximately 5 percent rock fragments of rounded quartz gravel; very strongly acid; abrupt wavy boundary.

C5--60 to 80 inches; mottled reddish brown (5YR 4/4) and strong brown (7.5YR 5/8) gravelly sand; single grain; loose; few fine flakes of mica; approximately 25 percent of rounded quartz gravel; strongly acid.
Table A: Particle-size distribution

<table>
<thead>
<tr>
<th>Depth (inches)</th>
<th>VC</th>
<th>C</th>
<th>M</th>
<th>F</th>
<th>VF</th>
<th>Total</th>
<th>Silt</th>
<th>Clay</th>
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<tr>
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Table B: Chemical properties

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Table C: Chemical properties

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Table E: Sand mineralogy

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<th>Mica</th>
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<th>Heavy minerals*</th>
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<td>0</td>
<td>35</td>
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</table>

*Opaque minerals are ilmenite, magnetite, hematite, etc.; Heavy minerals are translucent zircon, tourmaline, rutile, epidote, hornblende, etc.; Tr = Trace.

**Slagle Series**

The Slagle series consists of very deep, moderately well drained soils on uplands. They formed in loamy fluvial sediments. Slopes range from 0 to 6 percent.

Slagle fine sandy loam, in an area of Slagle-Emporia complex, cultivated, 0 to 2 percent slopes; 0.4 mile north of the junction of Highways VA-604 and VA-605, 1.4 miles northwest of the junction of Highway VA-659 and Virginia Division of Forestry fire trail 1557, 70 yards south of a 90-degree curve to the west on Highway VA-604; elevation 127 feet.

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

Bt1--10 to 25 inches; yellowish brown (10YR 5/6) sandy clay loam; common medium distinct strong brown (7.5YR 5/6) and pale brown (10YR 6/3) mottles; weak medium subangular blocky structure; friable, sticky, plastic; few fine roots; common medium and fine tubular pores; few distinct clay films on faces of peds and bridges on sand grains; strongly acid; gradual smooth boundary.

Bt2--25 to 44 inches; mottled yellowish brown (10YR 5/8), strong brown (7.5YR 5/6), and grayish brown (10YR 5/2) sandy clay loam; weak medium subangular blocky structure; friable, sticky, plastic; few fine roots; few fine and medium tubular pores; many distinct clay films on faces of peds and bridges between sand grains; very strongly acid; gradual smooth boundary.

Bt3--44 to 63 inches; mottled yellowish red (5YR 5/8), light brownish gray (10YR 6/2), yellowish brown (10YR 5/8), and light gray (10YR 6/1) sandy clay loam; weak coarse, medium, and fine subangular and angular blocky structure; firm, sticky, plastic; few fine roots; few fine and medium tubular pores; common distinct clay films on faces of peds; very strongly acid.
Table A: Particle-size distribution

<table>
<thead>
<tr>
<th>Depth</th>
<th>VC</th>
<th>C</th>
<th>M</th>
<th>F</th>
<th>VF</th>
<th>Total</th>
<th>Silt</th>
<th>Clay</th>
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<td>111</td>
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Table B: Chemical properties

<table>
<thead>
<tr>
<th>Depth</th>
<th>Exchangeable cations</th>
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<tbody>
<tr>
<td></td>
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</tr>
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<td>inches</td>
<td>cmol (+) kg$^{-1}$</td>
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<tr>
<td>0-10</td>
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<tr>
<td>10-25</td>
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<td>25-44</td>
<td>1.18</td>
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<td>44-63</td>
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Table C: Chemical properties

<table>
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<tr>
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<th>Organic matter</th>
<th>pH</th>
<th>Al</th>
<th>ECEC</th>
<th>EBS</th>
</tr>
</thead>
<tbody>
<tr>
<td>inches</td>
<td>g kg$^{-1}$</td>
<td>cmol (+) kg$^{-1}$</td>
<td>%</td>
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<td>5.20</td>
<td>0.45</td>
<td>3.39</td>
<td>86.73</td>
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<td>25-44</td>
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<td>4.82</td>
<td>2.55</td>
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<td>44-63</td>
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Table E: Sand mineralogy

<table>
<thead>
<tr>
<th>Depth</th>
<th>Quartz</th>
<th>Feldspar</th>
<th>Plagioclase</th>
<th>Mica</th>
<th>Opaque minerals*</th>
<th>Heavy minerals*</th>
</tr>
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<tbody>
<tr>
<td>inches</td>
<td>g kg$^{-1}$ of sand</td>
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<td></td>
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<td>10-25</td>
<td>955</td>
<td>20</td>
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<td>0</td>
<td>0</td>
<td>25</td>
</tr>
</tbody>
</table>

*Opaque minerals are ilmenite, magnetite, hematite, etc.; Heavy minerals are translucent zircon, tourmaline, rutile, epidote, hornblende, etc.; Tr = Trace.
Table F: Chemical properties

<table>
<thead>
<tr>
<th>Depth inches</th>
<th>pH</th>
<th>Ca</th>
<th>Mg</th>
<th>P</th>
<th>K</th>
<th>Zn</th>
<th>Mn</th>
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<tr>
<td>0-10</td>
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<td>59</td>
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<td>69</td>
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</tr>
<tr>
<td>10-25</td>
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<td>107</td>
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<td>39</td>
<td>--</td>
<td>--</td>
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<tr>
<td>25-44</td>
<td>4.7</td>
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<td>90</td>
<td>2</td>
<td>28</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>44-63</td>
<td>4.5</td>
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<td>79</td>
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Tetotum Series

The Tetotum series consists of very deep, moderately well drained soils on stream terraces. They formed in loamy fluvial sediments. Slopes range from 0 to 6 percent.

Tetotum silt loam, cultivated, 2 to 6 percent slopes; 0.7 mile southwest of the junction of Highways VA-613 and VA-623, 0.3 mile north-northeast of James River, 100 yards northwest of Highway VA-613; elevation 22 feet.

Ap--0 to 10 inches; yellowish brown (10YR 5/4) silt loam; moderate fine granular structure; friable, slightly sticky, slightly plastic; common fine roots; common fine and medium and few large tubular pores; moderately acid; abrupt smooth boundary.

BA--10 to 18 inches; yellowish brown (10YR 5/6) silt loam; common fine distinct pale brown (10YR 6/3) mottles; weak medium subangular blocky structure; friable, sticky, slightly plastic; few and common fine tubular pores; common distinct clay films on faces of peds; moderately acid; abrupt smooth boundary.

Bt1--18 to 26 inches; dark yellowish brown (10YR 4/6) silt loam; common fine distinct brownish yellow (10YR 6/6) mottles and common fine prominent very dark brown (10YR 2/2) mineral stains; moderate medium subangular blocky structure; friable, sticky, plastic; few fine tubular pores; many distinct clay films on faces of peds; common very fine flakes of mica; moderately acid; clear smooth boundary.

Bt2--26 to 40 inches; dark yellowish brown (10YR 4/6) silty clay loam; common medium prominent light brownish gray (10YR 6/2) mottles and very dark brown (10YR 2/2) mineral stains; moderate medium subangular blocky structure; friable, sticky, plastic; few fine tubular pores; many distinct clay films on faces of peds; common very fine flakes of mica; moderately acid; gradual smooth boundary.

Bt3--40 to 54 inches; yellowish brown (10YR 5/4) silty clay loam; common medium distinct light brownish gray (10YR 6/2) mottles and very dark brown (10YR 2/2) mineral stains; moderate medium subangular blocky structure; friable, sticky, plastic; few fine tubular pores; few distinct clay films on faces of peds; common very fine flakes of mica; very strongly acid; gradual smooth boundary.
Bt4--54 to 64 inches; dark yellowish brown (10YR 4/4) clay loam; common medium distinct brownish yellow (10YR 6/6) mottles and very dark brown (10YR 2/2) mineral stains; weak medium subangular blocky structure; friable, sticky, plastic; few fine tubular pores; few distinct clay films on faces of peds; common very fine flakes of mica; very strongly acid; gradual smooth boundary.

BC--64 to 72 inches; dark yellowish brown (10YR 4/6) loam; common medium prominent light gray (10YR 6/1) mottles and very dark brown (10YR 2/2) mineral stains; weak coarse subangular blocky structure; friable, sticky, plastic; few fine tubular pores; few distinct clay films on faces of peds; common very fine flakes of mica; very strongly acid.

Table A: Particle-size distribution

<table>
<thead>
<tr>
<th>Depth</th>
<th>VC</th>
<th>C</th>
<th>M</th>
<th>F</th>
<th>VF</th>
<th>Total</th>
<th>Silt</th>
<th>Clay</th>
</tr>
</thead>
<tbody>
<tr>
<td>inches</td>
<td>g kg^-1 of soil</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>0-10</td>
<td>8</td>
<td>9</td>
<td>13</td>
<td>52</td>
<td>76</td>
<td>157</td>
<td>638</td>
</tr>
<tr>
<td></td>
<td>10-18</td>
<td>12</td>
<td>13</td>
<td>11</td>
<td>41</td>
<td>81</td>
<td>158</td>
<td>618</td>
</tr>
<tr>
<td></td>
<td>18-26</td>
<td>4</td>
<td>7</td>
<td>8</td>
<td>33</td>
<td>67</td>
<td>119</td>
<td>652</td>
</tr>
<tr>
<td></td>
<td>26-40</td>
<td>4</td>
<td>10</td>
<td>10</td>
<td>32</td>
<td>69</td>
<td>125</td>
<td>554</td>
</tr>
<tr>
<td></td>
<td>40-54</td>
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<td>10</td>
<td>18</td>
<td>52</td>
<td>86</td>
<td>165</td>
<td>527</td>
</tr>
<tr>
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<td>54-64</td>
<td>0</td>
<td>6</td>
<td>11</td>
<td>57</td>
<td>134</td>
<td>208</td>
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<td>64-72</td>
<td>1</td>
<td>3</td>
<td>5</td>
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Table B: Chemical properties

<table>
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<tr>
<th>Depth</th>
<th>Ca</th>
<th>Mg</th>
<th>K</th>
<th>H</th>
<th>CEC</th>
<th>BS</th>
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<tbody>
<tr>
<td>inches</td>
<td>cmol (+) kg^-1</td>
<td>%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>11.96</td>
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<td>45.81</td>
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</tr>
<tr>
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<td>6.57</td>
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<td>43.62</td>
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<td>40-54</td>
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<td>10.15</td>
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### Table C: Chemical properties

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<th>Depth inches</th>
<th>Organ. matter g kg⁻¹</th>
<th>pH</th>
<th>Al cmol (+) kg⁻¹</th>
<th>ECEC</th>
<th>EBS %</th>
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</thead>
<tbody>
<tr>
<td>0-10</td>
<td>5.80 0.05</td>
<td>5.64</td>
<td>99.11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10-18</td>
<td>5.96 0.05</td>
<td>4.26</td>
<td>98.83</td>
<td></td>
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</tr>
<tr>
<td>18-26</td>
<td>5.93 0.05</td>
<td>6.29</td>
<td>99.21</td>
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<td></td>
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<tr>
<td>26-40</td>
<td>5.60 0.35</td>
<td>6.20</td>
<td>94.35</td>
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<td>40-54</td>
<td>4.90 1.35</td>
<td>5.70</td>
<td>76.32</td>
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<td>5.90</td>
<td>66.95</td>
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<tr>
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<td>67.61</td>
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<td>5.00 3.25</td>
<td>7.55</td>
<td>56.95</td>
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### Table D: Clay mineralogy

<table>
<thead>
<tr>
<th>Depth inches</th>
<th>HIV*</th>
<th>Mica</th>
<th>Verm*</th>
<th>Kaolinite</th>
<th>Quartz</th>
<th>Mont*</th>
<th>Gibbsite</th>
<th>Misc*</th>
<th>Tr</th>
</tr>
</thead>
<tbody>
<tr>
<td>26-40</td>
<td>180</td>
<td>310</td>
<td>250</td>
<td>240</td>
<td>20</td>
<td>0</td>
<td>0</td>
<td>Tr</td>
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*HIV = hydroxy interlayered vermiculite; Verm = vermiculite; Mont = montmorillonite; Misc = miscellaneous; Tr = Trace.

### Table F: Chemical properties

<table>
<thead>
<tr>
<th>Depth inches</th>
<th>pH</th>
<th>Ca ppm</th>
<th>Mg ppm</th>
<th>P ppm</th>
<th>K ppm</th>
<th>Zn ppm</th>
<th>Mn ppm</th>
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<td>157</td>
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<td>34</td>
<td>0.3</td>
<td>3.7</td>
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<td>18-26</td>
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<td>120</td>
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<td>26</td>
<td>0.2</td>
<td>3.6</td>
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<td>120</td>
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<td>22</td>
<td>0.2</td>
<td>3.4</td>
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<td>22</td>
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<td>5.4</td>
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<td>120</td>
<td>6</td>
<td>18</td>
<td>0.5</td>
<td>3.6</td>
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<tr>
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<td>120</td>
<td>5</td>
<td>20</td>
<td>0.6</td>
<td>2.4</td>
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</tbody>
</table>

**Tetotum Series - Supplemental profile 1**

Tetotum loam, woodlands, 0 to 2 percent slopes; 0.7 mile south of the junction of Highways VA-5 and VA-659, 0.6 mile east-northeast of Harrison Point; elevation 38 feet.
Ap--0 to 10 inches; dark brown (10YR 4/3) loam; weak fine granular structure; friable, slightly sticky, slightly plastic; common fine roots; common fine and medium and few large tubular pores; abrupt smooth boundary.

Bt1--10 to 26 inches; dark yellowish brown (10YR 4/6) silty clay loam; moderate medium subangular blocky structure; friable, sticky, plastic; few and common fine tubular pores; common distinct clay films on faces of peds; common fine flakes of mica; strongly acid; clear smooth boundary.

Bt2--26 to 45 inches; yellowish brown (10YR 5/6) silty clay loam; common medium prominent grayish brown (10YR 5/2) and strong brown (7.5YR 5/8) mottles; moderate medium subangular blocky structure; friable, sticky, plastic; few fine tubular pores; many distinct clay films on faces of peds; common fine flakes of mica; slightly plastic; clear smooth boundary.

Bt3--45 to 50 inches; mottled yellowish brown (10YR 5/6), grayish brown (10YR 5/2), strong brown (7.5YR 5/8), and very dark grayish brown (10YR 3/2) silty clay loam; weak medium subangular blocky structure; friable, sticky, plastic; few fine tubular pores; many distinct clay films on faces of peds; common very fine flakes of mica; strongly acid; clear smooth boundary.

BCg--50 to 62 inches; mottled light gray (10YR 6/1), yellowish brown (10YR 5/6), very dark grayish brown (10YR 3/2), and strong brown (7.5YR 5/6) silty clay loam; weak medium subangular blocky structure; friable, sticky, plastic; few distinct clay films on faces of peds; common very fine flakes of mica; strongly acid.

**Table A: Particle-size distribution**

<table>
<thead>
<tr>
<th>Depth (inches)</th>
<th>Sand VC</th>
<th>C</th>
<th>M</th>
<th>F</th>
<th>VF</th>
<th>Total</th>
<th>Silt</th>
<th>Clay</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-30</td>
<td>0</td>
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<td>1</td>
<td>7</td>
<td>43</td>
<td>51</td>
<td>589</td>
<td>360</td>
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</table>

**Table B: Chemical properties**

<table>
<thead>
<tr>
<th>Depth (inches)</th>
<th>Exchangeable cations</th>
<th>Ca</th>
<th>Mg</th>
<th>K</th>
<th>H</th>
<th>CEC</th>
<th>BS</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-30</td>
<td></td>
<td>2.70</td>
<td>3.60</td>
<td>0.21</td>
<td>5.94</td>
<td>12.45</td>
<td>52.29</td>
</tr>
<tr>
<td>60</td>
<td></td>
<td>0.42</td>
<td>3.80</td>
<td>0.15</td>
<td>9.11</td>
<td>13.48</td>
<td>32.42</td>
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</table>
Table C: Chemical properties

<table>
<thead>
<tr>
<th>Depth</th>
<th>Organic matter</th>
<th>pH</th>
<th>Al</th>
<th>ECEC</th>
<th>EBS</th>
</tr>
</thead>
<tbody>
<tr>
<td>inches</td>
<td>g kg(^{-1})</td>
<td>cmol (+) kg(^{-1})</td>
<td>%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10-30</td>
<td>3</td>
<td>5.30</td>
<td>1.05</td>
<td>7.56</td>
<td>86.10</td>
</tr>
<tr>
<td>60</td>
<td>1</td>
<td>5.18</td>
<td>3.55</td>
<td>7.92</td>
<td>55.18</td>
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</table>

Table D: Clay mineralogy

<table>
<thead>
<tr>
<th>Depth</th>
<th>HIV(^*)</th>
<th>Mica</th>
<th>Verm(^*)</th>
<th>Kaolinite Quartz</th>
<th>Mont(^*)</th>
<th>Gibbsite</th>
<th>Misc(^*)</th>
</tr>
</thead>
<tbody>
<tr>
<td>inches</td>
<td>g kg(^{-1}) of clay</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10-30</td>
<td>170</td>
<td>280</td>
<td>100</td>
<td>300</td>
<td>30</td>
<td>5</td>
<td>Tr</td>
</tr>
</tbody>
</table>

*HIV = hydroxy interlayered vermiculite; Verm = vermiculite; Mont = montmorillonite; Misc = miscellaneous; Tr = Trace.

Tetotum Series - Supplemental profile 2

Tetotum loam, cultivated, 0 to 2 percent slopes; 1.1 miles east-northeast of Harrison Point, 0.8 mile west-northwest of Westover Mansion on Westover Plantation; elevation 25 feet.

Ap--0 to 10 inches; dark brown (10YR 4/3) loam; weak fine granular structure; friable, slightly sticky, slightly plastic; common fine roots; common fine and medium and few large tubular pores; abrupt smooth boundary.

Bt1--10 to 22 inches; yellowish brown (10YR 5/4) silty clay loam; moderate medium subangular blocky structure; friable, sticky, plastic; few and common fine tubular pores; common distinct clay films on faces of peds; common very fine flakes of mica; strongly acid; clear smooth boundary.

Bt2--22 to 34 inches; mottled yellowish brown (10YR 5/4), dark brown (7.5YR 3/4), and light gray (10YR 6/1) clay loam; moderate medium subangular blocky structure; friable, sticky, plastic; few fine tubular pores; many distinct clay films on faces of peds; common very fine flakes of mica; clear smooth boundary.

Bt3--34 to 70 inches; mottled yellowish brown (10YR 5/4), dark brown (7.5YR 3/4), light gray (10YR 6/1), and very dark grayish brown (10YR 3/2) clay loam; moderate medium subangular blocky structure; friable, sticky, plastic; few fine tubular pores; many distinct clay films on faces of peds; common very fine flakes of mica; very strongly acid.
Table A: Particle-size distribution

<table>
<thead>
<tr>
<th>Depth inches</th>
<th>VC</th>
<th>C</th>
<th>M</th>
<th>F</th>
<th>VF</th>
<th>Total</th>
<th>Silt</th>
<th>Clay</th>
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Table B: Chemical properties

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<th>Depth inches</th>
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<th>Mg cmol (+) kg⁻¹</th>
<th>K cmol (+) kg⁻¹</th>
<th>H cmol (+) kg⁻¹</th>
<th>CEC</th>
<th>BS %</th>
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Table C: Chemical properties

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<th>Depth inches</th>
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<th>ECEC</th>
<th>EBS %</th>
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<td>3.75</td>
<td>7.87</td>
<td>52.29</td>
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Table D: Clay mineralogy

<table>
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<tr>
<th>Depth inches</th>
<th>HIV*</th>
<th>Mica</th>
<th>Verm*</th>
<th>Kaolinite</th>
<th>Quartz</th>
<th>Mont*</th>
<th>Gibbsite</th>
<th>Misc*</th>
</tr>
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<tbody>
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<td>70</td>
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*HIV = hydroxy interlayered vermiculite; Verm = vermiculite; Mont = montmorillonite; Misc = miscellaneous; Tr = Trace.
Photo 8. Sand and gravel borrowed from substrata of Pamunkey, Tetotum, and Roanoke soils along the James River are excellent construction materials.
Tomotley Series

The Tomotley series consists of very deep, poorly drained soils on low flats and old stream channels. They formed in loamy fluvial sediments. Slopes range from 0 to 2 percent.

Tomotley fine sandy loam, woodlands, 0 to 2 percent slopes; 1.6 miles east of the junction of Highways VA-614 and VA-155, 0.5 mile northeast of the junction of Highway VA-614 and Virginia Division of Forestry Fire Trail 1501; elevation 40 feet.

Ag--0 to 4 inches; dark gray (5Y 4/1) fine sandy loam; moderate medium granular structure; very friable, slightly sticky, slightly plastic; many fine and medium and common coarse roots; common fine and medium tubular pores; extremely acid; abrupt smooth boundary.

Eg--4 to 8 inches; dark grayish brown (2.5Y 4/2) fine sandy loam; weak fine granular structure; friable, sticky, slightly plastic; common fine and few medium and fine roots; common fine and medium and few coarse tubular pores; very strongly acid; abrupt smooth boundary.

Btg1--8 to 15 inches; gray (5Y 5/1) fine sandy loam; common medium prominent yellowish brown (10YR 5/8) mottles; moderate medium 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; very strongly acid; clear smooth boundary.

Btg2--15 to 38 inches; dark gray (5Y 4/1) sandy clay loam; common medium prominent yellowish brown (10YR 5/8) mottles; moderate medium subangular blocky structure; friable, sticky, plastic; few fine roots; common fine and medium tubular pores; many distinct clay films and bridges on sand grains; common distinct clay films on faces of peds; very strongly acid; clear smooth boundary.

Btg3--38 to 58 inches; gray (5Y 5/1) sandy clay loam; common medium prominent light olive brown (2.5Y 5/6) mottles; weak medium granular structure; friable, sticky, plastic; few fine roots; very strongly acid; gradual smooth boundary.

BCg--58 to 65 inches; light gray (N 6) fine sandy loam; common medium prominent light olive brown (2.5Y 5/6) mottles; massive; friable, sticky, slightly plastic; very strongly acid; clear smooth boundary.

Cg--65 to 75 inches; gray (5Y 5/1) loamy sand; massive; friable, sticky, slightly plastic; extremely acid.
### Table A: Particle-size distribution

<table>
<thead>
<tr>
<th>Depth</th>
<th>VC</th>
<th>C</th>
<th>M</th>
<th>F</th>
<th>VF</th>
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<th>Clay</th>
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<td>inches</td>
<td>g kg(^{-1}) of soil</td>
<td>inches</td>
<td>g kg(^{-1}) of soil</td>
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### Table B: Chemical properties

#### Exchangeable cations

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<th>K cmol (+) kg(^{-1})</th>
<th>H cmol (+) kg(^{-1})</th>
<th>CEC cmol (+) kg(^{-1})</th>
<th>BS %</th>
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### Table C: Chemical properties

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Table D: Clay mineralogy

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<th>Depth (inches)</th>
<th>HIV*</th>
<th>Mica</th>
<th>Verm*</th>
<th>Kaolinite</th>
<th>Quartz</th>
<th>Mont*</th>
<th>Gibbsite</th>
<th>Misc*</th>
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*HIV = hydroxy interlayered vermiculite; Verm = vermiculite; Mont = montmorillonite; Misc = miscellaneous; Tr = Trace.

Table F: Chemical properties

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<th>Mg</th>
<th>P</th>
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Tomotley Series - Supplemental profile 1

Tomotley loam, woodlands, 0 to 2 percent slopes; 2.3 miles east-northeast of the junction of Highways VA-600 and VA-603, 0.8 mile west-northwest of the junction of Highway VA-106 and C&O Railroad, 80 yards north of Highway VA-600, 50 yards west of farm lane; elevation 47 feet.

A--0 to 6 inches; dark grayish brown (2.5Y 4/2) loam; common medium prominent dark yellowish brown (10YR 3/4) mottles; weak medium granular structure; friable, slightly sticky, slightly plastic; many fine and few medium roots; common fine and medium tubular pores; extremely acid; abrupt smooth boundary.

BAg--6 to 14 inches; gray (10YR 5/1) loam; common medium prominent dark brown (7.5YR 4/4) mottles; moderate medium subangular blocky structure; friable, sticky, plastic; few fine roots; common fine and medium and few coarse tubular pores; very strongly acid; clear smooth boundary.

Btg1--14 to 24 inches; dark gray (5Y 4/1) loam; few medium prominent dark brown (7.5YR 4/4) mottles; weak medium subangular blocky structure; friable, sticky, plastic; few fine roots; common fine and medium tubular pores; many distinct clay films and bridges on sand grains; very strongly acid; clear smooth boundary.

Btg2--24 to 31 inches; gray (5Y 5/1) fine sandy loam; few fine prominent dark brown (7.5YR 4/4) mottles; weak coarse subangular blocky structure; friable,
sticky, plastic; few fine roots; common fine and medium tubular pores; many distinct clay films and bridges on sand grains; common distinct clay films on faces of peds; very strongly acid; abrupt smooth boundary.

Ab--31 to 36 inches; very dark gray (10YR 3/1) fine sandy loam; weak medium granular structure; friable, sticky, plastic; few fine roots; strongly acid; clear smooth boundary.

Btgb1--36 to 44 inches; gray (5Y 5/1) fine sandy loam; weak coarse subangular blocky structure; friable, sticky, plastic; few fine roots; strongly acid; clear smooth boundary.

Btgb2--44 to 74 inches; gray (N 5) clay loam; massive; friable, sticky, plastic; few fine and coarse roots; few highly weathered feldspar crystals; slightly acid.

Table A: Particle-size distribution

<table>
<thead>
<tr>
<th>Depth</th>
<th>VC</th>
<th>C</th>
<th>M</th>
<th>F</th>
<th>VF</th>
<th>Total</th>
<th>Silt</th>
<th>Clay</th>
</tr>
</thead>
<tbody>
<tr>
<td>inches</td>
<td>g kg(^{-1}) of soil</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
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<td>109</td>
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Table B: Chemical properties

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Table C: Chemical properties

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Table E: Sand mineralogy

<table>
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<tr>
<th>Depth</th>
<th>Quartz</th>
<th>Feldspar</th>
<th>Plagioclase</th>
<th>Mica</th>
<th>Opaque minerals*</th>
<th>Heavy minerals*</th>
</tr>
</thead>
<tbody>
<tr>
<td>inches</td>
<td>g kg⁻¹</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
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<td>14-31</td>
<td>950</td>
<td>25</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>20</td>
</tr>
</tbody>
</table>

*Opaque minerals are ilmenite, magnetite, hematite, etc.; Heavy minerals are translucent zircon, tourmaline, rutile, epidote, hornblende, etc.; Tr = Trace.

Table F: Chemical properties

<table>
<thead>
<tr>
<th>Depth</th>
<th>pH</th>
<th>Ca</th>
<th>Mg</th>
<th>P</th>
<th>K</th>
<th>Zn</th>
<th>Mn</th>
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<tbody>
<tr>
<td>inches</td>
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<td>ppm</td>
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<td></td>
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<td>4.8</td>
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<td>43</td>
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<td>13.7</td>
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<td>14-24</td>
<td>4.7</td>
<td>612</td>
<td>48</td>
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<td>29</td>
<td>4.4</td>
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<td>24-31</td>
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<td>14</td>
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<td>31-36</td>
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<td>11</td>
<td>12</td>
<td>0.5</td>
<td>8.1</td>
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</table>

**Turberville Series**

The Turbeville series consists of very deep, well drained soils on medium to narrow rises on high river terraces. They formed in fluvial sediments. Slopes range from 2 to 6 percent.
Turberville loam, woodlands, 2 to 6 percent slopes; 350 yards north of the junction of Highways VA-607 and VA-609, 150 yards west of Highway VA-609; elevation 125 feet.

A--0 to 4 inches; dark brown (7.5YR 4/4) loam; moderate medium and fine granular structure; friable, slightly sticky, slightly plastic; common fine and medium roots; few medium tubular pores; very strongly acid; clear smooth boundary.

BA--4 to 8 inches; reddish brown (5YR 4/4) loam; weak medium subangular blocky structure; friable, sticky, plastic; few fine and medium roots; common fine and medium and few coarse tubular pores; few distinct clay films on faces of peds and many distinct clay films and clay bridges on sand grains; very strongly acid; clear smooth boundary.

Bt1--8 to 15 inches; red (2.5YR 4/6) clay loam; moderate medium subangular blocky structure; friable, sticky, plastic; few fine and medium roots; common fine and medium tubular pores; common distinct clay films on faces of peds; strongly acid; gradual smooth boundary.

Bt2--15 to 25 inches; dark reddish brown (2.5YR 3/4) clay; moderate medium subangular blocky structure; friable, sticky, plastic; few fine and medium roots; few fine tubular pores; common distinct clay films on faces of peds and many distinct clay films and bridges on sand grains; strongly acid; gradual smooth boundary.

Bt3--25 to 50 inches; dark red (10R 3/6) clay; moderate medium subangular blocky structure; friable, sticky, plastic; few fine roots; few fine tubular pores; common distinct clay films on faces of peds and many distinct clay films and bridges on sand grains; less than 1 percent quartz fragments less than 0.5 inch in diameter; strongly acid; gradual smooth boundary.

Bt4--50 to 72 inches; dark red (10R 3/6) clay; moderate medium subangular blocky structure; friable, sticky, plastic; few fine roots; few fine tubular pores; common distinct clay films on faces of peds; less than 1 percent quartz fragments less than 0.5 inch in diameter; strongly acid.

Table A: Particle-size distribution

<table>
<thead>
<tr>
<th>Depth (inches)</th>
<th>Sand VC</th>
<th>C</th>
<th>M</th>
<th>F</th>
<th>VF</th>
<th>Total</th>
<th>Silt</th>
<th>Clay</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>g kg⁻¹ of soil</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>0-4</td>
<td>5</td>
<td>51</td>
<td>138</td>
<td>140</td>
<td>55</td>
<td>388</td>
<td>513</td>
<td>99</td>
</tr>
<tr>
<td>4-8</td>
<td>15</td>
<td>53</td>
<td>104</td>
<td>151</td>
<td>56</td>
<td>379</td>
<td>405</td>
<td>216</td>
</tr>
<tr>
<td>8-15</td>
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<td>45</td>
<td>88</td>
<td>124</td>
<td>52</td>
<td>319</td>
<td>329</td>
<td>352</td>
</tr>
<tr>
<td>15-25</td>
<td>11</td>
<td>42</td>
<td>96</td>
<td>109</td>
<td>51</td>
<td>309</td>
<td>296</td>
<td>395</td>
</tr>
<tr>
<td>25-50</td>
<td>8</td>
<td>41</td>
<td>89</td>
<td>103</td>
<td>54</td>
<td>293</td>
<td>211</td>
<td>496</td>
</tr>
<tr>
<td>50-72</td>
<td>11</td>
<td>34</td>
<td>86</td>
<td>109</td>
<td>52</td>
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### Table B: Chemical properties

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<th>Ca</th>
<th>Mg</th>
<th>K</th>
<th>H</th>
<th>CEC</th>
<th>BS</th>
</tr>
</thead>
<tbody>
<tr>
<td>inches</td>
<td>cmol (+) kg⁻¹</td>
<td>%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-4</td>
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<td>0.45</td>
<td>0.19</td>
<td>9.15</td>
<td>11.07</td>
<td>17.34</td>
</tr>
<tr>
<td>4-8</td>
<td>0.80</td>
<td>0.44</td>
<td>0.16</td>
<td>5.77</td>
<td>7.17</td>
<td>19.53</td>
</tr>
<tr>
<td>8-15</td>
<td>1.48</td>
<td>0.89</td>
<td>0.21</td>
<td>8.16</td>
<td>10.74</td>
<td>24.02</td>
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<td>8.96</td>
<td>11.80</td>
<td>24.07</td>
</tr>
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<td>0.46</td>
<td>9.35</td>
<td>10.52</td>
<td>11.12</td>
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<td>0.45</td>
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### Table C: Chemical properties

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<th>Organic matter</th>
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<th>Al</th>
<th>ECEC</th>
<th>EBS</th>
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</thead>
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<tr>
<td>inches</td>
<td>g kg⁻¹</td>
<td>cmol (+) kg⁻¹</td>
<td>%</td>
<td></td>
<td></td>
</tr>
<tr>
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<td>3.27</td>
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<td>13</td>
<td>1.10</td>
<td>2.50</td>
<td>56.00</td>
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<td>2.82</td>
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### Table F: Chemical properties

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<th>Mg</th>
<th>P</th>
<th>K</th>
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<th>Mn</th>
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<td></td>
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<td></td>
<td></td>
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<td>77</td>
<td>1</td>
<td>91</td>
<td>0.1</td>
<td>0.8</td>
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</table>
Turbeville Series - Supplemental profile 1

Turbeville loam, cultivated, 2 to 6 percent slopes; 0.8 mile south of the junction of Highways VA-5 and VA-618, 0.5 mile northwest of Wilcox Wharf, 270 yards north of the James River near Virginia Power pole #64856 on River's Edge Farm; elevation 70 feet.

Ap--0 to 10 inches; dark brown (7.5YR 4/4) loam; moderate medium granular structure; friable, slightly sticky, slightly plastic; common fine roots; few medium tubular pores; strongly acid; abrupt smooth boundary.

Bt1--10 to 16 inches; yellowish red (5YR 4/6) loam; moderate medium subangular blocky structure; friable, sticky, plastic; common fine roots; common fine and medium and few coarse tubular pores; common faint clay films on faces of peds and many distinct clay films and clay bridges on sand grains; common fine flakes of mica; strongly acid; clear smooth boundary.

Bt2--16 to 35 inches; red (2.5YR 4/6) clay loam; moderate medium subangular blocky structure; friable, sticky, plastic; common fine roots; common fine and medium tubular pores; common prominent clay films on faces of peds; common fine flakes of mica; moderately acid; gradual smooth boundary.

Bt3--35 to 56 inches; dark red (2.5YR 3/6) silt loam; moderate medium subangular blocky structure; friable, sticky, plastic; few fine tubular pores; many prominent clay films on faces of peds and many distinct clay films and bridges on sand grains; common fine flakes of mica; very strongly acid; diffuse smooth boundary.

Bt4--56 to 70 inches; dark red (2.5YR 3/6) clay; moderate medium subangular blocky structure; friable, sticky, plastic; few fine tubular pores; many prominent clay films on faces of peds and many distinct clay films and bridges on sand grains; common fine flakes of mica; very strongly acid.

Table A: Particle-size distribution

<table>
<thead>
<tr>
<th>Depth inches</th>
<th>VC</th>
<th>C</th>
<th>M</th>
<th>F</th>
<th>VF</th>
<th>Total</th>
<th>Silt</th>
<th>Clay</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-10</td>
<td>1</td>
<td>10</td>
<td>49</td>
<td>209</td>
<td>94</td>
<td>363</td>
<td>383</td>
<td>254</td>
</tr>
<tr>
<td>10-16</td>
<td>3</td>
<td>27</td>
<td>104</td>
<td>250</td>
<td>110</td>
<td>494</td>
<td>350</td>
<td>156</td>
</tr>
<tr>
<td>16-35</td>
<td>3</td>
<td>7</td>
<td>43</td>
<td>189</td>
<td>90</td>
<td>332</td>
<td>299</td>
<td>369</td>
</tr>
<tr>
<td>35-56</td>
<td>1</td>
<td>2</td>
<td>12</td>
<td>77</td>
<td>41</td>
<td>134</td>
<td>692</td>
<td>174</td>
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<td>3</td>
<td>25</td>
<td>196</td>
<td>89</td>
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**Table B: Chemical properties**

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<td></td>
<td>Ca</td>
<td>Mg</td>
<td>K</td>
<td>H</td>
<td>CEC</td>
<td>BS</td>
</tr>
<tr>
<td>inches</td>
<td>cmol (+) kg⁻¹</td>
<td>%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-10</td>
<td>2.28</td>
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<td>7.97</td>
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<td>10-16</td>
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<td>5.27</td>
<td>50.66</td>
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<td>16-35</td>
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**Table C: Chemical properties**

<table>
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<th>Organic matter</th>
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<th>Al</th>
<th>ECEC</th>
<th>EBS</th>
</tr>
</thead>
<tbody>
<tr>
<td>inches</td>
<td>g kg⁻¹</td>
<td>cmol (+) kg⁻¹</td>
<td>%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-10</td>
<td>--</td>
<td>5.35</td>
<td>0.15</td>
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<td>95.74</td>
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<td>98.95</td>
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<td>4.58</td>
<td>3.05</td>
<td>5.69</td>
<td>46.40</td>
</tr>
<tr>
<td>56-70</td>
<td>--</td>
<td>4.64</td>
<td>3.65</td>
<td>6.14</td>
<td>40.55</td>
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</table>

**Table D: Clay mineralogy**

<table>
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<tr>
<th>Depth</th>
<th>HIV*</th>
<th>Mica</th>
<th>Verm*</th>
<th>Kaolinite</th>
<th>Quartz</th>
<th>Mont*</th>
<th>Gibbsite</th>
<th>Misc*</th>
</tr>
</thead>
<tbody>
<tr>
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<td>g kg⁻¹ of clay</td>
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<td></td>
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<td>310</td>
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<td>50</td>
<td>10</td>
<td>30</td>
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</tbody>
</table>

*HIV = hydroxy interlayered vermiculite; Verm = vermiculite; Mont = montmorillonite; Misc = miscellaneous; Tr = Trace.
Table F: Chemical properties

<table>
<thead>
<tr>
<th>Depth</th>
<th>pH</th>
<th>Ca</th>
<th>Mg</th>
<th>P</th>
<th>K</th>
<th>Zn</th>
<th>Mn</th>
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<tbody>
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<td>39</td>
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<td>56-70</td>
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<td>120</td>
<td>3</td>
<td>44</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

**Uchee Series**

The Uchee series consists of very deep, well drained soils on upland rises and sideslopes. They formed in loamy fluvial and marine sediments. Slopes range from 2 to 10 percent.

Uchee loamy sand, in a unit of Craven-Uchee complex, woodlands, 6 to 10 percent slopes; 1.0 mile west of the junction of Highways VA-618 and VA-602 and 200 yards south of Highway VA-602; elevation 115 feet.

A--0 to 4 inches; dark gray (10YR 4/1) loamy sand; weak fine granular structure; very friable, nonsticky, nonplastic; few fine and common roots; common fine and medium and few large tubular pores; extremely acid; abrupt smooth boundary.

E--4 to 26 inches; light yellowish brown (10YR 6/4) loamy sand; single grain; very friable, nonsticky, nonplastic; few fine roots; common fine and medium and few large tubular pores; very strongly acid; gradual smooth boundary.

BE--26 to 30 inches; light yellowish brown (10YR 6/4) sandy loam; common medium prominent brownish yellow (10YR 6/8) mottles; weak fine granular structure; friable, slightly sticky, slightly plastic; few fine and medium roots; common fine and medium and few large tubular pores; many distinct clay films and bridges on sand grains; very strongly acid; clear smooth boundary.

Bt--30 to 50 inches; brownish yellow (10YR 6/8) sandy clay loam; weak medium subangular blocky structure; friable, sticky, plastic; few fine roots; few fine and medium tubular pores; very strongly acid; clear smooth boundary.

C--50 to 60 inches; yellowish brown (10YR 5/8) clay loam; common medium prominent yellowish red (5YR 5/6), strong brown (7.5YR 5/6), and light gray (10YR 6/1) mottles; massive; compact in place; friable, sticky, plastic; few fine roots; few fine tubular pores; very strongly acid.

**Uchee Series - Supplemental profile 1**

Uchee loamy sand, woodlands, 2 to 6 percent slopes; 1.4 miles northeast of the junction of Highways VA-650 and VA-655, 0.5 mile northwest of the junction of
Highways VA-609 and VA-650, 0.4 mile north-northeast of the junction of Highway VA-650 and Virginia Power transmission tower; elevation 141 feet.

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

E--4 to 23 inches; light yellowish brown (10YR 6/4) fine sandy loam; single grain; loose; nonsticky, nonplastic; common fine and few medium roots; common fine and medium and few large tubular pores; very strongly acid; clear smooth boundary.

BE--23 to 29 inches; light yellowish brown (10YR 6/4) fine sandy loam; moderate medium granular structure; friable, sticky, slightly plastic; few fine roots; common fine and medium and few large tubular pores; common distinct clay films and bridges on sand grains; very strongly acid; abrupt smooth boundary.

Bt1--29 to 34 inches; yellowish brown (10YR 5/6) sandy clay loam; common fine distinct pale brown (10YR 6/3) mottles; moderate medium subangular blocky structure; friable, sticky, plastic; few fine roots; few fine and medium tubular pores; common distinct clay films and bridges on sand grains; very strongly acid; clear smooth boundary.

Bt2--34 to 51 inches; yellowish brown (10YR 5/8) clay loam; many common prominent yellowish red (5YR 5/8) and light gray (10YR 6/1) and many common distinct strong brown (7.5YR 5/8) mottles; weak medium subangular blocky structure; friable, sticky, plastic; few fine roots; few fine and medium tubular pores; common distinct clay films and bridges on sand grains; very strongly acid; gradual smooth boundary.

Bt3--51 to 72 inches; mottled yellowish red (5YR 4/6), strong brown (7.5YR 5/8), yellowish brown (10YR 5/6), and light gray (10YR 6/1) clay; weak medium subangular blocky structure; firm, sticky, plastic; few fine roots; few fine tubular pores; many distinct clay films and bridges on sand grains; very strongly acid.

Table A: Particle-size distribution

<table>
<thead>
<tr>
<th>Depth</th>
<th>VC</th>
<th>C</th>
<th>M</th>
<th>F</th>
<th>VF</th>
<th>Total</th>
<th>Silt</th>
<th>Clay</th>
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</thead>
<tbody>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
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<td>14</td>
<td>32</td>
<td>183</td>
<td>459</td>
<td>73</td>
<td>761</td>
<td>179</td>
<td>60</td>
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<tr>
<td>4-23</td>
<td>1</td>
<td>2</td>
<td>84</td>
<td>481</td>
<td>115</td>
<td>683</td>
<td>244</td>
<td>73</td>
</tr>
<tr>
<td>23-29</td>
<td>1</td>
<td>3</td>
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<td>456</td>
<td>108</td>
<td>619</td>
<td>224</td>
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<td>1</td>
<td>55</td>
<td>393</td>
<td>106</td>
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<td>0</td>
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<td>301</td>
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140
Table B: Chemical properties

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<th>BS</th>
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<td>Mg</td>
<td>K</td>
</tr>
<tr>
<td>inches</td>
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<tr>
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Table C: Chemical properties

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<tr>
<th>Depth</th>
<th>Organic matter</th>
<th>pH</th>
<th>Al</th>
<th>ECEC</th>
<th>EBS</th>
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<tr>
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<td>g kg⁻¹</td>
<td>cmol (+) kg⁻¹</td>
<td>%</td>
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<td></td>
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Table E: Sand mineralogy

<table>
<thead>
<tr>
<th>Depth</th>
<th>Quartz</th>
<th>Feldspar</th>
<th>Plagioclase</th>
<th>Mica</th>
<th>Opaque minerals*</th>
<th>Heavy minerals*</th>
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<tbody>
<tr>
<td>inches</td>
<td>g kg⁻¹ of sand</td>
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*Opaque minerals are ilmenite, magnetite, hematite, etc.; Heavy minerals are translucent zircon, tourmaline, rutile, epidote, hornblende, etc.; Tr = Trace.
Table F: Chemical properties

<table>
<thead>
<tr>
<th>Depth</th>
<th>pH</th>
<th>Ca</th>
<th>Mg</th>
<th>P</th>
<th>K</th>
<th>Zn</th>
<th>Mn</th>
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<tbody>
<tr>
<td>inches</td>
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**Wickham Series**

The Wickham series consists of very deep, well drained soils on high stream terraces. They formed in loamy fluvial sediments. Slopes range from 0 to 6 percent.

Wickham fine sandy loam, cultivated, 2 to 6 percent slopes; 0.3 mile east of the junction of Highways VA-5 and VA-618, 0.5 mile west of Highway VA-5 and Gunns Run, 70 yards south of Highway VA-5; elevation 65 feet.

Ap--0 to 12 inches; dark brown (7.5YR 4/4) fine sandy loam; weak medium granular structure; very friable, slightly sticky, nonplastic; strongly acid; abrupt smooth boundary.

Bt1--12 to 50 inches; red (2.5YR 4/6) sandy clay loam; moderate medium subangular blocky structure; friable, sticky, plastic; common fine roots; common medium tubular pores; few prominent clay films on faces of peds; few fine flakes of mica; moderately acid; gradual smooth boundary.

Bt2--50 to 62 inches; yellowish red (5YR 4/6) sandy clay loam; weak medium subangular blocky structure; friable, sticky, plastic; few prominent clay films on faces of peds; few fine flakes of mica; strongly acid.

Table A: Particle-size distribution

<table>
<thead>
<tr>
<th>Depth</th>
<th>Sand</th>
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<tbody>
<tr>
<td>inches</td>
<td>VC</td>
</tr>
<tr>
<td></td>
<td>g kg^{-1} of soil</td>
</tr>
<tr>
<td>12-32</td>
<td>6</td>
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</table>
Table B: Chemical properties

<table>
<thead>
<tr>
<th>Depth</th>
<th>Exchangeable cations</th>
<th>Ca</th>
<th>Mg</th>
<th>K</th>
<th>H</th>
<th>CEC</th>
<th>BS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>cmol (+) kg⁻¹</td>
<td>%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>inches</td>
<td></td>
<td>kg⁻¹</td>
<td></td>
<td></td>
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<tr>
<td>12-32</td>
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Table C: Chemical properties

<table>
<thead>
<tr>
<th>Depth</th>
<th>Organic matter</th>
<th>pH</th>
<th>Al</th>
<th>ECEC</th>
<th>EBS</th>
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<tbody>
<tr>
<td>inches</td>
<td></td>
<td>cmol (+) kg⁻¹</td>
<td>%</td>
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<td></td>
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<tr>
<td></td>
<td></td>
<td>kg⁻¹</td>
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<tr>
<td>12-32</td>
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<td>1</td>
<td>4.47</td>
<td>1.45</td>
<td>3.93</td>
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</table>

Table E: Sand mineralogy

<table>
<thead>
<tr>
<th>Depth</th>
<th>Quartz</th>
<th>Feldspar</th>
<th>Plagioclase</th>
<th>Mica</th>
<th>Opaque minerals*</th>
<th>Heavy minerals*</th>
</tr>
</thead>
<tbody>
<tr>
<td>inches</td>
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*Opaque minerals are ilmenite, magnetite, hematite, etc.; Heavy minerals are translucent zircon, tourmaline, rutile, epidote, hornblende, etc.; Tr = Trace.