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# Supplemental Data: Aerial Survey of City of Virginia Beach, Virginia

D. R. Hatch and W. J. Edmonds



**L. A. Swiger, Interim Dean and Director  
College of Agriculture and Life Sciences  
Virginia Agricultural Experiment Station  
Virginia Polytechnic Institute and State University  
Blacksburg, Virginia 24061-0402**

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# **SUPPLEMENTAL DATA: SOIL SURVEY OF CITY OF VIRGINIA BEACH, VIRGINIA**

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D. R. Hatch and W. J. Edmonds

Department of Crop and Soil Environmental Sciences  
Virginia Agricultural Experimental Station  
Blacksburg, Virginia 24061

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## Abstract

This supplemental report presents the actual laboratory data used to characterize, classify, and interpret the uses of the soils in the map units of the Soil Survey of the City of Virginia Beach, Virginia (Hatch et al., 1985).

Because uses of these soils are possible that are not currently known, the data presented in this supplemental report can be used by professional agricultural workers, regulatory agents, and engineers as a basis for making interpretations for the soils in Virginia Beach that are not included in the published soil survey.

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We thank the City of Virginia Beach City Council, Virginia Department of Conservation and Historical Resources; and the Virginia Dare Soil and Water Conservation District for their assistance.

Cover - Virginia Beach resort strip north of Rudee Inlet. Buildings are on Psamments.



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## ***Introduction***

The soil survey of the City of Virginia Beach was completed in 1981. The survey was conducted by Department of Crop and Soil Environmental Sciences of Virginia Polytechnic Institute and State University, Research Division, in cooperation with the Soil Conservation Service of the United States Department of Agriculture, the Virginia Dare Soil and Water Conservation District, and the City Council of Virginia Beach.

The survey was made to determine the kinds of soils within Virginia Beach and to determine potential uses of the soils. Soil scientists observed steepness, length, and shape of slopes; size of streams and general pattern of drainage; kinds of native plants or crops; and kinds of sediments. 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 that have been changed little by plant roots.

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

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

## ***Materials and Methods***

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

### **Morphological Descriptions**

The morphology of each soil profile is described according to National Cooperative Soil Survey standards specified by the *Soil Survey Manual* (Soil

Survey Staff, 1951), *Soil Taxonomy* (Soil Survey Staff, 1975), and the *National Soils Handbook* (USDA, 1983)

## Laboratory Data

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

- A - Particle-size Distribution
- B - Chemical Properties
- C - Chemical Properties
- D - Chemical Properties
- E - Mineralogy of the Sand Fraction
- F - Mineralogy of the Clay Fraction
- G - Engineering Properties
- H - Chemical Properties
- I - Chemical Properties

When data presented in a given table were not available, the table was omitted. Therefore, table designations are not consecutive for all profile descriptions.

### *Table A - Particle-size Distribution*

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

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

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

### *Table B - Soil Test Data*

Table B gives:

1. CaO in  $\text{lbs acre}^{-1}$
2. MgO in  $\text{lbs acre}^{-1}$
3.  $\text{P}_2\text{O}_5$  in  $\text{lbs acre}^{-1}$
4.  $\text{K}_2\text{O}$  in  $\text{lbs acre}^{-1}$
5. Zn in ppm
6. Mn in ppm

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

### ***Table C - Chemical Properties***

Table C gives:

1.  $\text{NH}_4\text{OAc}$ , pH 7.0, extractable bases of  $\text{Ca}^{2+}$ ,  $\text{Mg}^{2+}$ , and  $\text{K}^+$  in  $\text{cmol (+) kg}^{-1}$  of soil.
2. Exchange acidity,  $\text{H}^+$ , in  $\text{cmol (+) kg}^{-1}$  of soil
3. Cation exchange capacity, CEC, by sum of  $\text{Ca}^{2+}$ ,  $\text{Mg}^{2+}$ ,  $\text{K}^+$ , and  $\text{H}^+$  in  $\text{cmol (+) kg}^{-1}$  of soil
4. Base saturation, BS, estimated by the sum of exchangeable bases of  $\text{Ca}^{2+}$ ,  $\text{Mg}^{2+}$ , and  $\text{K}^+$  divided by the CEC times 100.

Exchangeable bases of  $\text{Ca}^{2+}$ ,  $\text{Mg}^{2+}$ , and  $\text{K}^+$  were determined by  $N$   $\text{NH}_4\text{OAc}$ , pH 7.0, extraction with quantification by atomic absorption spectroscopy (SCS, 1972). Exchange acidity ( $\text{H}^+$ ) was determined by the  $\text{BaCl}_2$ -TEA, pH 8.2, method (SCS, 1972; Peech, 1965).

### ***Table D - Chemical Properties***

Table D gives:

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

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

### ***Table E - Mineralogy of the Sand Fraction***

Table E gives minerals present in the sand fractions.

Samples for mineralogical analysis were pretreated with  $\text{H}_2\text{O}_2$  and  $\text{NaOAc}$  adjusted to pH 5.0 followed by citrate-dithionite-bicarbonate to remove organic matter and oxide coatings.

Each sample was fractionated into sand, silt, and clay. The sand-size fraction was separated by sieving. Clay was separated from silt by centrifugation and decantation using dilute  $\text{NaHCO}_3$  adjusted to pH 9.5, as a dispersant (Tanner and Jackson, 1947; Jackson et al., 1950; Day, 1965; Jackson, 1979).

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

### ***Table F - Mineralogy of the Clay Fraction***

Table F gives minerals present in the clay fractions.

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

### ***Table G - Engineering Properties***

Table G gives:

1. Potential Volume Change (PVC)
2. Atterberg Liquid Limit
3. Atterberg Plastic Limit
4. Plasticity Index

These properties were determined by the procedures given by Holtz (1965) and Sowers (1965).

### ***Table H - Chemical Properties***

Table H gives:

1. Sulfur in  $\text{g kg}^{-1}$  of soil
2.  $\text{CaCO}_3$
3. pH

These properties were determined by the procedures used by Resche (1975).

## *Table I - Chemical Properties*

Table I gives:

1. Unrubbed fiber volume in percent
2. Rubbed fiber volume in percent
3. pH
4. Sulfur in  $\text{g kg}^{-1}$  of soil

These properties were determined by the USDA, SCS, National Soil Survey Laboratory, Lincoln, Nebraska, by the procedures given in USDA (1982).

## *Classification of the Soils*

"When the fixed limits of soil taxa are superimposed on the fixed pattern of soils in nature, limits of taxonomic classes rarely, if ever, coincide precisely with mappable areas" (USDA, 1983, p. 602-603). Therefore, only the typical profiles are required to be members of 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 Virginia Beach, Virginia. Therefore, no interpretations for the map units or data are presented.

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## *Appendix A - Profile Descriptions and Data*

### *Acredale Series*

The soils of the Acredale series are deep and poorly drained. They formed in loamy marine and fluvial sediments. Acredale soils are on inland flats on the lower part of the Coastal Plain. Slopes range from 0 to 2 percent.

Typical profile of Acredale silt loam, about 4.5 miles northwest of Princess Anne, 1,700 feet south-southwest of intersection of Lynhaven Parkway and Princess Anne Road.

Ap--0 to 7 inches; grayish brown (10YR 5/2) silt loam; weak fine granular structure; very friable, slightly sticky, slightly plastic; common fine and very fine roots; common fine and medium pores; strongly acid; clear smooth boundary.

B1tg--7 to 15 inches; light brownish gray (10YR 6/2) silt loam; few fine prominent yellowish brown (10YR 5/8) mottles; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; common fine and very fine roots; common very fine vesicular pores and few fine tubular pores; many sand grains coated and bridged with clay; very strongly acid; abrupt smooth boundary.

B21tg--15 to 35 inches; gray (5Y 5/1) silty clay loam; common medium prominent yellowish brown (10YR 5/8) mottles; weak coarse prismatic structure parting to moderate medium and coarse subangular blocky; friable, sticky, plastic; common very fine roots; few fine vesicular pores and few fine tubular pores; many thin continuous clay films on faces of peds; many very fine sand grains coated and bridged with clay; pockets of silt from 1/2 to 3 inches in diameter that are white when dry; very strongly acid; clear smooth boundary.

B22tg--35 to 43 inches; mottled light greenish gray (5GY 7/1), dark gray (N 4/0), and yellowish brown (10YR 5/8) silt loam; moderate fine and medium subangular blocky structure; friable, sticky, plastic; few very fine roots; few very fine vesicular pores; few thin discontinuous clay films on faces of peds; few very fine sand grains coated and bridged with clay; few fine prominent yellowish red stains along root channels; very strongly acid; clear smooth boundary.

IIB3tg--43 to 50 inches; mottled light gray (10YR 6/1), light greenish gray (5GY 7/1), and yellowish brown (10YR 5/8) fine sandy loam; weak medium subangular blocky structure; friable; slightly sticky; slightly plastic; few very fine roots; few fine vesicular pores; few thin discontinuous clay films on faces of peds; few sand grains coated and bridged with clay; many clean sand grains; common pockets of clean white sand up to 3 inches in diameter; strongly acid; clear wavy boundary.

IICg--50 to 66 inches; mottled gray (5Y 6/1), light olive gray (5Y 6/2), and yellowish brown (10YR 5/8) fine sandy loam; massive, very friable, nonsticky, nonplastic; few very fine vesicular pores; many fine flakes of mica; moderately acid.

Table A: Particle-size distribution for Acredale silt loam

Depth	Sand						Silt	Clay
	VC	C	M	F	VF	Total		
inches	g kg <sup>-1</sup> of soil							
0-7	1	2	24	105	122	254	631	115
7-15	0	1	17	84	124	226	593	181
15-35	0	1	13	66	84	164	523	313
35-43	0	1	21	82	116	220	521	259
43-50	0	2	76	371	239	688	166	146
50-66	0	3	39	397	298	737	160	103

Table B. Chemical properties for Acredale silt loam

Depth	CaO	MgO	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	Zn	Mn
inches	lbs acre <sup>-1</sup>				ppm	
0-7	1511	368	64	63	0.6	ND
7-15	1007	279	11	24	0.4	ND
15-35	974	398	4	29	0.4	ND
35-43	705	398	2	31	0.6	ND
43-50	470	398	9	24	0.7	ND
50-66	705	398	143	24	0.9	ND

Table C. Chemical properties for Acredale silt loam

Depth	Exchangeable cations				CEC	BS
	Ca <sup>2+</sup>	Mg <sup>2+</sup>	K <sup>+</sup>	H <sup>+</sup>		
inches	cmol ( + ) kg <sup>-1</sup> soil					%
0-7	2.80	1.15	0.09	4.80	8.84	45.70
7-15	1.96	0.90	0.05	6.03	8.94	32.55
15-35	1.95	1.88	0.09	9.59	13.51	29.02
35-43	1.74	4.70	0.11	5.78	12.33	53.12
43-50	1.20	3.70	0.10	2.21	7.21	69.35
50-66	1.05	2.86	0.07	1.35	5.33	74.67

Table D. Chemical properties for Acredale silt loam

Depth	Organic matter	pH	Al <sup>3+</sup>	ECEC	EBS
inches	g kg <sup>-1</sup>		cmol ( + ) kg <sup>-1</sup> soil		%
0-7	2.14	5.1	0.28	4.32	93.52
7-15	0.86	4.9	1.75	4.66	62.45
15-35	0.50	4.7	4.14	8.06	48.64
35-43	0.26	4.9	1.66	8.21	79.78
43-50	0.11	5.2	0.37	5.37	93.11
50-66	0.08	5.6	0.09	4.07	97.79

## Acredale Series supplemental profile 1

Location: About 2,500 feet south-southwest of junction of College Ave. and Princess Anne Road and 250 feet west of dirt farm road, 75 feet south of lead ditch, and 75 feet west of second ditch parallel to dirt farm road.

Ap--0 to 11 inches; dark grayish-brown (10YR 4/2) silt loam; weak, fine subangular blocky structure; friable, slightly sticky, nonplastic; common fine roots; thin discontinuous clay or silt coatings on faces of peds; very strongly acid; clear smooth boundary.

B1tg--11 to 17 inches, dark gray (10YR 4/1) silt loam; common, fine prominent dark yellowish-brown (10YR 4/6) mottles; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; common fine roots; thin discontinuous clay films on faces of peds; very strongly acid; clear smooth boundary.

B21tg--17 to 39 inches, dark gray (10YR 4/1) silty clay loam; common coarse prominent strong brown (7.5YR 5/8) mottles; weak medium subangular blocky structure; firm, slightly sticky, plastic; common fine roots; thin continuous clay films on faces of peds; few fine flakes of mica; strongly acid; clear smooth boundary.

B22tg--39 to 55 inches; olive gray (5Y 5/2) silty clay loam; many medium prominent yellowish brown (10YR 5/6) mottles; weak medium subangular structure; firm, slightly sticky, plastic; few fine roots; thick continuous clay films on faces of peds; common fine flakes of mica; neutral; clear smooth boundary.

B3tg--55 to 61 inches; olive gray (5Y 5/2) silty clay; many medium prominent dark yellowish brown (10YR 4/6) mottles; moderate and strong medium subangular blocky structure; friable, sticky, slightly plastic; few fine roots, some dead and decaying; many fine iron and manganese concretions; thick continuous clay films on faces of peds; common fine flakes of mica; neutral; abrupt smooth boundary.

IICg--61 to 72 inches; dark gray (10YR 4/1) fine sandy loam; common medium distinct dark olive (5Y 6/3) mottles; massive; friable, nonsticky, nonplastic; few fine flakes of mica.

Table A: Particle-size distribution for Acredale silt loam

Depth	Sand						Silt	Clay
	VC	C	M	F	VF	Total		
inches	g kg <sup>-1</sup> of soil							
0-11	0	1	39	60	13	113	636	251
11-17	0	0	23	49	19	91	641	268
17-39	0	0	20	22	49	91	551	358
39-55	0	0	1	9	71	81	545	374
55-61	0	1	20	32	84	137	457	406

Table C. Chemical properties for Acredale silt loam

Depth	Exchangeable cations				CEC	BS
	Ca <sup>2+</sup>	Mg <sup>2+</sup>	K <sup>+</sup>	H <sup>+</sup>		
inches	cmol ( + ) kg <sup>-1</sup> soil					%
0-11	1.38	0.75	0.05	11.16	13.34	16.34
11-17	2.10	1.68	0.06	8.60	12.44	30.87
17-39	4.75	6.50	0.12	5.58	16.95	67.08
39-55	6.50	9.50	0.24	3.48	19.72	82.35
55-61	6.50	9.00	0.25	3.48	19.23	81.90

Table D. Chemical properties for Acredale silt loam

Depth	Organic matter	pH	Al <sup>3+</sup>	ECEC	EBS
inches	g kg <sup>-1</sup>		cmol ( + ) kg <sup>-1</sup> soil		%
0-11	2.60	5.0	2.84	5.02	43.43
11-17	0.86	5.0	2.35	6.19	62.04
17-39	0.27	5.5	2.35	13.72	82.87
39-55	0.12	6.9	0.00	16.24	100.00
55-61	0.19	6.9	0.00	15.75	100.00

## Acredale Series supplemental profile 2

Location: About 125 feet south of Old Potter's Road, 250 feet east of junction of Old Potter's Road and Lynnhaven Parkway, and 500 feet southeast of overpass of Route 44 over Lynnhaven Parkway.

Ap--0 to 7 inches; brown (10YR 5/2) silt loam; weak fine granular structure; friable; slightly sticky, nonplastic; many fine and medium and few coarse roots; extremely acid; abrupt smooth boundary.

B21tg--7 to 15 inches; light brownish gray (10YR 6/2) silt loam; common, medium, prominent, yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable; sticky; slightly plastic; common fine and medium roots; few thin discontinuous clay films on faces of peds; very strongly acid; clear smooth boundary.

B22tg--15 to 26 inches; gray (10YR 5/1) silty clay loam, common, medium, prominent, yellowish brown (10YR 5/6) and few medium, distinct, light brownish gray (2.5Y 6/2) mottles; strong medium subangular blocky structure; firm; sticky, plastic; few fine roots; many thin continuous clay film on faces of peds; very strongly acid; gradual smooth boundary.

B23tg--26 to 52 inches; gray (10YR 5/1) clay loam, common, medium prominent yellowish brown (10YR 5/6) and common, medium, distinct, light gray (10YR 7/1) mottles; strong medium subangular blocky structure; firm; sticky, plastic; few fine and medium roots; light gray (10YR 7/1) pockets of more silty material, possibly old root channels; many thin continuous clay films on faces of peds; very strongly acid; clear wavy boundary; pockets in upper half horizon clayey; pockets in lower half horizon are coarser textured.

IICg--52 to 80 inches; light gray (10YR 7/1) fine sandy loam; many, medium, prominent brownish yellow (10YR 6/8) mottles; massive; very friable; nonsticky and nonplastic; few fine flakes of mica; few three to four inch thick lenses of sandy loam material; very strongly acid.

Table A: Particle-size distribution for Acredale silt loam

Depth	Sand					Total	Silt	Clay
	VC	C	M	F	VF			
<u>inches</u>	<u>g kg<sup>-1</sup> of soil</u>							
0-7	2	9	45	79	64	199	710	91
7-15	1	8	42	68	60	179	629	192
15-26	2	5	29	52	44	132	524	344
26-52	2	9	46	92	93	242	454	304
52-80	6	13	220	386	120	745	128	127

Table C. Chemical properties for Acredale silt loam

Depth	Exchangeable cations				CEC	BS
	Ca <sup>2+</sup>	Mg <sup>2+</sup>	K <sup>+</sup>	H <sup>+</sup>		
<u>inches</u>	<u>cmol ( + ) kg<sup>-1</sup> soil</u>					<u>%</u>
0-7	0.92	0.49	0.06	6.77	8.24	17.84
7-15	0.77	0.55	0.07	8.42	9.81	14.16
15-26	0.69	0.91	0.13	12.99	14.72	11.75
26-52	0.33	1.74	0.13	11.53	13.73	16.02
52-80	0.10	1.54	0.09	4.21	5.94	29.12

Table D. Chemical properties for Acredale silt loam

Depth	Organic matter	pH	Al <sup>3+</sup>	ECEC	EBS
<u>inches</u>	<u>g kg<sup>-1</sup></u>		<u>cmol ( + ) kg<sup>-1</sup> soil</u>		<u>%</u>
0-7	1.78	4.4	2.30	3.77	38.99
7-15	0.89	4.6	4.05	5.44	25.55
15-26	0.77	4.5	6.76	8.49	20.38
26-52	0.43	4.7	6.08	8.28	26.57
52-80	0.14	4.6	2.32	4.05	42.72

### Acredale Series supplemental profile 3

Location: About 6,800 feet west-southwest of junction of Blackwater Road and Old Carolina Road and 150 feet north of Old Carolina Road.

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

B2ltg--10 to 30 inches; grayish brown (10YR 5/2) silty clay loam; few, fine, distinct brownish yellow (10YR 6/8) mottles; few fine subangular blocky structure; friable, slightly sticky, slightly plastic; common very fine, few fine roots, common very fine, few fine pores; thin patchy clay and/or silt films on faces of peds; extremely acid; clear smooth boundary.

B22tg--30-46 inches; mottled light greenish gray (5GY 7/1), gray (10YR 5/1) and reddish yellow (7.5YR 6/8) silty clay loam; moderate medium subangular blocky structure; friable, slightly sticky, slightly plastic; few very fine roots; thin patchy clay films on faces of peds; very strongly acid; clear smooth boundary.

B23tg--46 to 57 inches; gray (5Y 6/1) clay loam; common medium prominent strong brown (7.5YR 5/8) mottles; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; few very fine roots, few very fine pores; thin patchy clay films with gray (10YR 5/1) coatings on faces of peds; few fine flakes of mica; moderately acid; clear smooth boundary.

B3tg--57 to 65 inches; gray (5Y 6/1) silt loam; common medium distinct yellowish brown (10YR 5/8) mottles; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; few very fine roots, few very fine and few fine pores; thin patchy clay films; few fine flakes of mica; moderately acid; clear smooth boundary.

C--65 to 72 inches; gray (5Y 6/1) silt loam; few medium distinct yellowish brown (10YR 5/8) mottles; massive; friable, slightly sticky, slightly plastic; few very fine roots; few very fine and fine pores; few fine flakes of mica; slightly acid.

Table A: Particle-size distribution for Acredale silt loam

Depth	Sand					Total	Silt	Clay
	VC	C	M	F	VF			
inches	g kg <sup>-1</sup> of soil							
0-10	0	1	4	43	90	138	657	205
10-30	0	1	1	11	3	16	642	342
30-46	1	0	1	22	141	164	530	306
46-57	0	2	3	66	204	275	452	273
57-65	0	1	3	44	162	210	530	260

Table C. Chemical properties for Acredale silt loam

Depth	Exchangeable cations				CEC	BS
	Ca <sup>2+</sup>	Mg <sup>2+</sup>	K <sup>+</sup>	H <sup>+</sup>		
inches	cmol ( + ) kg <sup>-1</sup> soil					%
0-10	4.43	3.20	0.20	7.40	15.23	51.41
10-30	2.67	2.90	0.13	10.80	16.50	34.55
30-46	2.13	7.60	0.29	7.00	17.02	58.87
46-57	2.19	8.90	0.35	4.60	16.04	71.32
57-65	2.30	8.70	0.38	2.80	14.18	80.25

Table D. Chemical properties for Acredale silt loam

Depth	Organic matter	pH	Al <sup>3+</sup>	ECEC	EBS
inches	g kg <sup>-1</sup>		cmol ( + ) kg <sup>-1</sup> soil		%
0-10	2.36	5.1	0.15	7.98	98.12
10-30	1.12	4.9	2.85	8.55	66.67
30-46	0.28	4.9	1.05	11.07	90.51
46-57	0.25	5.5	0.25	11.69	97.86
57-65	0.25	5.8	0.15	11.53	98.70

### Acredale Series supplemental profile 4

Location: About 300 feet southeast of junction of Bells Road and South Birdneck Road.

Ap--0 to 6 inches; gray (10YR 5/1) silt loam; few fine distinct yellowish brown (10YR 5/6) mottles; weak coarse and medium subangular blocky structure; friable, slightly sticky, slightly plastic; common very fine and fine and few medium and coarse roots; few very fine and fine pores; clear smooth boundary.

B21tg--6 to 14 inches; light gray (10YR 6/1) silty clay loam; common medium distinct yellowish brown (10YR 5/6) mottles; weak coarse and medium subangular blocky structure; friable, sticky, slightly plastic; few very fine and fine and common medium and coarse roots, few very fine and fine pores; thin discontinuous clay films on faces of peds; few sand grains coated and bridged with clay; clear smooth boundary.

B22tg--14 to 30 inches; light gray (10YR 6/1) silty clay loam; common medium distinct brownish yellow (10YR 6/8) and few fine prominent strong brown (7.5YR 5/8) mottles; weak coarse prismatic parting to weak coarse and medium subangular blocky structure; friable, sticky, slightly plastic; few very fine, fine, and common medium roots, few very fine and fine pores; thin discontinuous clay films on faces of peds; few sand grains coated and bridged with clay; clear wavy boundary.

B23tg--30 to 48 inches; mottled gray (5Y 6/1), brownish yellow (10YR 6/8) and reddish brown (5YR 5/4) silty clay; massive in place and parting to weak coarse prismatic and weak coarse subangular blocky structure; friable, sticky, plastic; few fine roots, few very fine and fine pores; thin discontinuous clay film on faces, of peds; few sand grains coated and bridged with clay; clear wavy boundary.

B24g--48 to 65 inches; gray (5Y 6/1) silt loam; many coarse prominent reddish yellow (7.5YR 6/8) mottles; massive in place with pockets parting to weak coarse prismatic structure; friable, sticky, slightly plastic; few very fine roots, few very fine and fine pores.

Table A: Particle-size distribution for Acredale silt loam

Depth	Sand						Silt	Clay
	VC	C	M	F	VF	Total		
inches	g kg <sup>-1</sup> of soil							
0-6	0	6	56	24	14	100	730	170
6-14	0	4	36	14	16	70	660	270
14-30	0	2	36	16	6	60	650	290
30-48	0	2	48	24	6	80	510	410
48-65	0	2	6	6	76	90	650	260

## Acredale Series supplemental profile 5

Location: About 600 feet west of Nimmo Methodist Church and 200 feet north of Princess Anne Road.

A1--0 to 2 inches; very dark brown (10YR 2/2) silt loam; weak fine granular structure; friable, slightly sticky, nonplastic; many fine, medium and coarse roots; common fine bleached white sand grains; extremely acid.

A2--2 to 7 inches; very dark grayish brown (10YR 3/2) silt loam; weak fine granular structure; friable, slightly sticky, nonplastic; common fine, medium and coarse roots; few worm ducts up to 1/4 inch in diameter; few to common white washed sand grains; extremely acid; abrupt smooth boundary.

B1tg--7 to 14 inches; light brownish gray (2.5Y 6/2) silt loam, common medium prominent strong brown (7.5YR 5/6), yellowish brown (10YR 5/6) and common fine and medium, faint grayish brown (10YR 5/2) mottles; weak fine and medium subangular blocky structure; friable, slightly sticky, slightly plastic; common fine and medium roots; thin discontinuous clay films on faces of peds; very strongly acid; clear wavy boundary.

B2ltg--14 to 28 inches; gray (10YR 5/1) silty clay loam; common medium distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm, sticky, plastic; few to common fine and medium roots; thick continuous clay films on faces of peds; few moderately thick discontinuous silt coatings on faces of peds; few krotovina up to 1 inch; moderately acid; clear wavy boundary.

B22tg--28 to 43 inches; gray (10YR 5/1) clay loam; few fine and medium distinct yellowish brown (10YR 5/6) and few fine and medium distinct very dark brown (10YR 2/2) mottles; moderate medium subangular blocky structure; firm, sticky, plastic; few fine roots; thick continuous clay films on faces of peds; few krotovina up to 1/2 inch filled with highly decayed root fiber; neutral; clear wavy boundary.

Cg--43 to 92 inches; gray (5Y 5/1) silt loam; common medium distinct yellowish brown (10YR 5/6), few fine distinct pale brown (10YR 6/3) and few fine distinct blue-green mottles; massive; friable, slightly sticky, slightly plastic; few krotovina up to 1/2 inch in diameter; common fine flakes of mica, few black mineral concretions; mildly alkaline.

Table A: Particle-size distribution for Acredale silt loam

Depth	Sand						Silt	Clay
	VC	C	M	F	VF	Total		
inches	g kg <sup>-1</sup> of soil							
0-2	1	10	27	124	43	205	623	172
2-7	2	4	19	123	67	215	628	157
7-14	0	2	17	119	70	208	599	193
14-28	1	1	14	98	53	167	560	273
28-43	0	1	14	138	58	211	425	364
43-92	0	1	8	23	277	309	522	169



Table C. Chemical properties for Acredale silt loam

Depth	Exchangeable cations				CEC	BS
	Ca <sup>2+</sup>	Mg <sup>2+</sup>	K <sup>+</sup>	H <sup>+</sup>		
inches	cmol ( + ) kg <sup>-1</sup> soil					%
0-2	1.88	1.94	0.20	21.56	25.58	15.72
2-7	0.91	1.08	0.12	14.61	16.72	12.62
7-14	1.43	2.50	0.10	6.61	10.64	37.88
14-28	3.30	6.00	0.16	5.04	14.50	65.24
28-43	4.70	9.00	0.21	2.61	16.52	84.20
43-92	4.60	6.50	0.23	1.22	12.55	90.28

Table D. Chemical properties for Acredale silt loam

Depth	Organic matter	pH	Al <sup>3+</sup>	ECEC	EBS
inches	g kg <sup>-1</sup>		cmol ( + ) kg <sup>-1</sup> soil		%
0-2	3.67	3.8	3.52	7.54	53.32
2-7	1.66	4.3	3.43	5.54	38.09
7-14	0.21	5.0	1.29	5.32	75.75
14-28	0.12	5.8	0.09	9.55	99.06
28-43	0.08	6.8	0.00	13.91	100.00
43-92	0.05	7.4	0.00	11.33	100.00

Table E: Mineralogy of the sand fraction for Acredale silt loam

Depth	Minerals Present*					
	Quartz	Feldspar	Mica	Opaques	Heavies	Misc.
inches	g kg <sup>-1</sup> of sand					
14-28	760	170	30	0	30	10

\*Opaques = iron minerals including ilmenite, magnetite, hematite, etc. Misc. = rock fragments.

Table F: Mineralogy of the clay fraction for Acredale silt loam

Depth	Minerals Present*							
	Kao	HIV	Verm	Mont	Mica	Fld	Qtz	Gibb
inches	g kg <sup>-1</sup> of clay							
14-28	200	350	ND	300	ND	ND	100	50

\*Kao = kaolinite, HIV = hydroxy interlayered vermiculite, Verm = vermiculite, Mont = montmorillonite, Fld = feldspar, Qtz = quartz, and Gibb = gibbsite.

Table G: Engineering properties for Acredale silt loam

Depth	PVC*	Atterburg Limits		PI*
		LL*	PL*	
<u>inches</u>	<u>lb foot<sup>-2</sup></u>			
14-28	2000	34.30	15.86	18.44
28-43	2900	43.78	14.57	29.21
43-92	1600	28.18	21.09	7.09

\*PVC = potential volume change, LL = liquid limit, PL = plastic limit, and PI = plasticity index.

## Acredale Series supplemental profile 6

Location: About 3,300 feet south-southwest of junction of College and Princess Anne Road and 400 feet west of dirt farm road.

Ap--0 to 9 inches; dark gray (10YR 4/1) silt loam; weak medium granular structure; friable, sticky, plastic; many fine roots; few fine flakes of mica; strongly acid; abrupt smooth boundary.

B21g--9 to 18 inches; gray (10YR 5/1) silt loam, with few medium dominant brown (7.5YR 4/4) mottles; weak medium subangular blocky structure; firm, sticky, plastic; common fine roots, common fine flakes of mica; strongly acid; diffuse wavy boundary.

B22g--18 to 26 inches; gray (10YR 5/1) silt loam, few medium distinct yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; firm, sticky, plastic; common fine roots, common fine flakes of mica; strongly acid; diffuse wavy boundary.

B23tg--26 to 39 inches; dark gray (10YR 4/1) ped coats and yellowish brown (10YR 5/6) ped interiors; silty clay loam; common medium distinct gray (10YR 5/1) mottles; moderate coarse prismatic parting to weak coarse subangular blocky structure; firm, sticky, plastic; common fine roots, common fine flakes of mica; common thick clay films on faces of peds; slightly acid; diffuse wavy boundary.

B24tg--39 to 59 inches; dark gray (10YR 4/1) ped coats with yellowish brown (10YR 5/8) and light gray (10YR 6/1) ped interiors, silty clay loam; weak coarse prismatic parting to weak coarse subangular blocky structure; firm, sticky, plastic; common fine roots, common fine flakes of mica; common thick clay films; neutral; gradual wavy boundary.

IICg--59 to 70 inches; gray (5Y 5/1) fine sandy loam, many medium distinct yellowish brown (10YR 5/6) mottles; massive; friable, slightly sticky, slightly plastic; few fine roots and few fine flakes of mica; neutral.

Table A: Particle-size distribution for Acredale silt loam

Depth	Sand					Total	Silt	Clay
	VC	C	M	F	VF			
inches	g kg <sup>-1</sup> of soil							
0-9	0	1	20	40	20	81	666	253
9-18	0	1	19	38	44	102	685	213
18-26	0	0	19	31	40	90	656	254
26-39	0	0	7	13	41	61	638	301
39-59	0	0	3	17	43	63	549	388
59-70	0	9	190	439	87	725	116	159

Table C. Chemical properties for Acredale silt loam

Depth	Exchangeable cations				CEC	BS
	Ca <sup>2+</sup>	Mg <sup>2+</sup>	K <sup>+</sup>	H <sup>+</sup>		
inches	cmol ( + ) kg <sup>-1</sup> soil					%
0-9	3.10	1.07	0.08	9.30	13.55	31.37
9-18	2.43	1.02	0.08	7.77	11.30	31.24
18-26	3.26	2.89	0.11	5.07	11.33	55.25
26-39	5.98	6.38	0.19	3.89	16.44	76.34
39-59	10.20	9.66	0.44	3.55	23.85	85.12
59-70	3.11	3.26	0.16	2.03	8.56	76.29

Table D. Chemical properties for Acredale silt loam

Depth	Organic matter	pH	Al <sup>3+</sup>	ECEC	EBS
inches	g kg <sup>-1</sup>		cmol ( + ) kg <sup>-1</sup> soil		%
0-9	2.30	5.1	1.66	5.91	71.91
9-18	1.67	5.1	1.76	5.29	66.73
18-26	0.72	5.3	0.59	6.85	91.39
26-39	0.37	6.3	0.00	12.55	100.00
39-59	0.14	6.7	0.00	20.30	100.00
59-70	0.49	7.0	0.00	6.53	100.00



Figure 1: Acredale - Urban land complex is on the left portion, and Acredale silt loam is on the right portion of the landscape represented by this photograph.



Figure 2: An area of Acredale - Urban land complex.



Figure 3: An area of Acredale - Urban land complex and Urban land.



Figure 4: An area of poorly drained Acredale silt loam drained by open ditches.

## Augusta Series

The soils of the Augusta series are deep and somewhat poorly drained. They formed in loamy fluvial and marine sediments. Augusta soils are on inland ridges on the lower part of the Coastal Plain. Slopes range from 0 to 2 percent.

Typical pedon of Augusta loam, about 3,500 feet west-northwest of the junction of West Landing and West Neck Roads, and 350 feet north of West Landing Road.

Ap--0 to 8 inches; light olive brown (2.5Y 5/4) loam; weak fine and medium granular structure; friable, slightly sticky, slightly plastic; few fine and common very fine roots; strongly acid; abrupt smooth boundary.

B1t--8 to 13 inches; light yellowish brown (2.5Y 6/4) loam; common medium prominent yellowish brown (10YR 5/8) mottles; weak fine and medium subangular blocky structure; friable, slightly sticky, slightly plastic; few very fine roots; many sand grains coated and bridged with clay; very strongly acid; clear smooth boundary.

B2t--13 to 18 inches; light yellowish brown (2.5Y 6/4) clay loam; many medium prominent yellowish brown (10YR 5/8) and few fine prominent strong brown (7.5YR 5/6) mottles; weak fine and medium subangular blocky structure; friable, sticky, slightly plastic; few very fine roots; few thin discontinuous clay films on faces of peds; many sand grains coated and bridged with clay; very strongly acid; clear smooth boundary.

B22t--18 to 27 inches; light brownish gray (2.5Y 6/2) and yellowish brown (10YR 5/8) clay loam; few fine distinct strong brown (7.5YR 5/6) mottles; weak fine and medium subangular blocky structure; friable, sticky, slightly plastic; few very fine roots; few thin discontinuous clay films on faces of peds; many sand grains coated and bridged with clay; very strongly acid; clear smooth boundary.

B23tg--27 to 34 inches; light brownish gray (2.5Y 6/2) clay loam; many medium prominent yellowish brown (10YR 5/8), common medium distinct light gray (10YR 6/1), and common fine and medium prominent black (N2/ 0) mottles; weak fine and medium subangular blocky structure; friable, slightly sticky, slightly plastic; few very fine roots; few thin discontinuous clay films on faces of peds; many sand grains coated and bridged with clay; very strongly acid; clear smooth boundary.

B24tg--34 to 45 inches; light gray (10YR 6/1) clay loam; few medium prominent brownish yellow (10YR 6/8) mottles; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; few very fine roots; few thin discontinuous clay films on faces of peds; many sand grains coated and bridged with clay; very strongly acid; clear wavy boundary.

IIC--45 to 63 inches; mottled light yellowish brown (2.5Y 6/4) and light gray (10YR 6/1) loamy sand; massive; very friable; many clean sand grains; very strongly acid.

Table A: Particle-size distribution for Augusta loam

Depth inches	Sand					Total	Silt	Clay
	VC	C	M	F	VF			
	g kg <sup>-1</sup> of soil							
0-8	1	9	98	225	89	422	409	169
8-13	0	9	98	181	76	364	407	229
13-18	1	7	70	138	67	283	402	315
18-27	1	8	62	127	86	284	371	345
27-34	0	7	70	146	101	324	345	331
34-45	1	8	90	176	111	386	324	290
45-63	0	26	345	470	16	857	12	131

Table B. Chemical properties for Augusta loam

Depth	CaO	MgO	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	Zn	Mn
inches	lbs acre <sup>-1</sup>				ppm	
0-8	5.3	1035	375	64	253	ND
8-13	4.6	448	253	4	96	ND
13-18	4.7	532	305	7	80	ND
18-27	4.8	560	398	9	63	ND
27-34	4.9	434	398	9	72	ND
34-45	4.9	392	398	9	67	ND
45-63	4.8	168	229	35	41	ND

Table C. Chemical properties for Augusta loam

Depth	Exchangeable cations				CEC	BS
	Ca <sup>2+</sup>	Mg <sup>2+</sup>	K <sup>+</sup>	H <sup>+</sup>		
inches	cmol ( + ) kg <sup>-1</sup> soil					%
0-8	1.99	1.08	0.35	7.08	10.50	32.57
8-13	1.07	0.74	0.19	8.61	10.61	18.85
13-18	1.50	1.07	0.20	9.92	12.69	21.83
18-27	1.52	1.54	0.19	10.25	13.50	24.07
27-34	1.25	1.64	0.18	10.46	13.53	22.69
34-45	1.06	1.58	0.18	9.26	12.08	23.34
45-63	0.44	0.88	0.11	4.96	6.39	22.38

Table D. Chemical properties for Augusta loam

Depth	Organic matter	pH	Al <sup>3+</sup>	ECEC	EBS
inches	g kg <sup>-1</sup>		cmol ( + ) kg <sup>-1</sup> soil		%
0-8	1.55	5.1	0.18	3.60	95.00
8-13	0.74	4.6	1.84	3.84	52.08
13-18	0.52	4.6	2.48	5.25	52.76
18-27	0.26	4.7	2.39	5.64	57.62
27-34	0.18	4.6	2.48	5.55	55.32
34-45	0.14	4.7	2.58	5.40	52.22
45-63	0.07	4.7	1.29	2.72	52.57

## Augusta Series supplemental profile 1

Location: About 2,000 feet south of junction of Indian River Road and West Neck Road and 6,200 feet north-northwest of junction of West Neck and West Landing Road.

Ap--0 to 9 inches; dark grayish brown (2.5Y 4/2) loam; weak fine and medium granular structure; friable, slightly sticky, slightly plastic; few fine and common very fine roots; strongly acid; abrupt smooth boundary.

B21t--9 to 19 inches; light yellowish brown (2.5Y 6/4) loam; common medium distinct yellowish brown (10YR 5/6) mottles; weak fine and medium subangular blocky structure; friable, slightly sticky, slightly plastic; few very fine roots; many sand grains coated and bridged with clay; few krotovina up to 1/4 inch in diameter; very strongly acid; clear smooth boundary.

B22t--19 to 29 inches; light yellowish brown (2.5Y 6/4) loam; many medium distinct yellowish brown (10YR 5/8), few fine and medium prominent strong brown (7.5YR 5/6), and few fine faint grayish brown (10YR 5/2) mottles; weak fine and medium subangular blocky structure; friable, slightly sticky, slightly plastic; few very fine roots; few thin discontinuous clay films on faces of peds; many sand grains coated and bridged with clay; very strongly acid; clear smooth boundary.

B23t--29 to 35 inches; mottled light yellowish brown (2.5Y 6/4), light gray (10YR 6/1) and yellowish brown (10YR 5/8) loam; weak fine and medium subangular blocky structure; friable, slightly sticky, slightly plastic; few very fine roots; few thin discontinuous clay films on faces of peds; many sand grains coated and bridged with clay; very strongly acid; clear smooth boundary.

B3tg--35 to 48 inches; mottled grayish brown (2.5Y 5/2), gray (10YR 6/1) and strong brown (7.5YR 5/6) sandy loam; weak fine and medium subangular blocky structure; friable, nonsticky, nonplastic; few very fine roots; few thin discontinuous clay films on faces of peds; many sand grains coated and bridged with clay; few reddish brown (5YR 4/4) iron and manganese concretions up to 1/4 inch in diameter; strongly acid; clear smooth boundary.

C1g--48 to 56 inches; mottled grayish brown (2.5Y 5/2) and gray (10YR 6/1) loamy sand; single grain, loose; strongly acid; clear smooth boundary.

C2g--56 to 62 inches; grayish brown (2.5Y 5/2) sand; few coarse prominent strong brown (7.5YR 5/6) mottles; single grain; loose; strongly acid.

Table A: Particle-size distribution for Augusta loam

Depth	Sand					Total	Silt	Clay
	VC	C	M	F	VF			
inches	g kg <sup>-1</sup> of soil							
0-9	2	72	294	106	16	490	390	120
9-19	2	68	282	106	12	470	370	160
19-29	2	50	232	84	12	380	410	210
29-35	4	78	120	114	14	330	480	190
35-48	2	84	396	154	24	660	200	140
48-56	6	107	523	160	14	810	130	60
56-62	5	154	638	98	05	900	70	30

Table B. Chemical properties for Augusta loam

Depth	CaO	MgO	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	Zn	Mn
inches	lbs acre <sup>-1</sup>			ppm		
0-9	1399	272	275	267	ND	ND
9-19	588	219	11	43	ND	ND
19-29	839	288	11	67	ND	ND
29-35	588	176	68	43	ND	ND
35-48	392	83	50	75	ND	ND
48-56	196	40	77	24	ND	ND
56-62	140	20	132	22	ND	ND



## Augusta Series supplemental profile 2

Location: About 4,900 feet southeast of junction of Swamp Road and London Bridge Road and 1,350 feet south-southeast of junction of Harper Road and London Bridge Road.

Ap--0 to 7 inches; brown (10YR 4/3) loam; weak fine granular structure; friable, slightly sticky, slightly plastic; few fine pores, common very fine roots; strongly acid; abrupt smooth boundary.

B1t--7 to 15 inches; light yellowish brown (2.5Y 6/4) loam; few fine faint light brownish gray (2.5Y 6/2) and common fine and medium distinct yellowish brown (10YR 5/8) mottles; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; few very fine pores; few very fine roots; many sand grains coated and bridged with clay; few iron and manganese concretions up to 1/2 inch in diameter; very strongly acid; clear wavy boundary.

B21t--15 to 25 inches; light yellowish brown (2.5Y 6/4) silt loam; common fine and medium distinct yellowish brown (10YR 5/8) and common fine and medium faint light brownish gray (2.5Y 6/2) mottles; moderate fine and medium subangular blocky structure; friable, slightly sticky, slightly plastic; common fine pores, few very fine roots; few thin discontinuous clay films on faces of peds; many sand grains coated and bridged with clay; few iron and manganese concretions up to 1/4 inch in diameter; very strongly acid; clear wavy boundary.

B22tg--25 to 42 inches; light brownish gray (2.5Y 6/2) loam; many coarse distinct yellowish brown (10YR 5/8) and common medium distinct gray (10YR 6/1) mottles; moderate fine and medium subangular blocky structure; friable, sticky, slightly plastic; common fine pores, few very fine roots; few thin discontinuous clay films on faces of peds; many sand grains coated and bridged with clay; few iron and manganese concretions up to 1/4 inch in diameter; strongly acid; clear smooth boundary.

B23tg--42 to 55 inches; gray (10YR 6/1) clay loam; few medium distinct strong brown (7.5YR 5/6) and few medium distinct light yellowish brown (10YR 6/4) mottles; moderate, medium, and coarse subangular blocky structure; friable, slightly sticky, slightly plastic; few fine pores, few very fine roots; few thin discontinuous clay films on faces of peds, many sand grains coated and bridged with clay; strongly acid; gradual smooth boundary.

IICg--55-70 inches; mottled light brownish gray (2.5Y 6/2), light yellowish brown (10YR 6/4) and yellowish brown (10YR 5/6) fine sandy loam; massive; friable, nonsticky, nonplastic; strongly acid.

Table A: Particle-size distribution for Augusta loam

Depth	Sand					Total	Silt	Clay
	VC	C	M	F	VF			
inches	g kg <sup>-1</sup> of soil							
0-7	2	14	62	208	58	344	486	170
7-15	2	12	58	216	56	344	486	170
15-25	2	8	46	200	52	308	512	180
25-42	0	6	36	200	56	298	452	250
42-55	0	2	22	200	62	286	394	320
55-70	1	15	80	476	100	672	178	150

Table B. Chemical properties for Augusta loam

Depth	CaO	MgO	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	Zn	Mn
inches	lbs acre <sup>-1</sup>				ppm	
0-7	979	398	214	313	ND	ND
7-15	280	136	33	82	ND	ND
15-25	532	159	39	118	ND	ND
25-42	839	385	9	43	ND	ND
42-55	839	398	6	89	ND	ND

### Augusta Series supplemental profile 3

Location: About 3,700 feet north-northwest of junction of Indian River Road and West Neck Road and about 300 feet southwest of sharp curve on West Neck Road in edge of field, 100 feet east of drainage ditch.

Ap--0 to 6 inches; brown to dark brown (10YR 4/3) loam; weak fine granular structure; friable, slightly sticky, nonplastic; few fine roots; few clean sand grains; (up to 2% crop residue) very strongly acid; abrupt smooth boundary.

B21t--6 to 17 inches; yellowish brown (10YR 5/6) clay loam; weak fine subangular blocky structure; friable, sticky, slightly plastic; few fine and medium roots; few thin discontinuous clay films on faces of peds; strongly acid; clear smooth boundary.

B22t--17 to 32 inches; yellowish brown (10YR 5/4) sandy clay loam; many fine distinct light gray to gray (10YR 6/1) and few fine distinct yellowish brown (10YR 5/8) mottles; weak fine subangular blocky structure; friable; slightly sticky, slightly plastic; few fine roots; many sand grains coated and bridged with clay; few fine shell fragments in lower 1/3 of horizon; very strongly acid; clear smooth boundary.

B23t--32 to 49 inches; mottled grayish brown (2.5Y 5/2), brownish yellow (10YR 6/6), and strong brown (7.5YR 5/8) loam; friable, slightly sticky, plastic; many sand grains coated and bridged with clay; few fine shell fragments; few pockets up to 1-1/2 inches in diameter of loam and silt loam; strongly acid; clear smooth boundary.

IIC1g--49 to 71; light brownish gray (2.5Y 6/2) loamy sand; common medium distinct brownish yellow (10YR 6/6) and few coarse prominent strong brown (7.5YR 5/8) mottles; massive in place parting to weak coarse platy structure; very friable, nonsticky, nonplastic; common fine shell fragments; compact in place; strongly acid; gradual smooth boundary.

IIC2g--71 to 80 inches; light brownish gray (2.5Y 6/2) fine sand; few coarse prominent strong brown (7.5YR 5/8) mottles; single grain; loose; compact in place; common very fine black mineral grains; strongly acid.

Table A: Particle-size distribution for Augusta loam

Depth	Sand					Total	Silt	Clay
	VC	C	M	F	VF			
inches	g kg <sup>-1</sup> of soil							
0-6	1	16	91	186	120	414	471	115
6-17	0	10	60	134	93	297	432	271
17-32	0	20	93	244	151	508	279	213
32-49	0	10	70	216	173	469	322	209

Table C. Chemical properties for Augusta loam

Depth	Exchangeable cations				CEC	BS
	Ca <sup>2+</sup>	Mg <sup>2+</sup>	K <sup>+</sup>	H <sup>+</sup>		
inches	cmol ( + ) kg <sup>-1</sup> soil					%
0-6	0.8	0.3	0.6	8.6	10.3	16.5
6-17	1.7	1.1	0.4	7.6	10.8	29.6
17-32	1.2	0.8	0.2	7.9	10.1	21.8
32-49	0.7	0.7	0.1	10.0	11.5	13.0

## Backbay Series

The soils of the Backbay series are deep and very poorly drained. They formed in organic material and the underlying loamy marine and fluvial sediments. The Backbay soils are in marshes on the lower part of the Coastal Plain. Slope ranges from 0 to 1 percent.

Typical pedon of Backbay mucky peat, about 1,900 feet from the eastern side of Long Island and 1,000 feet from the northern edge of Long Island in the Back Bay National Wildlife Refuge:

Oe--0 to 11 inches; very dark brown (10YR 2/2) mucky peat (hemic material); about 36 percent fiber, 28 percent rubbed; massive; common fine and medium roots; very pale brown (10YR 7/3) sodium pyrophosphate extract; slight sulfide odor; strongly acid; clear smooth boundary.

A1--11 to 22 inches; black (10YR 2/1) silt loam; weak medium granular structure; slightly sticky, slightly plastic; common fine and medium roots; slightly acid; clear smooth boundary.

C1g--22 to 33 inches; gray (10YR 5/1) sandy clay loam; massive; sticky, slightly plastic; few medium roots; few fine flakes of mica; neutral; clear smooth boundary.

C2g--33 to 47 inches; gray (N 6/0) silty clay loam; common medium distinct light olive brown (2.5Y 5/6) mottles; massive; slightly sticky, plastic; few fine flakes of mica; neutral; gradual smooth boundary.

C3g--47 to 60 inches; gray (N 6/0) silty clay loam; many coarse distinct light olive brown (2.5Y 5/6) mottles; massive; slightly sticky, plastic; common fine flakes of mica; neutral.

Table H: Chemical properties for Backbay mucky peat

Depth	Sulfur	CaCO <sub>3</sub>	pH
inches	g kg <sup>-1</sup> of soil		
0-11	14.2	ND	5.2
11-22	2.8	4.0	6.5
22-33	1.4	5.0	7.0
33-47	1.2	5.0	6.7
47-60	ND	ND	6.6

## Backbay Series supplemental profile 1

Location: About 5,500 feet east of the end of Public Landing Road and 6,100 feet north of Virginia-North Carolina state line.

Oi--0 to 6 inches; very dark grayish brown (10YR 3/2) peat (fibric material); about 95 percent fiber, 80 percent rubbed; massive; common fine and medium roots; clear smooth boundary.

Oe--6 to 13 inches; very dark grayish brown (10YR 3/2) mucky peat (hemic material); about 40 percent fiber, 29 percent rubbed; massive; common fine and medium roots; clear smooth boundary.

IIC1g--13 to 21 inches; dark grayish brown (2.5Y 4/2) silty clay loam; massive; sticky, slightly plastic; few medium roots; clear smooth boundary.

IIC2g--21 to 33 inches; very dark gray (10YR 3/1) loam; massive; slightly sticky, slightly plastic; few medium roots; clear smooth boundary.

IIC3g--33 to 46 inches; very dark gray (5Y 3/1) silt loam; massive; sticky, slightly plastic; few medium roots; clear smooth boundary.

IIC4g--46 to 53 inches; gray (5Y 5/1) silty clay loam; massive; sticky, slightly plastic; few medium roots.

Vegetation: cordgrass.

Table A: Particle-size distribution for Backbay peat

Depth	Sand					Total	Silt	Clay
	VC	C	M	F	VF			
inches	g kg <sup>-1</sup> of soil							
13-21	1	16	12	20	39	88	575	337
21-33	40	99	54	91	94	378	427	195
33-46	0	6	7	111	152	276	497	227

## Backbay Series supplemental profile 2

Location: On Horse Island, about 1.5 miles west of Atlantic Ocean and 5,000 feet north of Virginia-North Carolina state line.

Oi--0 to 12 inches; dark gray (7.5YR 3/2) peat (fibric material); about 95 percent fiber, 80 percent rubbed; massive; common fine and medium roots; slight sulfide odor; clear smooth boundary.

IIC1g--12 to 28 inches; very dark grayish brown (2.5Y 3/2) silt loam; massive; sticky, slightly plastic; few medium roots; clear smooth boundary.

IIC2g--28 to 60 inches; dark gray (N 4/) fine sand; massive; slightly sticky, slightly plastic; few fine roots.

Vegetation: needlerush.

Table A: Particle-size distribution for Backbay peat

Depth	Sand						Silt	Clay
	VC	C	M	F	VF	Total		
inches	g kg <sup>-1</sup> of soil							
28-60	0	2	20	756	162	940	30	30

### Backbay Series supplemental profile 3

Location: About 1.0 mile west of Atlantic Ocean and 1.6 miles east-southeast of southern tip of Cedar Island.

Oi--0 to 12 inches; very dark grayish brown (10YR 3/2) peat (fibric material); 96 percent fiber, 82 percent rubbed; massive; common fine and medium roots; slight sulfide odor; clear smooth boundary.

IIC1g--12 to 20 inches; very dark gray (5Y 3/1) loam; massive; slightly sticky, slightly plastic; few medium roots; clear smooth boundary.

IIIC2g--20 to 60 inches; dark gray (5Y 4/1) fine sand; massive; slightly sticky, nonplastic; few fine roots.

Vegetation: needlerush and cordgrass.

Table A: Particle-size distribution for Backbay peat

Depth	Sand						Silt	Clay
	VC	C	M	F	VF	Total		
inches	g kg <sup>-1</sup> of soil							
12-20	0	11	67	261	52	391	429	180
20-60	0	20	132	695	102	949	29	22

### Backbay Series supplemental profile 4

Location: On Ragged Island, about 3.4 miles east of end of Mill Landing Road and 1.5 miles south-southeast of Gall Bush Point.

Oi--0 to 9 inches; very dark grayish brown (10YR 3/2) peat (fibric material); 98 percent fiber, 84 percent rubbed; common fine and medium roots; slight sulfide odor; clear smooth boundary.

IIC1g--9 to 30 inches; very dark gray (10YR 3/1) silty clay loam; massive; sticky, slightly plastic; few medium roots; clear smooth boundary.

IIC2g--30 to 60 inches; gray (5Y 5/1) silt loam; massive; sticky, slightly plastic; few fine roots.

Vegetation: cattails and cordgrass.

Table A: Particle-size distribution for Backbay peat

Depth	Sand					Total	Silt	Clay
	VC	C	M	F	VF			
inches	g kg <sup>-1</sup> of soil							
9-30	1	13	40	56	11	121	569	310
30-60	0	3	28	40	09	80	684	236

### Backbay Series supplemental profile 5

Location: About 6,000 feet east of Public Landing Road and 6100 feet north of Virginia-North Carolina state line.

Oi--0-13 inches very dark grayish brown (10YR 3/2) mucky peat (hemic material); 32 percent fiber, 16 percent rubbed; massive; common fine and medium roots; extremely acid; clear smooth boundary.

IIC1g--13-31 inches, dark brown (10YR 4/1) silt loam; massive; sticky, nonplastic; common fine and medium roots; clear smooth boundary.

IIC2g--31-54 inches, very dark gray (10YR 3/1) silt loam; massive; sticky, nonplastic; few medium roots; clear smooth boundary.

IIC3g--54-59 inches, very dark gray (10YR 3/1) silt loam; massive; sticky, nonplastic; few medium roots.

Table I: Chemical properties for Backbay peat

Depth	Unrubbed	Rubbed	pH	Sulfur
inches	% Fiber Volume			g kg <sup>-1</sup>
0-13	32	16	3.6	9.7
13-31	ND	ND	ND	8.3

### Backbay Series supplemental profile 6

Location: On Big Ball Island, about 1.2 miles west of Atlantic Ocean and 1.2 miles north of Virginia-North Carolina state line.

Oi--0-10 inches, very dark grayish brown (10YR 3/2) mucky peat (hemic material); 36 percent fiber, 28 percent rubbed; massive; common fine and medium roots; extremely acid; clear smooth boundary.

IIC1g--10-20 inches, mottled very dark grayish brown (10YR 3/2) and dark gray (N 4/0) silt loam; massive; sticky, nonplastic; few medium roots; clear smooth boundary.

IIC2g--20-60 inches, dark gray (N 4/0) loamy fine sand; massive; slightly sticky, slightly plastic; few medium roots.

Vegetation: needlerush.

Table I: Chemical properties for Backbay peat

Depth	Unrubbed	Rubbed	pH	Sulfur
<u>inches</u>	<u>% Fiber Volume</u>			<u>g kg<sup>-1</sup></u>
0-10	36	28	3.9	7.5
10-20	ND	ND	ND	2.2

## Backbay Series supplemental profile 7

Location: About 1.1 mile west of Atlantic Ocean and 1.6 mile east of southern tip of Little Cedar Island.

Oi--0-12 inches, very dark grayish brown (10YR 3/2) mucky peat (hemic material); 60 percent fiber, 40 percent rubbed; massive; common fine and medium roots; very strongly acid; clear smooth boundary.

IIC1g--12-23 inches, very dark grayish brown (10YR 3/2); silt loam; massive; slightly sticky, slightly plastic; few medium roots.

IIC2g--23-60 inches, dark greenish gray (5GY 4/1) sand; single grain; loose; nonsticky, non-plastic; few fine roots.

Vegetation: needlerush and cordgrass.

Table I: Chemical properties for Backbay peat

Depth	Unrubbed	Rubbed	pH	Sulfur
<u>inches</u>	<u>% Fiber Volume</u>			<u>g kg<sup>-1</sup></u>
0-12	60	40	4.7	5.5
12-23	ND	ND	ND	4.7

## Backbay Series supplemental profile 8

Location: About 4,900 feet west of Atlantic Ocean and 1.5 mile east of northern tip of Cedar Island.

Oi--0-6 inches, very dark grayish brown (10YR 3/2) mucky peat (hemic material); 36 percent fiber, 16 percent rubbed; massive; common fine and medium roots; very strongly acid; clear smooth boundary.

IICg--6-60 inches gray (5Y 3/1) sand; single grain; loose; nonsticky, nonplastic; few medium roots.

Vegetation: needlerush.

Table I: Chemical properties for Backbay peat

Depth	Unrubbed	Rubbed	pH	Sulfur
<u>inches</u>	<u>% Fiber Volume</u>			<u>g kg<sup>-1</sup></u>
0-6	36	16	5.0	4.5
6-60	ND	ND	ND	0.5

## Backbay Series supplemental profile 9

Location: On Ragged Island, about 3.4 miles east of end of Mill Landing Road and 1.6 mile south-southeast of Gall Bush Point.

Oi--0-13 inches, very dark grayish brown (10YR 3/2) mucky peat (hemic material); 32 percent fiber, 16 percent rubbed; massive; common fine and medium roots; extremely acid; clear smooth boundary.

IIC1g--13-25 inches, very dark gray (10YR3/1) silt loam; massive; sticky, nonplastic; few medium roots; clear smooth boundary.

IIC2g--25-35 inches, very dark gray (10YR3/1) silt loam; massive; sticky, nonplastic; few fine roots; clear smooth boundary.

IIC3g--35-60 inches, gray (N 5/0) silty clay loam; massive; sticky, slightly plastic; few fine roots.

Vegetation: Cattails and cordgrass burned over.

Table I: Chemical properties for Backbay peat

Depth	Unrubbed	Rubbed	pH	Sulfur
<u>inches</u>	<u>% Fiber Volume</u>			<u>g kg<sup>-1</sup></u>
0-13	32	16	4.4	4.8
25-35	ND	ND	ND	3.7

## Bojac Series

The soils of the Bojac series are deep and well drained. They formed in loamy fluvial and marine sediments. Bojac soils are on inland ridges and on the lower part of the Coastal Plain. Slopes range from 0 to 2 percent.

Typical pedon of Bojac fine sandy loam, about 3,100 feet north-northwest of the junction of Princess Anne Road and Pungo Ferry Road, 900 feet west of Princess Anne Road, and 3,000 feet north of Pungo Ferry Road:

Ap--0 to 8 inches; dark brown (10YR 4/3) fine sandy loam; weak fine granular structure; friable, slightly sticky; nonplastic; common fine and very fine roots; moderately acid; abrupt smooth boundary.

B21t--8 to 15 inches; strong brown (7.5YR 5/8) fine sandy loam; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; few fine and very fine roots; many sand grains bridged and coated with clay; strongly acid; clear smooth boundary.



B22t--15 to 32 inches; strong brown (7.5YR 5/6) loam; weak fine and medium subangular blocky structure; friable, slightly sticky, slightly plastic; few fine and common very fine roots; few thin discontinuous clay films on faces of peds; many sand grains bridged and coated with clay; very strongly acid; clear smooth boundary.

B23t--32 to 38 inches; yellowish brown (10YR 5/8) fine sandy loam; weak fine subangular blocky structure; friable, slightly sticky; slightly plastic; few very fine roots; common sand grains bridged and coated with clay; very strongly acid; clear smooth boundary.

C1--38 to 48 inches; brownish yellow (10YR 6/6) loamy fine sand; single grain; loose; few fine roots; many sand grains stained; strongly acid; clear smooth boundary.

C2--48 to 62 inches; mottled brownish yellow (10YR 6/8) and yellow (10YR 7/8) fine sand; single grain; loose; few very fine roots; moderately acid.

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

Depth	Sand					Total	Silt	Clay
	VC	C	M	F	VF			
inches	g kg <sup>-1</sup> of soil							
0-8	0	8	128	492	52	680	240	80
8-15	0	2	102	400	36	540	300	160
15-32	0	2	88	344	36	470	350	180
32-38	0	3	118	500	59	680	220	100
38-48	1	3	152	619	55	830	130	40
48-62	0	2	181	736	31	950	30	20

Table B. Chemical properties for Bojac fine sandy loam

Depth	CaO	MgO	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	Zn	Mn
inches	lbs acre <sup>-1</sup>				ppm	
0-8	1276	151	250	258	2.1	8.8
8-15	604	151	68	200	1.2	6.1
15-32	604	195	40	196	0.5	9.0
32-38	1511	135	90	188	0.4	6.2
38-48	739	84	84	131	0.4	2.5
48-62	437	40	57	26	0.3	0.7

## Bojac Series supplemental profile 1

Location: About 3/4 mile due south of Nimmo Methodist Church, and 350 feet northwest of Princess Anne Road.

Ap--0 to 9 inches; brown to dark brown (10YR 4/3) fine sandy loam; weak fine granular structure; friable; slightly sticky, nonplastic; common fine and few medium roots; few sand grains partially coated; strongly acid; abrupt smooth boundary.

B21t--9 to 14 inches; yellowish brown (10YR 5/4) loam; few fine faint yellowish brown (10YR 5/6) mottles; weak fine and medium subangular blocky structure; friable; slightly sticky, slightly plastic; few fine roots; few thin discontinuous clay films on faces of peds; many clay bridges and clay coatings; common sand grains clean; very strongly acid; clear smooth boundary.

B22t--14 to 23 inches; yellowish brown (10YR 5/6) loam; few fine distinct strong brown (7.5YR 5/6) mottles; weak fine subangular blocky structure; friable; slightly sticky; slightly plastic; few fine roots; many clay bridgings and coatings on sand grains; few thin discontinuous clay films on faces of peds; very strongly acid; clear smooth boundary.

B3--23 to 26 inches; yellowish brown (10YR 5/6) fine sandy loam; weak fine subangular blocky structure; friable; slightly sticky; nonplastic; few fine roots; many sand grains bridged and coated with clay; few fine iron and manganese concretions; very strongly acid; clear smooth boundary.

C1--26 to 32 inches; yellowish brown (10YR 5/8) fine sand; common, medium and coarse prominent reddish brown (5YR 4/4), few fine and medium faint strong brown (7.5YR 5/6) and few, fine, prominent reddish brown (2.5YR 4/4) mottles; single grain, loose; few fine roots; many sand grains stained; many black rounded sand sized mineral grains; strongly acid; clear smooth boundary.

C2--32 to 49 inches; mottled dark brown (10YR 3/3), brown to dark brown (10YR 4/3), strong brown (7.5YR 5/6), reddish brown (5YR 4/4), and yellowish brown (10YR 5/6) compact fine sand; single grain; massive; firm; nonsticky, nonplastic; few fine roots; few to common sand grains stained; many black rounded sand-sized mineral grains; moderately acid; abrupt smooth boundary.

C3--49 to 66 inches; pale brown (10YR 6/3) fine sand; single grain; loose; clean rounded sand grains; common black rounded sand-sized mineral grains; few black iron and manganese concretions; moderately acid.

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

Depth	Sand					Total	Silt	Clay
	VC	C	M	F	VF			
inches	g kg <sup>-1</sup> of soil							
0-9	0	10	233	368	14	625	308	67
9-14	0	4	142	307	11	464	365	171
14-23	0	6	176	269	13	464	365	171
23-26	1	8	240	487	12	748	121	131
26-32	0	8	305	565	16	894	44	62
32-49	0	10	359	548	5	922	64	14
49-66	0	45	427	508	5	985	10	5

Table C. Chemical properties for Bojac fine sandy loam

Depth	Exchangeable cations				CEC	BS
	Ca <sup>2+</sup>	Mg <sup>2+</sup>	K <sup>+</sup>	H <sup>+</sup>		
inches	cmol (+) kg <sup>-1</sup> soil					%
0-9	0.9	0.5	0.2	3.1	4.7	34.0
9-14	1.3	0.8	0.1	3.2	5.4	40.7
14-23	0.9	0.6	0.1	3.7	5.3	30.2
23-26	0.7	0.4	0.0	2.7	3.8	28.9
26-32	0.5	0.2	0.0	2.4	3.1	22.6
32-49	0.2	0.1	0.0	2.5	2.8	10.7
49-66	0.2	0.0	0.0	1.2	1.4	14.2

Table D. Chemical properties for Bojac fine sandy loam

Depth	Organic matter	pH	Al <sup>3+</sup>	ECEC	EBS
inches	g kg <sup>-1</sup>		cmol ( + ) kg <sup>-1</sup> soil		%
0-9	0.54	5.4	0.26	1.86	86.02
9-14	0.14	5.0	0.94	3.14	70.06
14-23	0.08	4.7	1.63	3.23	49.53
23-26	0.05	4.5	1.37	2.47	44.56
26-32	0.03	5.2	0.51	1.21	57.85
32-49	0.08	5.6	0	0.29	100.00
49-66	0.05	5.8	0	0.27	100.00

Table E: Mineralogy of the sand fraction for Bojac fine sandy loam

Depth	Minerals Present*					
	Quartz	Feldspar	Mica	Opauques	Heavies	Misc.
inches	g kg <sup>-1</sup> of sand					
26-32	850	90	0	0	60	0
32-49	780	100	0	0	0	120

\*Opauques = iron minerals including ilmenite, magnetite, hematite, etc. Misc. = rock fragments.

## Bojac Series supplemental profile 2

Location: About 2,900 feet west southwest of junction of Pungo Ferry Road and Princess Anne Road, 500 feet south of Pungo Ferry Road, and 30 feet west of cinder block shed.

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

B21t--9 to 28 inches; yellowish red (5YR 5/6) loam; weak fine and medium subangular blocky structure; friable, slightly sticky, slightly plastic; common very fine roots, many fine and few very fine pores; few thin discontinuous clay films on faces of peds; many sand grains coated and bridged with clay; very strongly acid; clear smooth boundary.

B22t--28 to 35 inches; strong brown (7.5YR 5/6) fine sandy loam; weak fine subangular blocky structure; friable, slightly sticky, nonplastic; few very fine roots, common fine pores; few sand grains coated and bridged with clay; strongly acid; clear smooth boundary.

B3--35 to 41 inches; strong brown (7.5YR 5/6) loamy fine sand; weak fine subangular blocky structure; very friable, nonsticky, nonplastic; few very fine roots; few fine pores; many sand grains stained; strongly acid; gradual smooth boundary.

C1--41 to 53 inches; light yellowish brown (10YR 6/4) fine sand; single grain; loose; few fine pores; common sand grains stained and many sand grains clean; strongly acid; gradual smooth boundary.

C2--53 to 65 inches; yellowish brown (10YR 5/4) fine sand; single grain; loose; few fine pores; few sand grains stained; moderately acid.

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

Depth	Sand					Total	Silt	Clay
	VC	C	M	F	VF			
inches	g kg <sup>-1</sup> of soil							
0-9	1	9	212	463	32	717	223	60
9-28	0	4	130	352	18	504	316	180
28-35	0	2	158	522	32	714	176	110
35-41	0	4	197	619	33	853	78	69
41-53	0	4	190	693	61	948	50	2
53-65	1	13	320	580	52	966	34	0

Table B. Chemical properties for Bojac fine sandy loam

Depth	CaO	MgO	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	Zn	Mn
inches	lbs acre <sup>-1</sup>				ppm	
0-9	1875	269	275	294	ND	ND
9-28	560	169	17	277	ND	ND
28-35	588	196	20	205	ND	ND
35-41	364	103	35	183	ND	ND
41-53	140	26	48	75	ND	ND
53-65	140	16	39	36	ND	ND

### Bojac Series supplemental profile 3

Location: Approximately 1,400 feet north-northeast of junction of Bells Road and Ocean Blvd. and 300 feet east northeast of Ocean Blvd.

Ap--0 to 8 inches; dark brown (10YR 4/3) loam; weak fine granular structure; friable, slightly sticky, slightly plastic; common very fine and few fine roots; few fine and very fine pores; strongly acid; clear smooth boundary.

B21t--8 to 18 inches; strong brown (7.5YR 5/8) loam; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; few very fine and fine roots; common very fine and fine pores; few thin discontinuous clay films, many sand grains coated and bridged with clay; very strongly acid; clear smooth boundary.

B22t--18 to 31 inches; strong brown (7.5YR 5/8) loam; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; few very fine roots, common very fine and few fine pores; few thin discontinuous clay films, many sand grains coated and bridged with clay; very strongly acid; clear smooth boundary.

B23t--41 to 51 inches; yellowish brown (10YR 5/8) loam; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; few very fine roots, common very fine and few fine pores; many sand grains coated and bridged with clay; few iron and manganese concretions up to 1/4 inch in diameter with exterior color of very dusky red (2.5YR 2.5/2) and interior color of yellowish red (5YR 5/8); very strongly acid; clear smooth boundary.

B3t--41 to 51 inches; strong brown (7.5YR 5/8) sandy loam; weak medium subangular blocky structure; friable, slightly sticky, nonplastic; few very fine roots; few very fine pores; common sand grains coated and bridged with clay; very strongly acid; clear smooth boundary.

C1--51 to 59 inches; brownish yellow (10YR 6/8) loamy sand; single grain; loose, nonsticky, nonplastic; many sand grains stained with iron; very strongly acid; clear smooth boundary.

C2--59 to 70 inches; very pale brown (10YR 7/4) sand; single grain; loose, nonsticky, nonplastic; strongly acid.

Table A: Particle-size distribution for Bojac loam

Depth	Sand					Total	Silt	Clay
	VC	C	M	F	VF			
inches	g kg <sup>-1</sup> of soil							
0-8	2	62	244	98	4	410	460	130
8-18	2	60	272	112	4	450	380	170
18-31	4	64	256	100	6	430	390	180
31-41	4	72	305	123	6	510	360	130
41-51	5	112	440	179	4	740	170	90
51-59	7	161	545	195	2	910	80	10

Table B. Chemical properties for Bojac loam

Depth	CaO	MgO	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	Zn	Mn
inches	lbs acre <sup>-1</sup>				ppm	
0-8	504	92	81	67	0.9	10.3
8-18	504	100	29	82	0.4	7.2
18-31	873	119	31	48	0.4	4.5
31-41	839	127	24	56	0.4	3.7
41-51	739	111	70	101	0.4	7.3
51-59	336	40	148	60	0.4	5.0

## Bojac Series supplemental profile 4

Location: About 3,200 feet north-northeast of junction of Ives Road and Blackwater Road and 600 feet east-southeast of Blackwater Road.

Ap--0 to 10 inches; brown (10YR 4/3) loamy sand; weak fine granular structure; friable, nonsticky, nonplastic; common very fine roots; many very fine and common fine pores; strongly acid; abrupt smooth boundary.

B21t--10 to 19 inches; yellowish brown (10YR 5/6) fine sandy loam; weak medium subangular blocky structure; friable, slightly plastic; common fine roots; many very fine and common fine pores; common sand grains coated and bridged with clay; moderately acid; clear smooth boundary.

B22t--19 to 35 inches; yellowish brown (10YR 5/8) fine sandy loam; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; common fine roots; many very fine and fine and few medium pores; common sand grains coated and bridged with clay; moderately acid; clear smooth boundary.

B3t--35 to 40 inches; yellowish brown (10YR 5/8) fine sandy loam; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; common fine and few medium pores; few sand grains coated and bridged with clay; strongly acid; clean smooth boundary.

C1--40 to 52 inches; yellowish brown (10YR 5/8) sand; single grain; loose; few fine roots; few fine pores; common dark brown (10YR 3/4) weathered mineral concretions up to 1 inch in diameter; strongly acid; clear smooth boundary.

C2--52 to 67 inches; brownish yellow (10YR 6/6) fine sand; single grain; loose; discontinuous layers of iron and manganese concentrations up to 1-1/2 inches thick that are slightly brittle, few dark brown (10YR 4/3) weathered concretions up to 2 inches in diameter; strongly acid.

Table A: Particle-size distribution for Bojac loamy sand

Depth	Sand					Total	Silt	Clay
	VC	C	M	F	VF			
inches	g kg <sup>-1</sup> of soil							
0-10	2	83	301	363	20	769	225	6
10-19	1	72	247	346	3	669	212	119
19-35	2	75	228	347	0	652	200	148
35-40	2	112	291	380	9	794	99	107
40-52	3	97	348	442	1	891	59	50
52-67	1	12	302	640	1	956	44	0

Table C. Chemical properties for Bojac loamy sand

Depth	Exchangeable cations				CEC	BS
	Ca <sup>2+</sup>	Mg <sup>2+</sup>	K <sup>+</sup>	H <sup>+</sup>		
inches	cmol ( + ) kg <sup>-1</sup> soil					%
0-10	1.70	0.67	0.24	4.40	7.01	37.23
10-19	1.51	0.82	0.42	2.80	5.55	49.55
19-35	2.64	0.82	0.33	5.40	9.19	41.24
35-40	1.59	0.46	0.21	4.00	6.26	36.10
40-52	0.93	0.26	0.17	5.40	6.76	20.12
52-67	0.18	0.05	0.02	3.20	3.45	7.25

Table D. Chemical properties for Bojac loamy sand

Depth	Organic matter	pH	Al <sup>3+</sup>	ECEC	EBS
<u>inches</u>	<u>g kg<sup>-1</sup></u>		<u>cmol ( + ) kg<sup>-1</sup> soil</u>		<u>%</u>
0-10	0.90	5.5	0.05	2.66	98.12
10-19	0.41	5.8	0.05	2.80	98.21
19-35	0.28	5.6	0.05	3.84	98.69
35-40	0.09	5.4	0.05	2.31	97.84
40-52	0.09	5.4	0.15	1.51	90.07
52-67	0.28	5.4	0.05	0.30	83.33

## Bojac Series supplemental profile 5

Location: About 1,100 feet northwest of North Stowe Road and Princess Anne Road, and 50 feet south-southwest of Pecan Tree, and about 100 feet southeast of Farm Pond.

Ap--0 to 8 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak fine granular structure; friable, nonsticky, nonplastic; many fine roots; many sand grains clean; strongly acid; clear smooth boundary.

B21t--8 to 14 inches; strong brown (7.5YR 5/6) sandy loam; weak fine subangular blocky structure; friable; slightly sticky, slightly plastic; few fine, medium, and coarse roots; common sand grains coated and weakly bridged with clay; strongly acid; clear smooth boundary.

B22t--14 to 30 inches; strong brown (7.5YR 5/6) sandy clay loam; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; many fine and medium roots; many sand grains coated and bridged with clay; few thin discontinuous clay films on faces of peds; very strongly acid; clear smooth boundary.

B31t--30 to 36 inches; strong brown (7.5YR 5/6) loamy sand; massive, parting to weak fine granular structure; very friable, nonsticky, nonplastic; common fine and medium roots; many sand grains coated with clay; strongly acid; gradual smooth boundary.

B32--36 to 50 inches; brownish yellow (10YR 6/6) sand; single grain; loose; common fine and medium roots; many sand grains clean; many sand grains stained; moderately acid; clear smooth boundary.

C1--50 to 64 inches; pale yellow (2.5Y 7/4) sand; single grain; loose; few fine roots; many clear quartz sand grains; common sand-sized black mineral grains; moderately acid; clear smooth boundary.

C2--64 to 78 inches; light yellowish brown (10YR 6/4) sand; single grain; loose; many sand grains clean; many sand grains stained; few sand-sized black rounded mineral grains; few strong brown mineral grains; strongly acid; abrupt smooth boundary.

C3--78 to 83 inches; dark brown (7.5YR 3/2) fine sand; single grain; loose; many sand grains clean; many sand grains stained; few sand-sized black rounded mineral grains; few strong brown mineral grains; very strongly acid.

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

Depth	Sand					Total	Silt	Clay
	VC	C	M	F	VF			
inches	g kg <sup>-1</sup> of soil							
0-8	0	49	353	338	13	753	156	91
8-14	0	39	314	234	16	603	286	111
14-30	0	30	254	240	4	528	259	213
30-36	1	60	412	331	11	815	115	70
36-50	1	58	439	423	13	934	32	34
50-64	1	89	521	360	9	980	14	6
64-78	5	69	506	382	15	977	13	10
78-83	0	18	297	574	37	926	28	46

Table C. Chemical properties for Bojac fine sandy loam

Depth	Exchangeable cations				CEC	BS
	Ca <sup>2+</sup>	Mg <sup>2+</sup>	K <sup>+</sup>	H <sup>+</sup>		
inches	cmol ( + ) kg <sup>-1</sup> soil					%
0-8	1.18	0.30	0.26	5.75	7.49	23.23
8-14	0.86	0.57	0.70	3.89	6.02	35.38
14-30	0.93	0.59	0.75	6.08	8.35	27.19
30-36	0.57	0.17	0.32	3.04	4.10	25.85
36-50	0.20	0.04	0.06	3.04	3.34	8.98
50-64	0.14	0.03	0.02	2.03	2.22	8.56
64-78	0.09	0.05	0.03	5.41	5.58	3.05
78-83	0.07	0.06	0.04	4.06	4.23	4.02

## Bojac Series supplemental profile 6

Location: About 3,800 feet northwest of junction of Jarvis Road and Princess Anne Road and 800 feet west of Jarvis Road.

Ap--0 to 8 inches; dark yellowish brown (10YR 4/4) fine sandy loam; weak fine granular structure; friable, nonsticky, nonplastic; few fine and common very fine roots; abrupt smooth boundary.

B1t--8 to 12 inches; brown (7.5YR 5/4) loam; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; few very fine roots; common very fine and fine pores; many sand grains coated and bridged with clay; clear smooth boundary.

B2t--12 to 27 inches; yellowish red (5YR 5/6) loam; weak fine and medium subangular blocky structure; friable, slightly sticky, slightly plastic; few very fine roots, common very fine, fine and medium pores; thin discontinuous clay films on faces of peds; many sand grains coated and bridged with clay; few krotovina up to 1/2 inch in diameter; clear smooth boundary.

B3t--27 to 34 inches; strong brown (7.5YR 5/6) fine sandy loam; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; few very fine roots; few fine and very fine pores; many sand grains coated and bridged with clay; few weak concretions up to 1/4 inch in diameter; exteriors of dusky red (10R 3/4) and interiors of dark red (2.5YR 3/6); clear smooth boundary.

C1--34 to 50 inches; yellowish brown (10YR 5/8) fine sand; few fine prominent dark yellowish brown (10YR 3/4) and common fine and medium prominent red (2.5YR 4/6) mottles; single grain; loose; few very fine roots; few fine pores; red mottles are concentrated in lower boundary; gradual smooth boundary.

C2--50 to 60 inches; grayish brown (2.5Y 5/2) loamy fine sand; few fine prominent reddish brown (5YR 4/4) and strong brown (7.5YR 5/6) mottles; single grain; friable, nonsticky, nonplastic; few fine and very fine pores.



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

Depth	Sand					Total	Silt	Clay
	VC	C	M	F	VF			
inches	g kg <sup>-1</sup> of soil							
0-8	0	6	232	456	36	730	240	30
8-12	0	2	156	266	16	440	380	180
12-27	0	2	144	250	14	410	380	210
27-34	0	12	214	408	26	660	190	150
34-50	0	7	280	553	40	880	90	30
50-60	0	7	224	501	78	810	170	20

## Bojac Series supplemental profile 7

Location: About 1,200 feet southwest of Munden Point Road and Princess Anne Road and 300 feet south of Munden Point Road.

Ap-0 to 7 inches; brown (10YR 4/3) fine sandy loam; weak fine granular structure; friable, slightly sticky, slightly plastic; many fine pores, common fine and very fine roots; very strongly acid; abrupt smooth boundary.

B21t-7 to 14 inches; yellowish brown (10YR 5/6) fine sandy loam; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; common fine and very fine pores, common very fine roots; many sand grains coated and bridged with clay; very strongly acid; clear smooth boundary.

B22t-14 to 27 inches; strong brown (7.5YR 5/6) sandy clay loam; weak fine medium subangular blocky structure; friable, slightly sticky, slightly plastic; common very fine and fine pores, common very fine roots; few thin discontinuous clay films on faces of peds; many sand grains coated and bridged with clay; very strongly acid; clear smooth boundary.

B23t-27 to 37 inches; strong brown (7.5YR 5/8) fine sandy loam; weak medium subangular blocky structure; friable, slightly sticky; slightly plastic; common fine and few very fine pores, few very fine roots; few thin discontinuous clay films on faces of peds; many sand grains coated and bridged with clay; very strongly acid; clear smooth boundary.

B3t-37 to 44 inches; mottled strong brown (7.5YR 5/8) and brownish yellow (10YR 6/8) loamy fine sand; single grain; loose; nonsticky, nonplastic; few fine and very fine pores; few very fine roots; common sand grains coated and few sand grains bridged with clay; very strongly acid; clear smooth boundary.

C1-44 to 58 inches; brownish yellow (10YR 6/6) sand; many coarse prominent reddish brown (5YR 4/3) and few fine prominent reddish yellow (7.5YR 6/8) mottles; single grain; loose; few very fine pores; many black mineral grains; very strongly acid; clear smooth boundary.

C2-58 to 68 inches; mottled pale yellow (2.5Y 7/4) and brown (10YR 5/3) fine sand; few fine prominent strong brown (7.5YR 5/8) mottles; single grain; loose; few very fine pores; many black mineral grains; strongly acid.

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

Depth	Sand					Total	Silt	Clay
	VC	C	M	F	VF			
inches	g kg <sup>-1</sup> of soil							
0-7	2	20	247	383	14	666	245	89
7-14	2	14	157	371	15	559	288	153
14-27	0	12	158	331	2	503	271	226
27-37	0	14	204	469	14	701	141	158
37-44	1	28	295	510	17	851	62	87
44-58	0	21	660	259	15	955	25	20
58-68	1	8	281	684	11	985	5	10

Table B. Chemical properties for Bojac fine sandy loam

Depth	CaO	MgO	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	Zn	Mn
inches	lbs acre <sup>-1</sup>				ppm	
0-7	1108	179	183	266	1.0	12.0
7-14	571	88	15	177	0.5	5.7
14-27	403	135	17	67	0.3	3.2
27-37	403	108	17	37	0.4	2.2
37-44	470	80	44	30	0.3	11.5
44-58	235	36	71	15	0.3	0.8
58-68	101	20	99	12	0.3	0.5

Table C. Chemical properties for Bojac fine sandy loam

Depth	Exchangeable cations				CEC	BS
	Ca <sup>2+</sup>	Mg <sup>2+</sup>	K <sup>+</sup>	H <sup>+</sup>		
inches	cmol ( + ) kg <sup>-1</sup> soil					%
0-7	1.09	0.51	0.39	6.48	8.47	23.49
7-14	0.73	0.33	0.24	5.67	6.97	18.65
14-27	1.05	0.57	0.16	9.18	10.96	16.24
27-37	0.99	0.53	0.06	6.62	8.20	19.27
37-44	0.51	0.21	0.07	4.46	5.25	15.05
44-58	0.05	0.01	0.01	6.35	6.42	1.09
58-68	0.01	0.01	0.01	4.46	4.49	0.67

Table D. Chemical properties for Bojac fine sandy loam

Depth	Organic matter	pH	Al <sup>3+</sup>	ECEC	EBS
inches	g kg <sup>-1</sup>		cmol ( + ) kg <sup>-1</sup> soil		%
0-7	0.10	4.9	0.65	2.64	75.38
7-14	0.37	4.8	1.35	2.65	49.06
14-27	0.07	4.8	2.65	4.43	40.18
27-37	0.14	4.7	1.65	3.23	48.92
37-44	0.14	4.8	4.45	5.24	15.08
44-58	0.14	4.9	0.25	0.32	21.88
58-68	0.21	5.1	0.25	0.28	10.71

Table G: Engineering properties for Bojac fine sandy loam

Depth	PVC*	Atterburg Limits		PI*
		LL*	PL*	
inches	lb foot <sup>-2</sup>			
7-14	721	0	0	0
14-27	324	24.2	16.8	7.4
27-37	ND	0	0	0

\*PVC = potential volume change, LL = liquid limit, PL = plastic limit, and PI = plasticity index.

## Chapanoke Series

The soils of the Chapanoke series are deep and somewhat poorly drained. They formed in loamy fluvial and marine sediments. Chapanoke soils are on uplands on the lower part of the Coastal Plain. Slopes range from 0 to 2 percent.

Typical pedon of Chapanoke silt loam, about 4,300 feet northeast of junction of Hungarian Road and Blackwater Road.

A1--0 to 3 inches; light brownish gray (10YR 6/2) silt loam; weak fine granular structure; friable, slightly sticky, slightly plastic; common very fine and fine, few medium and coarse roots; common fine, and few medium pores; extremely acid; clear smooth boundary.

B1t--3 to 7 inches; olive yellow (2.5Y 6/6) silt loam; common medium distinct yellowish brown (10YR 5/8) mottles; weak fine subangular blocky structure; friable, sticky, slightly plastic; few fine and medium roots; common fine, and few medium pores; thin discontinuous clay film on faces of peds; extremely acid; clear smooth boundary.

B21t--7 to 12 inches; olive yellow (2.5Y 6/6) silty clay loam; common medium distinct yellowish brown (10YR 5/8), few fine distinct strong brown (7.5YR 5/8), and few medium distinct light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; friable, sticky, slightly plastic; few fine and medium roots; few fine and medium pores; thin discontinuous clay films on faces of peds; extremely acid; clear smooth boundary.

B22t--12 to 18 inches; mottled light brownish gray (10YR 6/2), light reddish brown (2.5YR 6/4) and strong brown (7.5YR 5/8) silty clay loam; moderate coarse prismatic structure parting to moderate medium subangular blocky structure; firm, sticky, slightly plastic; few fine roots along

faces of prisms; few very fine and fine pores; thin discontinuous clay and silt films on faces of peds; extremely acid; clear smooth boundary.

B23tg--18 to 32 inches; gray (5Y 5/1) silty clay; common coarse prominent strong brown (7.5YR 5/6) mottles; moderate coarse prismatic structure parting to moderate medium subangular blocky structure; firm, sticky, plastic; few fine roots along faces of prisms; few very fine and fine pores; thin continuous clay films on faces of peds; very strongly acid; clear smooth boundary.

B24tg--32 to 39 inches; mottled gray (5Y 5/1), strong brown (7.5YR 5/6), and yellowish brown (10YR 5/8) silty clay loam; moderate coarse prismatic structure parting to moderate medium subangular blocky structure; friable, sticky, plastic; few fine roots along faces of prisms; few very fine and fine pores; thin discontinuous clay films on faces of peds; few fine flakes of mica; extremely acid; clear smooth boundary.

B25tg--39 to 46 inches; light gray (10YR 6/1) silty clay loam, common medium prominent yellowish red (5YR 5/8) mottles; weak medium subangular blocky structure; friable, sticky, slightly plastic; few fine roots; few fine pores; thin discontinuous clay films on faces of peds; few fine flakes of mica; very strongly acid; clear smooth boundary.

C1--46 to 53 inches; light yellowish brown (10YR 6/4) silt loam; few fine faint yellowish brown (10YR 5/6) and few medium distinct strong brown (7.5YR 5/8) mottles; massive; friable, slightly sticky, slightly plastic; few fine roots; few fine pores; few fine flakes of mica; extremely acid; gradual smooth boundary.

C2--53 to 72 inches; light yellowish brown (10YR 6/4) fine sandy loam, few fine faint yellowish brown (10YR 5/6) and few medium distinct strong brown (7.5YR 5/8) mottles; massive; friable, slightly sticky, nonplastic; few fine roots; few fine pores; few fine flakes of mica; few old root channels surrounded by iron concretions; pockets of white very fine sand in old root channels; extremely acid.

Table A: Particle-size distribution for Chapanoke silt loam

Depth	Sand						Silt	Clay
	VC	C	M	F	VF	Total		
inches	g kg <sup>-1</sup> of soil							
0-3	0	4	24	40	42	110	760	130
3-7	0	2	12	30	36	80	700	220
7-12	0	2	12	22	44	80	640	280
12-18	0	1	7	18	44	70	550	380
18-32	0	1	5	16	48	70	470	460
32-39	0	1	7	22	70	100	520	380
39-46	0	1	2	11	96	110	530	360
46-53	0	1	4	20	205	230	550	220
53-72	0	2	42	304	222	570	290	140

Table B. Chemical properties for Chapanoke silt loam

Depth	CaO	MgO	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	Zn	Mn
inches	lbs acre <sup>-1</sup>				ppm	
0-3	72	24	2	34	ND	ND
3-7	48	46	0	22	ND	ND
7-12	72	130	2	16	ND	ND
12-18	72	240	2	22	ND	ND
18-32	72	240	2	24	ND	ND
32-39	72	240	0	30	ND	ND
39-46	48	240	2	30	ND	ND
46-53	48	240	2	22	ND	ND
53-72	48	240	2	18	ND	ND

Table C. Chemical properties for Chapanoke silt loam

Depth	Exchangeable cations				CEC	BS
	Ca <sup>2+</sup>	Mg <sup>2+</sup>	K <sup>+</sup>	H <sup>+</sup>		
inches	cmol ( + ) kg <sup>-1</sup> soil					%
0-3	0.04	0.12	0.12	9.20	9.48	2.95
3-7	0.04	0.24	0.07	6.40	6.75	5.19
7-12	0.04	0.85	0.04	8.60	9.53	9.76
12-18	0.04	1.76	0.07	14.20	16.07	11.64
18-32	0.02	4.50	0.14	14.60	19.26	24.20
32-39	0.04	4.70	0.18	12.00	16.92	29.08
39-46	0.02	5.80	0.17	10.20	16.19	37.00
46-53	0.02	4.20	0.08	9.60	13.90	30.94
53-72	0.02	3.10	0.05	4.80	7.97	39.77

Table D. Chemical properties for Chapanoke silt loam

Depth	Organic matter	pH	Al <sup>3+</sup>	ECEC	EBS
inches	g kg <sup>-1</sup>		cmol ( + ) kg <sup>-1</sup> soil		%
0-3	2.30	4.0	4.25	4.53	6.18
3-7	0.41	3.9	3.65	4.00	8.75
7-12	0.32	4.2	5.45	6.38	14.58
12-18	0.28	4.4	7.15	9.02	20.73
18-32	0.32	4.7	7.45	12.11	38.48
32-39	0.13	4.5	5.45	10.37	47.44
39-46	0.13	4.6	5.15	11.14	53.77
46-53	0.10	4.3	3.55	7.85	54.78
53-72	0.03	4.5	2.35	5.52	57.43

## Chapanoke Series supplemental profile 1

Location: About 450 feet south-southwest of junction of Indian Road and Delaware Avenue and 2,400 feet southwest of Cypress and Norfolk Avenue.

O1 and O2--1 to 0 inches; Partially decomposed leaves, roots, and twigs present.

A1--0 to 3 inches; dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; friable, slightly sticky, slightly plastic; common very fine, fine and medium roots; common very fine, fine and medium pores; very strongly acid; clear smooth boundary.

A2--3 to 9 inches; brown (10YR 5/3) silt loam; few fine distinct yellowish brown (10YR 5/4) mottles; weak medium subangular blocky structure; friable, sticky, slightly plastic; few very fine and fine roots; many very fine, common fine and few medium pores; very strongly acid; clear smooth boundary.

B21t--9 to 15 inches; light olive brown (2.5Y 5/4) silty clay loam; common medium distinct grayish brown (10YR 5/2) and few fine prominent yellowish red (5YR 4/6) mottles; weak fine subangular blocky structure; friable, sticky, slightly plastic; few very fine and fine roots; many very fine, fine and few medium pores; few thin discontinuous clay and/or silt coatings on faces of peds; strongly acid; clear smooth boundary.

B22t--15 to 27 inches; mottled gray (10YR 5/1) and olive brown (2.5Y 5/4) and yellowish red (5YR 4/6) silty clay loam; moderate medium subangular blocky structure; friable, sticky, slightly plastic; few very fine and fine roots; many very fine and fine pores; few thin discontinuous clay and/or silt coatings on faces of peds; common fine flakes of mica; moderately acid; gradual smooth boundary.

B23tg--27 to 39 inches; gray (10YR 6/1) silty clay loam; many coarse distinct brownish yellow (10YR 6/8) and few fine prominent yellowish red (5YR 4/6) mottles; moderate medium subangular blocky structure; friable, sticky, slightly plastic; few very fine and fine roots; many very fine pores; few thin discontinuous clay and/or silt coatings on faces of peds; common fine flakes of mica; moderately acid; gradual smooth boundary.

B24tg--39 to 53 inches; greenish gray (5GY 6/1) silt loam; many coarse prominent yellowish brown (10YR 5/8) and few medium prominent yellowish red (5YR 4/6) mottles; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; few very fine and fine roots; many very fine and fine pores; many fine flakes of mica; few old root channels surrounded by iron concretions; very strongly acid; gradual smooth boundary.

B25tg--53 to 83 inches; mottled greenish gray (5GY 6/1), brownish yellow (10YR 6/8), and yellowish red (5YR 4/6) loam; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; few very fine and fine roots; many very fine and fine pores; few thin discontinuous silty and/or clay coatings on faces of peds; many fine flakes of mica; common old root channels surrounded by iron concretions; very strongly acid; gradual smooth boundary.

B26tg--83 to 99 inches; light gray (5Y 7/1) silty clay; many coarse prominent strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; friable, slightly sticky, slightly plastic; few very fine and fine pores; few thin discontinuous silt and/or clay coatings on faces of peds; few fine flakes of mica; few old root channels surrounded by iron concretions; very strongly acid; abrupt smooth boundary.

IIC--100 to 140 inches; very pale brown (10YR 7/3) fine sandy loam; few coarse prominent brownish yellow (10YR 6/8) mottles; massive; very friable, nonsticky, nonplastic; horizon is stratified and pocketed with loamy sand, sand, coarse sand, and sandy loam; strongly acid.

Table A: Particle-size distribution for Chapanoke silt loam

Depth	Sand					Total	Silt	Clay
	VC	C	M	F	VF			
inches	g kg <sup>-1</sup> of soil							
0-3	2	4	13	15	62	96	782	122
3-9	1	3	12	9	57	82	773	145
9-15	0	2	2	6	45	55	631	314
15-27	0	1	1	4	47	53	602	345
27-39	0	1	2	5	107	115	566	319
39-53	1	1	1	5	228	236	504	260
53-83	1	2	4	9	301	317	447	236
83-100	2	5	11	16	54	88	481	431
100-140	16	37	303	323	12	691	255	54

Table B. Chemical properties for Chapanoke silt loam

Depth	CaO	MgO	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	Zn	Mn
inches	lbs acre <sup>-1</sup>				ppm	
0-3	1200	120	10	40	ND	ND
3-9	492	68	9	20	ND	ND
9-15	864	120	8	15	ND	ND
15-27	876	120	8	18	ND	ND
27-39	636	120	8	31	ND	ND
39-53	276	120	9	29	ND	ND
53-83	156	120	10	39	ND	ND
83-100	228	120	9	51	ND	ND
100-140	120	103	10	23	ND	ND

Table C. Chemical properties for Chapanoke silt loam

Depth	Exchangeable cations				CEC	BS
	Ca <sup>2+</sup>	Mg <sup>2+</sup>	K <sup>+</sup>	H <sup>+</sup>		
inches	cmol ( + ) kg <sup>-1</sup> soil					%
0-3	9.00	2.30	0.20	15.60	27.10	42.44
3-9	3.20	0.80	0.10	16.60	20.70	19.81
9-15	5.90	1.80	0.11	9.00	16.81	46.46
15-27	6.30	2.70	0.12	8.40	17.52	52.05
27-39	5.20	3.60	0.18	7.80	16.78	53.52
39-53	2.18	3.20	0.19	12.20	17.77	31.34
53-83	1.14	3.90	0.20	11.20	16.44	31.87
83-100	2.07	7.60	0.33	11.40	21.40	46.73
100-140	0.61	1.05	0.07	4.80	6.53	26.49

Table D. Chemical properties for Chapanoke silt loam

Depth	Organic matter	pH	Al <sup>3+</sup>	ECEC	EBS
inches	g kg <sup>-1</sup>		cmol ( + ) kg <sup>-1</sup> soil		%
0-3	6.57	5.0	0.05	11.55	99.57
3-9	1.70	4.9	0.55	4.65	88.17
9-15	0.61	5.2	0.15	7.96	98.12
15-27	0.51	6.0	0.05	9.17	99.45
27-39	0.48	5.9	0.15	9.13	98.36
39-53	0.31	4.9	2.25	7.82	71.23
53-83	0.21	4.8	2.45	7.69	68.14
83-100	0.61	4.8	2.05	12.05	82.99
100-140	0.24	5.2	0.25	1.98	87.37

## Corolla Series

The soils of the Corolla series are deep and moderately well to somewhat poorly drained. They formed in sandy marine sediments. Corolla soils are on Coastal areas on the low Coastal Plain. Slopes range from 0 to 6 percent.

### Corolla Series supplemental profile 1

Location: In False Cape State Park, about 2,300 feet west of Atlantic Ocean and 3,400 feet north of Virginia-North Carolina state line.

C1--0 to 12 inches; very pale brown (10YR 7/3) fine sand; single grain, loose; clear smooth boundary.

C2--12 to 24 inches; light yellowish brown (10YR 6/4) fine sand; single grain, loose; extremely acid; clear smooth boundary.

C3--24 to 50 inches; grayish brown (10YR 5/2) fine sand; few medium distinct light yellowish brown (10YR 6/4) mottles at 45 to 50 inches; single grain, loose; many black mineral grains, extremely acid.

Table A: Particle-size distribution for Corolla fine sand

Depth	Sand						Silt	Clay
	VC	C	M	F	VF	Total		
inches	g kg <sup>-1</sup> of soil							
12-24	0	21	318	636	23	998	2	0
24-50	0	3	159	801	37	1000	0	0



Table C. Chemical properties for Corolla fine sand

Depth	Exchangeable cations				CEC	BS
	Ca <sup>2+</sup>	Mg <sup>2+</sup>	K <sup>+</sup>	H <sup>+</sup>		
inches	cmol ( + ) kg <sup>-1</sup> soil					%
12-24	0.01	0.01	0.01	0.60	0.63	4.76
24-50	0.04	0.01	0.00	0.60	0.65	7.69

Table D. Chemical properties for Corolla fine sand

Depth	Organic matter	pH	Al <sup>3+</sup>	ECEC	EBS
inches	g kg <sup>-1</sup>		cmol ( + ) kg <sup>-1</sup> soil		%
12-24	0.00	4.1	0.15	0.18	16.67
24-50	0.03	4.2	0.15	0.20	25.00

## Corolla Series supplemental profile 2

Location: In False Cape State Park, about 2,800 feet west of Atlantic Ocean and 3500 feet north of Virginia-North Carolina state line.

A1--0 to 2 inches; light brownish gray (10YR 6/2) fine sand; single grain, loose; many clean sand grains, common sand grains stained with organic material; clear broken boundary.

C1--2 to 19 inches; pale brown (10YR 6/3) fine sand; few medium distinct reddish yellow (7.5YR 6/6) mottles starting at 15 inches; single grain, loose; extremely acid; clear smooth boundary.

C2--19 to 40 inches; mottled dark grayish brown (10YR 4/2), light brownish gray (10 6/2) and reddish yellow (7.5YR 6/6) fine sand; single grain, loose; extremely acid.

Table A: Particle-size distribution for Corolla fine sand

Depth	Sand						Silt	Clay
	VC	C	M	F	VF	Total		
inches	g kg <sup>-1</sup> of soil							
10-40	0	10	251	723	16	996	4	0

Table C. Chemical properties for Corolla fine sand

Depth	Exchangeable cations				CEC	BS
	Ca <sup>2+</sup>	Mg <sup>2+</sup>	K <sup>+</sup>	H <sup>+</sup>		
inches	cmol ( + ) kg <sup>-1</sup> soil					%
0-7	0.04	0.01	0.01	1.00	1.06	5.66

Table D. Chemical properties for Corolla fine sand

Depth	Organic matter	pH	Al <sup>3+</sup>	ECEC	EBS
inches	g kg <sup>-1</sup>		cmol ( + ) kg <sup>-1</sup> soil		%
10-40	0.00	4.0	0.15	0.21	28.57

Table E: Mineralogy of the sand fraction for Corolla fine sand

Depth	Minerals Present*					
	Quartz	Feldspar	Mica	Opaques	Heavies	Misc.
inches	g kg <sup>-1</sup> of sand					
10-40	900	40	10	0	50	0

\*Opaques = iron minerals including ilmenite, magnetite, hematite, etc. Misc. = rock fragments.

### Corolla Series supplemental profile 3

Location: In False Cape State Park, about 500 feet west of Atlantic Ocean and 2.3 miles north of Virginia-North Carolina State line.

C1--0 to 21 inches; very pale yellow (10YR 7/3) fine sand; few fine distinct brownish yellow (10YR 6/6) mottles starting at 12 inches; single grain, loose; extremely acid; clear smooth boundary.

C2--21 to 42 inches; light brownish gray (10YR 6/2) fine sand; common fine distinct brownish yellow (10YR 6/6) mottles; single grain, loose; extremely acid; clear smooth boundary.

C3--42 to 60 inches; gray (10R 5/1) fine sand; single grain, loose; extremely acid.

Table A: Particle-size distribution for Corolla fine sand

Depth	Sand						Silt	Clay
	VC	C	M	F	VF	Total		
inches	g kg <sup>-1</sup> of soil							
0-21	0	13	300	662	23	998	2	0
21-60	4	37	312	618	29	1000	0	0

Table C. Chemical properties for Corolla fine sand

Depth	Exchangeable cations				CEC	BS
	Ca <sup>2+</sup>	Mg <sup>2+</sup>	K <sup>+</sup>	H <sup>+</sup>		
inches	cmol ( + ) kg <sup>-1</sup> soil					%
0-21	0.10	0.05	0.01	0.60	0.76	21.05
21-60	0.08	0.06	0.01	0.80	0.95	15.79

Table D. Chemical properties for Corolla fine sand

Depth	Organic matter	pH	Al <sup>3+</sup>	ECEC	EBS
inches	g kg <sup>-1</sup>		cmol ( + ) kg <sup>-1</sup> soil		%
0-21	0.03	3.8	0.25	0.41	39.02
21-60	0.03	4.2	0.25	0.40	37.50

Table E: Mineralogy of the sand fraction for Corolla fine sand

Depth	Minerals Present*					
	Quartz	Feldspar	Mica	Opauques	Heavies	Misc.
inches	g kg <sup>-1</sup> of sand					
10-40	930	20	0	0	50	0

\*Opauques = iron minerals including ilmenite, magnetite, hematite, etc. Misc. = rock fragments.

## Corolla Series supplemental profile 4

Location: In False Cape State Park, about 3,200 feet west of Atlantic Ocean and 2.2 miles north of Virginia-North Carolina state line.

C--0 to 35 inches; light brownish gray (10YR 6/2) fine sand; few fine distinct brownish yellow (10YR 6/6) mottles; single grain, loose; extremely acid; clear smooth boundary.

Ab--35 to 40 inches; dark gray (10YR 4/1) fine sand; single grain, loose; many clean sand grains, common sand grains stained with organic material; extremely acid; clear smooth boundary.

Cb--40 to 60 inches; grayish brown (10YR 5/2) fine sand; single grain, loose; extremely acid.

Table A: Particle-size distribution for Corolla fine sand

Depth	Sand						Silt	Clay
	VC	C	M	F	VF	Total		
inches	g kg <sup>-1</sup> of soil							
0-35	1	9	236	724	25	995	5	0

Table C. Chemical properties for Corolla fine sand

Depth	Exchangeable cations				CEC	BS
	Ca <sup>2+</sup>	Mg <sup>2+</sup>	K <sup>+</sup>	H <sup>+</sup>		
inches	cmol ( + ) kg <sup>-1</sup> soil					%
0-35	0.01	0.01	0.00	0.20	0.22	9.09
40-60	0.04	0.03	0.01	0.60	0.15	53.33

Table D. Chemical properties for Corolla fine sand

Depth	Organic matter	pH	Al <sup>3+</sup>	ECEC	EBS
inches	g kg <sup>-1</sup>		cmol ( + ) kg <sup>-1</sup> soil		%
0-35	0.00	3.4	0.25	0.27	7.41
40-60	0.07	3.6	0.15	0.23	34.78

### Corolla Series supplemental profile 5

Location: In False Cape State Park, about 1,600 feet west of Atlantic Ocean and 3.4 miles north of Virginia-North Carolina state line.

C1--0 to 18 inches; very pale brown (10YR 7/3) fine sand; single grain, loose; clear smooth boundary.

C2--18 to 48 inches; light brownish gray (10YR 6/2) fine sand; few medium distinct brownish yellow (10YR 6/6) mottles; single grain, loose; clear smooth boundary.

C3--48 to 72 inches; gray (10YR 6/1) fine sand; single grain, loose.

Table A: Particle-size distribution for Corolla fine sand

Depth	Sand						Silt	Clay
	VC	C	M	F	VF	Total		
inches	g kg <sup>-1</sup> of soil							
0-18	0	10	275	691	22	998	2	0
18-48	0	9	235	730	21	995	5	0
48-72	0	4	206	777	13	1000	0	0

Table C. Chemical properties for Corolla fine sand

Depth	Exchangeable cations				CEC	BS
	Ca <sup>2+</sup>	Mg <sup>2+</sup>	K <sup>+</sup>	H <sup>+</sup>		
inches	cmol ( + ) kg <sup>-1</sup> soil					%
0-18	0.01	0.01	0.00	0.40	0.42	4.76
18-48	0.00	0.01	0.00	1.00	1.01	0.99
48-72	0.00	0.01	0.01	1.00	1.02	1.96

Table E: Mineralogy of the sand fraction for Corolla fine sand

Depth	Minerals Present*					
	Quartz	Feldspar	Mica	Opakes	Heavies	Misc.
inches	g kg <sup>-1</sup> of sand					
18-48	930	30	Tr	0	30	0

\*Opakes = iron minerals including ilmenite, magnetite, hematite, etc. Misc. = rock fragments.

## Corolla Series supplemental profile 6

Location: In False Cape State Park, about 2,400 feet west of Atlantic Ocean and 3.4 miles north of Virginia-North Carolina state line.

A1--0 to 4 inches; dark gray (10YR 4/1) fine sand; single grain, loose; many clean sand grains, common sand grains stained with organic material; clear smooth boundary.

C1--4 to 30 inches; very pale brown (10YR 7/3) fine sand; few medium distinct brownish yellow (10YR 6/6) mottles starting at 21 inches; single grain, loose.

C2--30 to 72 inches; light brownish gray (10YR 6/2) fine sand; massive; loose.

Table A: Particle-size distribution for Corolla fine sand

Depth	Sand					Total	Silt	Clay
	VC	C	M	F	VF			
inches	g kg <sup>-1</sup> of soil							
0-4	0	20	322	637	21	1000	0	0
4-30	0	10	268	706	20	1000	0	0
30-72	0	4	255	728	13	1000	0	0

Table C. Chemical properties for Corolla fine sand

Depth	Exchangeable cations				CEC	BS
	Ca <sup>2+</sup>	Mg <sup>2+</sup>	K <sup>+</sup>	H <sup>+</sup>		
inches	cmol ( + ) kg <sup>-1</sup> soil					%
0-4	0.06	0.04	0.01	0.80	0.91	12.09
4-30	0.01	0.02	0.01	1.40	1.44	2.77
30-72	0.02	0.01	0.01	0.40	0.44	9.09

Table D. Chemical properties for Corolla fine sand

Depth	Organic matter	pH	Al <sup>3+</sup>	ECEC	EBS
inches	g kg <sup>-1</sup>		cmol ( + ) kg <sup>-1</sup> soil		%
0-4	0.32	3.2	0.25	0.36	30.56
4-30	0.13	3.7	0.15	0.19	21.05
30-72	0.00	3.1	0.25	0.29	13.79

## Corolla Series supplemental profile 7

Location: In False Cape State Park, about 1,300 feet west of Atlantic Ocean and 3.9 miles north of Virginia-North Carolina state line.

A1--0 to 2 inches; dark grayish brown (10YR 4/2) fine sand, extremely acid.

C1--2 to 23 inches; light yellowish brown (10YR 6/4) fine sand; single grain, loose; extremely acid; clear smooth boundary.

C2--23 to 42 inches; pale brown (10YR 6/3) fine sand; common medium faint light brownish gray (10YR 6/2) and few fine prominent strong brown (7.5YR 5/6) mottles; single grain, loose; extremely acid; clear smooth boundary.

C3--42 to 60 inches; gray (10YR 6/1) fine sand; few medium distinct brownish yellow (10YR 6/6) mottles; single grain, loose; extremely acid.

Table A: Particle-size distribution for Corolla fine sand

Depth	Sand					Total	Silt	Clay
	VC	C	M	F	VF			
inches	g kg <sup>-1</sup> of soil							
2-23	0	13	242	723	22	1000	0	0
23-42	1	6	155	810	28	1000	0	0
42-60	0	5	262	714	19	1000	0	0

Table C. Chemical properties for Corolla fine sand

Depth	Exchangeable cations				CEC	BS
	Ca <sup>2+</sup>	Mg <sup>2+</sup>	K <sup>+</sup>	H <sup>+</sup>		
inches	cmol ( + ) kg <sup>-1</sup> soil					%
2-23	0.05	0.03	0.01	1.00	1.09	8.25
23-42	0.03	0.04	0.01	0.40	0.48	16.67
42-60	0.00	0.02	0.01	0.20	0.23	13.04

Table D. Chemical properties for Corolla fine sand

Depth	Organic matter	pH	Al <sup>3+</sup>	ECEC	EBS
inches	g kg <sup>-1</sup>		cmol ( + ) kg <sup>-1</sup> soil		%
2-23	0.07	3.6	0.25	0.34	26.47
23-42	0.07	3.7	0.25	0.33	24.24
42-60	0.00	3.7	0.15	0.18	16.67

## Corolla Series supplemental profile 8

Location: About 600 feet west of Atlantic Ocean and 3.9 miles north of Virginia-North Carolina state line.

C1--0 to 25 inches; very pale brown (10YR 7/3) fine sand; single grain. loose; extremely acid; clear smooth boundary.

C2--25 to 55 inches; light brownish gray (10YR 6/2) fine sand; few fine faint yellowish brown (10YR 5/4) mottles; single grain, loose; extremely acid; clear smooth boundary.

C3--55 to 60 inches; gray (10YR 5/1) fine sand; single grain, loose; extremely acid.

Table A: Particle-size distribution for Corolla fine sand

Depth	Sand						Silt	Clay
	VC	C	M	F	VF	Total		
inches	g kg <sup>-1</sup> of soil							
0-25	0	3	185	775	37	1000	0	0
25-55	0	10	225	738	27	1000	0	0

Table C. Chemical properties for Corolla fine sand

Depth	Exchangeable cations				CEC	BS
	Ca <sup>2+</sup>	Mg <sup>2+</sup>	K <sup>+</sup>	H <sup>+</sup>		
inches	cmol ( + ) kg <sup>-1</sup> soil					%
0-25	0.00	0.01	0.01	1.20	1.22	1.64
25-55	0.05	0.04	0.01	0.40	0.50	20.00
55-60	0.10	0.12	0.01	2.20	2.43	9.47

Table D. Chemical properties for Corolla fine sand

Depth	Organic matter	pH	Al <sup>3+</sup>	ECEC	EBS
inches	g kg <sup>-1</sup>		cmol ( + ) kg <sup>-1</sup> soil		%
0-25	0.00	3.8	0.15	0.17	11.76
25-55	0.00	4.3	0.15	0.25	40.00
55-60	0.13	3.5	0.15	0.38	60.53

## Corolla Series supplemental profile 9

Location: In False Cape State Park, about 2,600 feet west of Atlantic Ocean and 3.9 miles north of Virginia-North Carolina state line.

A1--0 to 2 inches; grayish brown (10YR 5/2) fine sand; single grain, loose; clear smooth boundary.

C1--2 to 31 inches; pale brown (10YR 6/3) fine sand; single grain, loose; extremely acid; clear smooth boundary.

C2--31 to 60 inches; grayish brown (10YR 5/2) fine sand; single grain, loose; extremely acid.

Table A: Particle-size distribution for Corolla fine sand

Depth	Sand						Silt	Clay
	VC	C	M	F	VF	Total		
inches	g kg <sup>-1</sup> of soil							
2-31	0	11	282	687	19	999	1	0
31-60	0	28	343	610	19	1000	0	0

Table C. Chemical properties for Corolla fine sand

Depth	Exchangeable cations				CEC	BS
	Ca <sup>2+</sup>	Mg <sup>2+</sup>	K <sup>+</sup>	H <sup>+</sup>		
inches	cmol ( + ) kg <sup>-1</sup> soil					%
2-31	0.08	0.02	0.01	2.40	2.51	4.38
31-60	0.01	0.03	0.01	2.20	2.25	2.22

Table D. Chemical properties for Corolla fine sand

Depth	Organic matter	pH	Al <sup>3+</sup>	ECEC	EBS
inches	g kg <sup>-1</sup>		cmol ( + ) kg <sup>-1</sup> soil		%
2-31	0.22	3.6	0.45	0.56	19.64
31-60	0.16	4.0	0.15	0.20	25.00

Table E: Mineralogy of the sand fraction for Corolla fine sand

Depth	Minerals Present*					
	Quartz	Feldspar	Mica	Opauques	Heavies	Misc.
inches	g kg <sup>-1</sup> of sand					
2-31	930	30	Tr	0	20	10

\*Opauques = iron minerals including ilmenite, magnetite, hematite, etc. Misc. = rock fragments.

## Corolla Series supplemental profile 10

Location: Back Bay Wildlife Refuge 900 feet north-northeast of new service building.

A--0 to 15 inches; pale brown (10YR 6/3) sand; single grain, loose; few fine roots; many sand grains clean and rounded; few pink and few blue sand-sized, rounded mineral grains; common strong brown (7.5YR 5/6) mineral grains or stained sand grains; many black, rounded sand sized mineral grains, possibly titanium oxides; moderately acid; diffuse smooth boundary.

C--15 to 36 inches; pale brown (10YR 6/3) to light brownish gray (10YR 6/2) sand; single grain; loose; few pink and few blue sand-sized, rounded mineral grains; common strong brown (7.5YR 5/6) mineral grains or stained sand grains; many black, rounded, sand-sized mineral grains possibly, titanium oxides; moderately acid.

Table A: Particle-size distribution for Corolla sand

Depth	Sand						Silt	Clay
	VC	C	M	F	VF	Total		
inches	g kg <sup>-1</sup> of soil							
0-15	2	138	535	313	12	1000	0	0
15-36	1	86	470	435	7	999	1	0



Table C. Chemical properties for Corolla sand

Depth	Exchangeable cations				CEC	BS
	Ca <sup>2+</sup>	Mg <sup>2+</sup>	K <sup>+</sup>	H <sup>+</sup>		
inches	cmol ( + ) kg <sup>-1</sup> soil					%
0-15	0.06	0.00	0.02	7.09	7.17	1.12
15-36	0.06	0.02	0.02	8.61	8.71	1.15

## *Dragston Series*

The soils of the Dragston series are deep and somewhat poorly drained. They formed in loamy fluvial and marine sediments. Dragston soils are on inland ridges on the lower part of the Coastal Plain. Slopes range from 0 to 2 percent.

Typical pedon of Dragston fine sandy loam, about 2,000 feet south-southwest of junction of Dam Neck Road and Oceana Boulevard, and 75 feet west-northwest of Oceana Boulevard.

Ap--0 to 9 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak fine granular structure; very friable; few fine and common very fine roots; moderately acid; abrupt smooth boundary.

B2lt--9 to 19 inches; light yellowish brown (2.5Y 6/4) sandy loam; common medium distinct brownish yellow (10YR 6/8), few fine faint light brownish gray (10YR 6/2), and few fine prominent yellowish red (5YR 5/8) mottles; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; common very fine roots; few sand grains coated and bridged with clay; very strongly acid; clear smooth boundary.

B22t--19 to 29 inches; mottled light yellowish brown (2.5Y 6/4), light gray (10YR 7/1), strong brown (7.5YR 5/8), and red (2.5YR 4/8) sandy loam; weak fine and medium subangular blocky structure; friable, slightly sticky, slightly plastic; few very fine roots; few sand grains coated and many bridged with clay; very strongly acid; clear smooth boundary.

B3tg--29 to 38 inches; light gray (10YR 7/1) sandy loam; many medium distinct light yellowish brown (2.5Y 6/4), and common fine and medium prominent yellowish brown (10YR 5/8) mottles; weak medium subangular blocky structure; friable, nonsticky, nonplastic; few very fine roots; few sand grains coated and bridged with clay; very strongly acid; clear smooth boundary.

Cg--38 to 60 inches; light gray (10YR 7/1) sandy loam; many medium and coarse strong brown (7.5YR 5/8), and few fine prominent red (2.5YR 4/8) mottles; massive; friable, nonsticky, nonplastic; very strongly acid.

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

Depth	Sand						Silt	Clay
	VC	C	M	F	VF	Total		
inches	g kg <sup>-1</sup> of soil							
0-9	3	26	264	307	24	624	283	93
9-19	1	22	280	261	16	580	281	139
19-29	2	23	302	220	16	563	252	185
29-38	1	26	306	213	0	547	345	109
38-60	2	29	450	275	4	760	110	130

Table B. Chemical properties for Dragston fine sandy loam

Depth	CaO	MgO	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	Zn	Mn
inches	lbs acre <sup>-1</sup>				ppm	
0-9	1612	390	250	123	2.1	5.4
9-19	504	119	39	78	0.7	1.0
19-29	369	108	37	97	0.7	0.3
29-38	369	76	26	86	0.5	1.6
38-60	202	48	62	75	0.5	0.5

Table C. Chemical properties for Dragston fine sandy loam

Depth	Exchangeable cations				CEC	BS
	Ca <sup>2+</sup>	Mg <sup>2+</sup>	K <sup>+</sup>	H <sup>+</sup>		
inches	cmol ( + ) kg <sup>-1</sup> soil					%
0-9	2.62	1.41	0.29	4.73	9.05	47.73
9-19	0.86	0.42	0.16	3.92	5.36	26.87
19-29	0.82	0.44	0.19	5.81	7.26	19.97
29-38	0.26	0.17	0.09	3.65	4.17	12.47
38-60	0.42	0.26	0.12	4.46	5.26	15.21

Table D. Chemical properties for Dragston fine sandy loam

Depth	Organic matter	pH	Al <sup>3+</sup>	ECEC	EBS
inches	g kg <sup>-1</sup>		cmol ( + ) kg <sup>-1</sup> soil		%
0-9	1.73	5.8	0.05	4.37	98.86
9-19	0.37	4.9	1.55	2.99	48.16
19-29	0.17	4.6	3.05	4.50	32.22
29-38	0.17	4.6	1.55	2.07	25.12
38-60	0.21	4.6	2.05	2.85	28.07

Table G: Engineering properties for Dragston fine sandy loam

Depth	PVC*	Atterburg Limits		PI*
		LL*	PL*	
inches	lb foot <sup>-2</sup>			
19-29	691	20.7	14.9	5.74

\*PVC = potential volume change, LL = liquid limit, PL = plastic limit, and PI = plasticity index.

## Dragston Series loam supplemental profile 1

Location: About 3,500 feet southwest of junction of Vaughan Road and Princess Anne Road, and 2,500 feet west of Princess Anne Road in east edge of woods.

A1--0 to 5 inches; very dark brown (10YR 2/2) sandy loam, weak fine granular structure; very friable; slightly sticky; nonplastic; common medium, many fine, and few coarse roots; many sand grains clean; extremely acid; abrupt smooth boundary.

A2--5 to 9 inches; yellowish brown (10YR 5/4) fine sandy loam; weak fine subangular blocky structure; friable; slightly sticky, nonplastic; common fine and medium roots; few krotovina of darker material; many sand grains coated and weakly bridged, few clean sand grains; very strongly acid; clear smooth boundary.

B1t--9 to 13 inches; light olive brown (2.5Y 5/4) fine sandy loam; few fine faint strong brown 7.5YR 5/6 mottles; weak fine subangular blocky structure; friable; slightly sticky, nonplastic; common fine and medium roots; weak clay bridging between sand grains; very strongly acid; clear wavy boundary.

B21t--13 to 21 inches; light yellowish brown (2.5Y 6/4) sandy loam; many medium, faint light gray (10YR 7/2) and common fine and medium, distinct brownish yellow (10YR 6/6) mottles; weak medium subangular blocky structure; friable; slightly sticky, nonplastic; few fine and medium roots, sand grains coated and weakly bridged with clay; very strongly acid; gradual smooth boundary.

B22tg--21 to 26 inches; light gray (2.5Y 7/2) sandy loam; many, medium, distinct brownish yellow (10YR 6/6), few, fine, faint gray (10YR 6/1), and pale brown (10YR 6/3) mottles; weak, medium, subangular blocky structure; friable; slightly sticky, slightly plastic; few fine roots; sand grains coated and bridged with clay; very strongly acid; clear smooth boundary.

B23tg--26 to 32 inches; gray (10YR 6/2) fine sandy loam; common, fine and medium, distinct yellowish brown (10YR 5/8) mottles; weak, medium subangular, blocky structure; friable; slightly sticky; slightly plastic; few fine and medium roots; sand grains coated and bridged with clay; very strongly acid; clear smooth boundary.

B3tg--32 to 39 inches; gray (10YR 6/1) fine sandy loam; common, medium, distinct brownish yellow (10YR 6/6) mottles; weak fine, subangular blocky structure; friable; slightly sticky, nonplastic; few fine and medium roots; sand grains coated and weakly bridged with clay; very strongly acid; clear smooth boundary.

C--39 to 60 inches; very pale brown (10YR 7/3) sand with pockets of loamy sand; common, medium, distinct yellowish brown (10YR 5/8) mottles; single grain; loose; many sand grains stained and many sand grains clean; moderately acid.

Table A: Particle-size distribution for Dragston sandy loam

Depth	Sand					Total	Silt	Clay
	VC	C	M	F	VF			
inches	g kg <sup>-1</sup> of soil							
0-5	6	37	404	289	7	743	203	54
5-9	0	28	351	323	10	712	218	70
9-13	0	24	319	313	9	665	232	103
13-21	0	26	313	312	6	657	245	98
21-26	0	25	290	290	7	612	274	114
26-32	2	23	313	303	7	648	205	147
32-39	3	50	363	387	9	813	44	143
39-60	2	61	548	350	8	969	21	10

Table C. Chemical properties for Dragston sandy loam

Depth	Exchangeable cations				CEC	BS
	Ca <sup>2+</sup>	Mg <sup>2+</sup>	K <sup>+</sup>	H <sup>+</sup>		
inches	cmol ( + ) kg <sup>-1</sup> soil					%
0-5	0.75	0.32	0.08	15.19	16.34	7.04
5-9	0.17	0.07	0.05	9.70	9.99	2.90
9-13	0.05	0.05	0.05	6.95	7.10	2.11
13-21	0.10	0.16	0.04	3.29	3.59	8.35
21-26	0.12	0.22	0.07	4.57	4.98	8.23
26-32	0.08	0.17	0.09	5.67	6.01	5.66
32-39	0.03	0.15	0.09	6.22	6.49	4.16
39-60	0.00	0.13	0.02	2.74	2.89	5.19

Table D. Chemical properties for Dragston sandy loam

Depth	Organic matter	pH	Al <sup>3+</sup>	ECEC	EBS
inches	g kg <sup>-1</sup>		cmol ( + ) kg <sup>-1</sup> soil		%
0-5	5.95	4.1	3.47	4.62	24.89
5-9	1.90	4.7	2.12	2.41	12.03
9-13	1.12	4.7	1.74	1.88	7.94
13-21	0.28	4.7	1.45	1.75	17.14
21-26	0.16	4.8	2.03	2.44	16.80
26-32	0.23	4.6	3.57	3.91	8.70
32-39	0.14	4.7	3.09	3.36	8.04
39-60	0.19	5.6	0.10	0.25	60.00

## Dragston Series loam supplemental profile 2

Location: About 3180 feet south-southeast of junction of South Stowe Road and Princess Anne Road and 2,000 feet east of Princess Anne Road.

Ap--0 to 8 inches; very dark grayish brown (10YR 3/2) fine sandy loam; weak fine granular structure; friable; nonsticky, slightly plastic; common medium and few fine and very fine roots; strongly acid; abrupt smooth boundary.

B21t--8 to 14 inches; olive yellow (2.5Y 6/6) loam; common medium distinct yellowish brown (10YR 5/8) and few fine faint light gray (10YR 7/1) mottles; weak fine subangular blocky structure; friable; slightly sticky, slightly plastic; few coarse, fine, and very fine roots; many sand grains coated and bridged with clay; few krotovina up to 1/4 inch in diameter; very strongly acid; clear smooth boundary.

B22t--14 to 22 inches; light yellowish brown (2.5Y 6/4) loam; common medium distinct yellowish brown (10YR 5/8) and light gray (10YR 6/1) mottles; weak fine subangular blocky structure; friable; slightly sticky, slightly plastic; few fine and very fine roots; many sand grains coated and bridged with clay; extremely acid; clear smooth boundary.

B23tg--22 to 33 inches; light gray (10YR 6/1) loam; many coarse distinct yellowish brown (10YR 5/8) and few medium prominent strong brown (7.5YR 5/8) mottles; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; few fine and very fine roots; many sand grains coated and bridged with clay; few thin discontinuous clay films on faces of peds; extremely acid; clear smooth boundary.

B3tg--33 to 38 inches; light gray (10YR 6/1) fine sandy loam; many coarse distinct yellowish brown (10YR 5/8) and few medium prominent strong brown (7.5YR 5/8) mottles; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; few very fine roots; many sand grains coated and bridged with clay; extremely acid; abrupt wavy boundary.

IIC--38 to 49 inches; pale brown (10YR 6/3) fine sand; single grain; loose; very strongly acid.

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

Depth	Sand						Silt	Clay
	VC	C	M	F	VF	Total		
inches	g kg <sup>-1</sup> of soil							
0-8	2	18	166	406	30	622	272	106
8-14	0	10	130	324	24	488	334	178
14-22	0	8	128	316	28	480	342	178
22-33	1	6	126	346	28	507	333	160
33-38	1	8	138	391	28	566	288	146
38-49	1	12	259	613	22	907	73	20

Table B. Chemical properties for Dragston fine sandy loam

Depth	CaO	MgO	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	Zn	Mn
inches	lbs acre <sup>-1</sup>				ppm	
0-8	1539	358	114	190	ND	ND
8-14	308	139	7	72	ND	ND
14-22	196	96	4	60	ND	ND
22-33	196	116	2	60	ND	ND
33-38	196	116	6	67	ND	ND
38-49	84	23	40	29	ND	ND

## Dragston Series loam supplemental profile 3

Location: About 620 feet northwest of junction of Oceana Boulevard and London Bridge Road, and 60 feet southwest of London Bridge Road.

Ap--0 to 7 inches; dark grayish brown (10YR 4/2) sandy loam; weak; fine granular structure; friable, slightly sticky, nonplastic; common fine roots; strongly acid; abrupt smooth boundary.

B1t--7 to 13 inches; light olive brown (2.5Y 5/4) sandy loam; few, fine distinct strong brown (7.5YR 5/6) mottles; weak fine subangular blocky structure; friable, slightly sticky, nonplastic; few fine roots; many sand grains coated and bridged with clay; few krotovina up to 1 inch in diameter filled with Ap material; very strongly acid; clear smooth boundary.

B21t--13 to 23 inches; light olive brown (2.5Y 5/4) loam; common, fine and medium distinct yellowish brown, and common, fine and medium, distinct light gray (10YR 7/2) mottles in the lower half of the horizon; weak fine subangular blocky structure; friable; slightly sticky, nonplastic; few fine roots; many sand grains coated and bridged with clay; few thin discontinuous clay films on faces of peds; very strongly acid; gradual smooth boundary.

B22tg--23 to 37 inches; light gray to gray (10YR 6/1) loam; many, medium, prominent strong brown (7.5YR 5/6) and common medium distinct pale brown (10YR 6/3) and yellowish brown (10YR 5/8) mottles; moderate, medium subangular blocky structure; friable; slightly sticky, nonplastic; few fine roots; many sand grains coated and bridged with clay; very strongly acid; clear smooth boundary.

C--37 to 57 inches; mottled pale brown (10YR 6/3) and grayish brown (10YR 5/2) sand, few fine rounded gravel; single grain; loose; common black rounded mineral grains; strongly acid.

Table A: Particle-size distribution for Dragston sandy loam

Depth	Sand					Total	Silt	Clay
	VC	C	M	F	VF			
inches	g kg <sup>-1</sup> of soil							
0-7	2	53	358	136	7	556	354	90
7-13	3	53	344	132	0	532	333	135
13-23	3	50	295	124	5	477	392	131
23-37	3	53	329	124	5	514	355	131
37-57	8	127	511	315	4	965	5	30

Table C. Chemical properties for Dragston sandy loam

Depth	Exchangeable cations				CEC	BS
	Ca <sup>2+</sup>	Mg <sup>2+</sup>	K <sup>+</sup>	H <sup>+</sup>		
inches	cmol ( + ) kg <sup>-1</sup> soil					%
0-7	1.65	0.36	0.28	6.78	9.07	25.24
7-13	0.56	0.32	0.12	3.30	4.30	23.25
13-23	0.59	0.48	0.10	4.00	5.17	22.63
23-37	0.67	0.46	0.07	4.00	5.20	23.07
37-57	0.05	0.04	0.02	3.13	3.24	3.39

Table D. Chemical properties for Dragston sandy loam

Depth	Organic matter	pH	Al <sup>3+</sup>	ECEC	EBS
inches	g kg <sup>-1</sup>		cmol ( + ) kg <sup>-1</sup> soil		%
0-7	0.75	5.2	0.26	2.55	89.80
7-13	0.07	5.0	1.03	2.03	49.26
13-23	0.05	4.9	1.46	2.63	44.49
23-37	0.01	5.0	1.63	2.83	42.40
37-57	0.07	5.1	0.17	0.28	39.29

Table G: Engineering properties for Dragston sandy loam

Depth	PVC*	Atterburg Limits		PI*
		LL*	PL*	
inches	lb foot <sup>-2</sup>			
13-23	1050	19.0	12.1	6.86
23-37	1200	18.9	11.9	6.98
37-57	N.C.	0	0	--

\*PVC = potential volume change, LL = liquid limit, PL = plastic limit, and PI = plasticity index.

### Dragston Series loam supplemental profile 4

Location: About 2,700 feet southwest of junction of Vaughan Road and Princess Anne Road and 1,300 feet west of Princess Anne Road.

Ap-0 to 7 inches; brown (10YR 4/3) fine sandy loam; weak fine granular; friable, slightly sticky, slightly plastic; common very fine and few fine roots; few fine pores; moderately acid; abrupt smooth boundary.

B21t-7 to 13 inches; light yellowish brown (2.5Y 6/4) fine sandy loam; common fine and medium yellowish brown (10YR 5/8) and few fine faint light brownish gray (2.5Y 6/2) mottles; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; few very fine roots; common very fine and fine and few medium pores; many sand grains coated and bridged with clay; very strongly acid; clear smooth boundary.

B22t-13 to 24 inches; mottled light yellowish brown (2.5Y 6/4), light brownish gray (2.5Y 6/2), and yellowish brown (10YR 5/8) fine sandy loam; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; few very fine roots; common very fine, fine, and medium pores; common sand grains coated and bridged with clay; very strongly acid; clear smooth boundary.

B3t-24 to 32 inches; mottled light yellowish brown (10YR 6/4), brownish yellow (10YR 6/6), yellowish brown (10YR 5/8), and light gray (10YR 7/2) loamy sand; weak medium subangular blocky structure; very friable, nonsticky, slightly plastic; few fine roots; common very fine and few fine pores; few sand grains coated and bridged with clay; very strongly acid; clear smooth boundary.

C1-32 to 49 inches; dark reddish brown (5YR 3/3) sand; common fine prominent red (2.5YR 4/8) mottles; single grain; loose; common fine pores; strongly acid; clear smooth boundary.

C2--49 to 60 inches; yellowish brown (10YR 5/6) fine sand; common medium prominent yellowish red (5YR 5/8) mottles; single grain; loose; sand is slightly compacted in places; strongly acid.

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

Depth	Sand					Total	Silt	Clay
	VC	C	M	F	VF			
inches	g kg <sup>-1</sup> of soil							
0-7	0	16	242	264	8	530	360	110
7-13	0	14	230	270	6	520	350	130
13-24	0	18	254	300	8	580	260	160
24-32	0	24	336	428	12	800	130	70
32-49	1	28	402	447	12	890	110	0
49-60	0	13	409	540	8	970	0	30

Table B. Chemical properties for Dragston fine sandy loam

Depth	CaO	MgO	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	Zn	Mn
inches	lbs acre <sup>-1</sup>				ppm	
0-7	907	167	97	239	1.1	11.9
7-13	302	72	26	123	0.4	9.1
13-24	403	119	11	105	0.4	5.7
24-32	336	80	68	67	0.4	3.3
32-49	302	32	61	33	0.3	0.5
49-60	101	16	73	8	0.3	0.0

## Dragston Series loam supplemental profile 5

Location: About 2,800 feet west-northwest of junction of South Stowe Road and Princess Anne Road and 70 feet south of South Stowe Road.

Ap--0 to 9 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak fine granular structure; friable, slightly sticky, slightly plastic; common very fine and few fine roots; moderately acid; abrupt smooth boundary.

B21t--9 to 15 inches; light olive brown (2.5Y 5/4) sandy loam; many medium prominent strong brown (7.5YR 5/8) and common medium and coarse distinct dark grayish brown (10YR 4/2) mottles; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; few very fine roots; many sand grains coated and bridged with clay; very strongly acid; clear smooth boundary.

B22t--15 to 23 inches; pale brown (10YR 6/3) fine sandy loam; many medium prominent strong brown (7.5YR 5/8), few medium faint light brownish gray (10YR 6/2), and few fine prominent yellowish red (5YR 4/6) mottles; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; few very fine roots; many sand grains coated and bridged with clay; very strongly acid; clear smooth boundary.

B23t--23 to 31 inches; mottled light brownish gray (10YR 6/2), dark yellowish brown (10YR 4/6), and pale brown (10YR 6/3) sandy loam; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; few very fine roots; many sand grains coated and bridged with clay; very strongly acid; clear smooth boundary.



B3t--31 to 38 inches; pale brown (10YR 6/3) fine sandy loam; common medium faint light brownish gray (10YR 5/6) mottles; weak fine subangular blocky structure; very friable, slightly sticky, slightly plastic; few very fine roots; common sand grains coated and bridged with clay; very strongly acid; gradual smooth boundary.

C--38 to 55 inches; pale brown (10YR 6/3) sand; few fine prominent yellowish red (5YR 4/6) mottles; single grain; loose; strongly acid.

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

Depth	Sand						Silt	Clay
	VC	C	M	F	VF	Total		
inches	g kg <sup>-1</sup> of soil							
0-9	0	12	264	320	14	610	280	110
9-15	1	14	316	298	11	640	200	160
15-23	0	14	390	316	10	730	160	110
23-31	1	14	336	280	19	650	210	140
31-38	1	16	350	317	16	700	190	110
38-55	1	20	473	380	6	880	87	33

Table B. Chemical properties for Dragston fine sandy loam

Depth	CaO	MgO	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	Zn	Mn
inches	lbs acre <sup>-1</sup>				ppm	
0-9	1427	255	275	108	ND	ND
9-15	392	143	15	63	ND	ND
15-23	308	96	20	60	ND	ND
23-31	420	139	7	63	ND	ND
31-38	392	93	48	36	ND	ND
38-55	140	40	90	17	ND	ND

## Duckston Series

The soils of the Duckston series are deep and poorly drained. They formed in sandy marine sediments. Duckston soils are on Coastal areas on the lower part of the Coastal Plain. Slopes range from 0 to 2 percent.

### Duckston Series supplemental profile 1

Location: In False Cape State Park, about 800 feet west of Atlantic Ocean and 2.3 miles north of Virginia-North Carolina state line.

A1--0 to 2 inches; very dark gray (10YR 3/1) fine sand; single grain, loose; common fine and medium roots; few clean sand grains; clear smooth boundary.

C--2 to 15 inches; gray (10YR 5/1) fine sand; single grain, loose; few fine roots; extremely acid; clear smooth boundary.

Ab--15 to 20 inches; very dark grayish brown (10YR 3/2) fine sand; single grain, loose; few clean sand grains, many stained with organic material; few fine roots; extremely acid; clear smooth boundary.

Cb--20 to 40 inches; grayish brown (10YR 5/2) fine sand; single grain, loose; few fine roots; extremely acid.

Table A: Particle-size distribution for Duckston fine sand

Depth	Sand					Total	Silt	Clay
	VC	C	M	F	VF			
inches	g kg <sup>-1</sup> of soil							
2-15	0	8	143	807	41	999	1	0
20-40	3	47	282	627	37	996	4	0

Table C. Chemical properties for Duckston fine sand

Depth	Exchangeable cations				CEC	BS
	Ca <sup>2+</sup>	Mg <sup>2+</sup>	K <sup>+</sup>	H <sup>+</sup>		
inches	cmol ( + ) kg <sup>-1</sup> soil					%
2-15	0.09	0.06	0.02	0.20	0.37	45.95
15-20	1.99	1.33	0.01	9.00	12.33	27.01
20-40	0.07	0.11	0.01	0.60	0.79	24.05

Table D. Chemical properties for Duckston fine sand

Depth	Organic matter	pH	Al <sup>3+</sup>	ECEC	EBS
inches	g kg <sup>-1</sup>		cmol ( + ) kg <sup>-1</sup> soil		%
2-15	0.00	3.9	0.15	0.32	53.13
15-20	3.62	3.3	0.55	3.88	85.82
20-40	0.13	3.7	0.25	0.44	43.18

Table E: Mineralogy of the sand fraction for Duckston fine sand

Depth	Minerals Present*					
	Quartz	Feldspar	Mica	Opauques	Heavies	Misc.
inches	g kg <sup>-1</sup> of sand					
20-40	910	20	Tr	0	60	0

\*Opauques = iron minerals including ilmenite, magnetite, hematite, etc. Misc. = rock fragments.

## Duckston Series supplemental profile 2

Location: In False Cape State Park about 2,900 feet west of Atlantic Ocean and 2.2 miles north of Virginia-North Carolina state line.

A1--0 to 2 inches; very dark grayish brown (10YR 3/2) fine sand; single grain, loose; common fine and medium roots; clear smooth boundary.

C--2 to 40 inches; grayish brown (10YR 5/2) fine sand; single grain, loose; few fine roots; extremely acid.

Table A: Particle-size distribution for Duckston fine sand

Depth	Sand						Silt	Clay
	VC	C	M	F	VF	Total		
<u>inches</u>	<u>g kg<sup>-1</sup> of soil</u>							
2-40	0	7	242	717	30	996	4	0

Table C. Chemical properties for Duckston fine sand

Depth	Exchangeable cations				CEC	BS
	Ca <sup>2+</sup>	Mg <sup>2+</sup>	K <sup>+</sup>	H <sup>+</sup>		
<u>inches</u>	<u>cmol ( + ) kg<sup>-1</sup> soil</u>					<u>%</u>
2-40	0.02	0.01	0.01	0.40	0.44	9.09

Table D. Chemical properties for Duckston fine sand

Depth	Organic matter	pH	Al <sup>3+</sup>	ECEC*	EBS**
<u>inches</u>	<u>g kg<sup>-1</sup></u>		<u>cmol ( + ) kg<sup>-1</sup> soil</u>		<u>%</u>
2-40	0.00	3.9	0.15	0.19	21.05

Table E: Mineralogy of the sand fraction for Duckston fine sand

Depth	Minerals Present*					
	Quartz	Feldspar	Mica	Opaques	Heavies	Misc.
<u>inches</u>	<u>g kg<sup>-1</sup> of sand</u>					
2-40	920	20	10	0	50	0

\*Opaques = iron minerals including ilmenite, magnetite, hematite, etc. Misc. = rock fragments.

### Duckston Series supplemental profile 3

Location: In False Cape State Park about 2,000 feet west of the Atlantic Ocean and 3.9 miles north of the Virginia North Carolina state line.

A1--0 to 2 inches; dark gray (10YR 4/2) fine sand; single grain, loose; common fine and medium roots; clear smooth boundary.

C--2 to 40 inches; grayish brown (10YR 5/2) fine sand; single grain, loose; few fine roots; extremely acid.

Table A: Particle-size distribution for Duckston fine sand

Depth	Sand						Silt	Clay
	VC	C	M	F	VF	Total		
<u>inches</u>	<u>g kg<sup>-1</sup> of soil</u>							
2-40	0	16	305	667	12	1000	0	0

Table C. Chemical properties for Duckston fine sand

Depth	Exchangeable cations				CEC	BS
	Ca <sup>2+</sup>	Mg <sup>2+</sup>	K <sup>+</sup>	H <sup>+</sup>		
<u>inches</u>	<u>cmol ( + ) kg<sup>-1</sup> soil</u>					<u>%</u>
2-40	0.05	0.12	0.01	1.80	1.98	9.09

Table D. Chemical properties for Duckston fine sand

Depth	Organic matter	pH	Al <sup>3+</sup>	ECEC	EBS
<u>inches</u>	<u>g kg<sup>-1</sup></u>		<u>cmol ( + ) kg<sup>-1</sup> soil</u>		<u>%</u>
2-40	0.16	4.1	0.35	0.53	33.96

Table E: Mineralogy of the sand fraction for Duckston fine sand

Depth	Minerals Present*					
	Quartz	Feldspar	Mica	Opauques	Heavies	Misc.
<u>inches</u>	<u>g kg<sup>-1</sup> of sand</u>					
2-40	950	30	Tr	0	10	0

\*Opauques = iron minerals including ilmenite, magnetite, hematite, etc. Misc. = rock fragments.

## Duckston Series supplemental profile 4

Location: In False Cape State Park about 3,700 feet west of Atlantic Ocean and 3.9 miles north of Virginia-North Carolina state line.

A1--0 to 4 inches; very dark gray (10YR 3/1) fine sand; single grain, loose; common fine and medium roots; extremely acid; clear smooth boundary.

C--4 to 32 inches; pale brown (10YR 6/3) fine sand; single grain, loose; few fine roots; extremely acid; clear smooth boundary.

Ab--32 to 34 inches; very dark grayish brown (10YR 3/2) fine sand; single grain, loose; few fine roots; many sand grains stained with organic material; extremely acid; clear smooth boundary.

Cb--34 to 50 inches; gray (10YR 6/1) fine sand; single grain, loose; extremely acid.

Table A: Particle-size distribution for Duckston fine sand

Depth	Sand						Silt	Clay
	VC	C	M	F	VF	Total		
<u>inches</u>	<u>g kg<sup>-1</sup> of soil</u>							
4-32	0	43	416	531	5	995	5	0
32-34	0	6	173	790	31	1000	0	0

Table C. Chemical properties for Duckston fine sand

Depth	Exchangeable cations				CEC	BS
	Ca <sup>2+</sup>	Mg <sup>2+</sup>	K <sup>+</sup>	H <sup>+</sup>		
<u>inches</u>	<u>cmol ( + ) kg<sup>-1</sup> soil</u>					<u>%</u>
0-4	0.16	0.24	0.08	16.00	16.48	2.91
4-32	0.01	0.02	0.01	1.40	1.44	2.78
32-34	0.08	0.10	0.00	1.40	1.58	11.39

Table D. Chemical properties for Duckston fine sand

Depth	Organic matter	pH	Al <sup>3+</sup>	ECEC	EBS
<u>inches</u>	<u>g kg<sup>-1</sup></u>		<u>cmol ( + ) kg<sup>-1</sup> soil</u>		<u>%</u>
0-4	5.91	3.9	2.75	3.23	14.86
4-32	0.16	4.1	0.25	0.29	13.79
32-34	0.35	3.3	0.65	0.83	21.69

## Frripp Series

The soils of the Frripp series are deep and excessively drained. They formed in marine and eolian sediments. Frripp soils are on Coastal dunes on the lower part of the Coastal Plain. Slopes range from 2 to 30 percent.

Typical pedon of Frripp sand, 2 to 30 percent slopes, about 400 feet west of west end of 69th Street in Seashore State Park:

A1--0 to 5 inches; dark grayish brown (10YR 4/2) sand; single grain; loose; common very fine to coarse roots; many clear sand grains and few pink and red sand grains; extremely acid; clear smooth boundary.

A2--5 to 12 inches; light brownish gray (10YR 6/2) fine sand; single grain; loose; common very fine, few fine, and common medium roots; few pink, green, opaque, and red sand grains; extremely acid; clear smooth boundary.

Bir&C--12 to 20 inches; mottled brown (7.5YR 4/4) (Bir) and yellowish brown (10YR 5/6) (C) fine sand; single grain; loose; dark brown (7.5YR 4/4) discontinuous pockets mainly in upper 4 inches; few very fine and fine and common medium roots; few clear, common opaque, few pink, and common iron-stained sand grains; extremely acid; gradual wavy boundary.

C1--20 to 29 inches; brownish yellow (10YR 6/6) fine sand; single grain; loose; few very fine and fine and common medium roots; common clear and few opaque, green, and pink sand grains; extremely acid; gradual wavy boundary.

C2--29 to 60 inches; very pale brown (10YR 7/3) fine sand; single grain; loose; few very fine and fine roots; many clear, common opaque, and few pink and green sand grains; very strongly acid.

Table A: Particle-size distribution for Fripp sand

Depth	Sand					Total	Silt	Clay
	VC	C	M	F	VF			
inches	g kg <sup>-1</sup> of soil							
0-5	2	23	475	480	11	991	9	0
5-12	1	7	408	575	4	995	5	0
12-20	0	8	405	581	4	998	2	0
20-29	0	6	461	532	1	1000	0	0
29-60	0	6	493	497	4	1000	0	0

Table B. Chemical properties for Fripp sand

Depth	CaO	MgO	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	Zn	Mn
inches	lbs acre <sup>-1</sup>				ppm	
0-5	98	14	8	16	ND	0.8
5-12	72	6	4	6	ND	0.2
12-20	72	6	10	2	ND	0.7
20-29	72	4	10	6	ND	0.6
29-60	48	4	6	2	ND	0.5

Table C. Chemical properties for Fripp sand

Depth	Exchangeable cations				CEC	BS
	Ca <sup>2+</sup>	Mg <sup>2+</sup>	K <sup>+</sup>	H <sup>+</sup>		
inches	cmol ( + ) kg <sup>-1</sup> soil					%
0-5	0.10	0.08	0.02	4.40	4.60	4.35
5-12	0.05	0.03	0.01	2.20	2.29	3.93
12-20	0.03	0.02	0.01	2.00	2.06	2.91
20-29	0.01	0.02	0.01	1.20	1.24	3.23
29-60	0.02	0.01	0.01	1.00	1.04	3.85

Table D. Chemical properties for Fripp sand

Depth	Organic matter	pH	Al <sup>3+</sup>	ECEC	EBS
inches	g kg <sup>-1</sup>		cmol ( + ) kg <sup>-1</sup> soil		%
0-5	2.28	3.7	0.85	1.05	19.05
5-12	0.48	3.9	0.45	0.54	16.67
12-20	0.52	4.0	0.65	0.71	8.45
20-29	0.10	4.5	0.45	0.49	8.16
29-60	0.10	4.7	0.25	0.29	13.79

Table E: Mineralogy of the sand fraction for Fripp sand

Depth	Minerals Present*					
	Quartz	Feldspar	Mica	Opagues	Heavies	Misc.
inches	g kg <sup>-1</sup> of sand					
12-20	910	30	Tr	0	50	10
20-29	890	40	Tr	0	60	10

\*Opagues = iron minerals including ilmenite, magnetite, hematite, etc. Misc. = rock fragments.

## Fripp Series supplemental profile 1

Location: About 300 feet east of Nature Center in Seashore State Park.

A1--0 to 6 inches; grayish brown (10YR 5/2) sand; single grain; loose; few very fine, common fine, and medium roots; white and black sand grains; very strongly acid; clear smooth boundary.

A2--6 to 24 inches; light gray (10YR 7/2) sand; single grain; loose; few fine and common roots; moderately acid; clear smooth boundary.

Bir/C--24 to 47 inches; brownish yellow (10YR 6/6) sand; single grain; loose; few medium and common coarse roots; dark brown (7.5YR 4/4) vertical pockets 2 to 5 inches wide; very weakly cemented; strongly acid; gradual wavy boundary.

C1--47 to 59 inches; yellowish brown (10YR 5/6) sand; single grain; loose; common medium roots; moderately acid.

C2--59 to 78 inches; brownish yellow (10YR 6/6) sand; common medium distinct strong brown (7.5YR 5/6) mottles; single grain; loose; few medium roots; moderately acid.

Table A: Particle-size distribution for Fripp sand

Depth	Sand						Silt	Clay
	VC	C	M	F	VF	Total		
inches	g kg <sup>-1</sup> of soil							
0-6	1	177	734	87	1	1000	0	0
6-24	0	129	771	99	1	1000	0	0
24-47	0	113	802	84	1	1000	0	0
47-59	0	398	588	14	0	1000	0	0
59-78	2	223	713	62	0	1000	0	0

Table B. Chemical properties for Fripp sand

Depth	CaO	MgO	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	Zn	Mn
inches	lbs acre <sup>-1</sup>				ppm	
0-6	72	6	16	2	ND	0.5
6-24	72	2	4	2	ND	0.1
24-47	48	2	6	2	ND	0.1
47-59	72	2	6	2	ND	0.2
59-78	72	4	16	2	ND	0.7

## Fripp Series supplemental profile 2

Location: In Seashore State Park about 6,200 feet southeast of Atlantic Avenue and Shore Drive and 4,300 feet south of Shore Drive off Kingfisher Trail.

A1--0 to 3 inches; very dark grayish brown (10YR 3/2) sand; single grain; loose; many fine and medium and common coarse roots; white and black sand grains; extremely acid; clear smooth boundary.

A2--3 to 13 inches; light gray (10YR 7/2) sand; single grain; loose; common very fine, fine, and medium roots; few pink and black mineral grains and few stained sand grains; very strongly acid; clear wavy boundary.

B21hr--13 to 18 inches; strong brown (7.5YR 5/6) fine sand; single grain, loose; common very fine, fine, and medium roots; many clear and common stained sand grains, few black, pink, and green mineral grains; very strongly acid; clear irregular boundary.

B22--18 to 30 inches; brownish yellow (10YR 6/6) sand; single grain; loose; few fine and common medium and coarse roots; many clean and common stained sand grains, few black, pink, and green mineral grains; very strongly acid; gradual wavy boundary.

C--30 to 60 inches; very pale brown (10YR 7/4) fine sand; single grain; loose; few fine and common medium roots; many clean sand grains and few black, green, and pink mineral grains; strongly acid.



Table A: Particle-size distribution for Fripp sand

Depth	Sand						Silt	Clay
	VC	C	M	F	VF	Total		
inches	g kg <sup>-1</sup> of soil							
0-3	28	106	523	334	3	994	6	0
3-13	0	28	480	491	1	1000	0	0
13-18	0	16	466	508	2	992	8	0
18-30	0	25	502	473	0	1000	0	0
30-60	0	5	468	526	1	1000	0	0

Table B. Chemical properties for Fripp sand

Depth	CaO	MgO	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	Zn	Mn
inches	lbs acre <sup>-1</sup>				ppm	
0-3	144	18	8	24	ND	2.4
3-13	72	6	6	6	ND	0.2
13-18	96	6	18	6	ND	0.7
18-30	72	6	30	2	ND	0.6
30-60	72	2	32	6	ND	0.3

## Hyde Series

The soils of the Hyde series are deep and very poorly drained. They formed in loamy marine and fluvial sediments. Hyde soils are on the lower part of the Coastal Plain on inland flats and in slight depressions. Slopes range from 0 to 1 percent.

Typical pedon of Hyde silt loam, about 4,500 feet southwest of the intersection of Oceana Boulevard and Bells Road, and 4,300 feet northwest of the intersection Oceana Boulevard and Harper Road:

Ap--0 to 8 inches; very dark grayish brown (2.5Y 3/2) silt loam; weak fine granular structure; friable, slightly sticky, slightly plastic; many very fine and fine roots; many very fine, fine, and medium pores; extremely acid; clear smooth boundary.

A--8 to 16 inches; very dark grayish brown (2.5Y 3/2) silt loam; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; common very fine and fine roots; common fine and medium pores; extremely acid; abrupt smooth boundary.

B21tg--16 to 28 inches; dark grayish brown (2.5Y 4/2) silty clay loam; weak medium subangular blocky structure; friable, sticky, plastic; few very fine and fine roots; many fine and medium pores; thin patchy clay films on faces of peds; extremely acid; clear smooth boundary.

B22tg--28 to 37 inches; grayish brown (10YR 5/2) silty clay loam; common medium distinct olive yellow (2.5Y 6/6), and few medium distinct yellowish brown (10YR 5/6) mottles; moderate fine and medium subangular blocky structure; firm, sticky, plastic; few very fine and fine roots; many fine, and medium pores; thin patchy clay films and silt coatings on faces of peds; extremely acid; clear smooth boundary.

B23tg--37 to 45 inches; dark grayish brown (2.5Y 4/2) silty clay; many medium distinct olive yellow (2.5Y 6/6) and yellowish brown (10YR 5/6) mottles; moderate fine and medium subangular

blocky structure; firm, sticky, plastic; few very fine roots; common very fine and fine pores; thin patchy clay films and silt coatings on faces of peds; extremely acid; gradual smooth boundary.

B24tg--45 to 53 inches; mottled light olive gray (5Y 6/2), olive yellow (2.5Y 6/8), and strong brown (7.5YR 5/8) silty clay loam; weak fine and medium subangular blocky structure; firm, sticky, plastic; few very fine roots; many very fine and fine pores; thin patchy clay films and silty coatings on faces of peds; few medium flakes of mica; very strongly acid; clear smooth boundary.

B3tg--53 to 58 inches; light olive gray (5Y 6/2) loam; common medium distinct brownish yellow (10YR 6/6), few medium prominent strong brown (7.5YR 5/8), and few medium distinct olive yellow (2.5Y 6/8) mottles; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; few very fine and fine roots; common very fine and fine pores; thin patchy clay films and silt coatings on faces of peds; few medium flakes of mica; very strongly acid; abrupt smooth boundary.

IICg--58 to 72 inches; light gray (10YR 7/2) fine sand; single grain; loose; fluid sands in water table; very strongly acid.

Table A: Particle-size distribution for Hyde silt loam

Depth	Sand						Silt	Clay
	VC	C	M	F	VF	Total		
inches	g kg <sup>-1</sup> of soil							
0-8	1	1	5	8	7	22	705	273
8-16	1	3	9	8	9	30	687	283
16-28	0	1	5	6	15	27	675	298
28-37	1	2	11	14	21	49	643	308
37-45	1	3	21	29	12	66	498	436
45-53	0	2	9	15	64	90	558	352
53-58	1	17	114	159	52	343	409	248
58-72	1	14	336	623	3	977	13	10

Table B. Chemical properties for Hyde silt loam

Depth	CaO	MgO	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	Zn	Mn
inches	lbs acre <sup>-1</sup>				ppm	
0-8	1176	238	120	192	ND	ND
8-16	1056	134	34	34	ND	ND
16-28	384	90	14	28	ND	ND
28-37	504	238	6	36	ND	ND
37-45	504	240	6	52	ND	ND
45-53	336	240	8	126	ND	ND
53-58	206	240	18	106	ND	ND
58-72	72	72	8	6	ND	ND

Table C. Chemical properties for Hyde silt loam

Depth	Exchangeable cations				CEC	BS
	Ca <sup>2+</sup>	Mg <sup>2+</sup>	K <sup>+</sup>	H <sup>+</sup>		
inches	cmol ( + ) kg <sup>-1</sup> soil					%
0-8	3.93	1.40	0.60	26.00	31.93	18.57
8-16	3.33	0.87	0.17	30.80	35.17	12.43
16-28	1.01	0.46	0.08	15.00	16.55	9.37
28-37	1.69	1.14	0.12	14.60	17.55	16.81
37-45	1.77	2.20	0.15	16.20	20.32	20.28
45-53	1.76	8.20	0.33	8.60	18.89	54.47
53-58	0.77	6.50	0.24	3.60	11.11	67.60
58-72	0.00	0.38	0.01	0.20	0.59	66.10

Table D. Chemical properties for Hyde silt loam

Depth	Organic matter	pH	Al <sup>3+</sup>	ECEC	EBS
inches	g kg <sup>-1</sup>		cmol ( + ) kg <sup>-1</sup> soil		%
0-8	8.67	4.4	4.35	10.28	57.68
8-16	10.63	4.2	5.85	10.22	42.76
16-28	0.48	4.3	4.65	6.20	25.00
28-37	1.66	4.2	5.95	8.90	33.15
37-45	1.08	4.2	6.55	10.67	38.61
45-53	0.28	4.5	3.05	13.34	77.14
53-58	0.24	4.8	0.95	8.46	88.77
58-72	0.00	4.7	0.15	0.54	72.22

Table G: Engineering properties for Hyde silt loam

Depth	PVC*	Atterburg Limits		PI*
		LL*	PL*	
inches	lb foot <sup>-2</sup>			
37-45	3491	44.69	24.58	20.11

\*PVC = potential volume change, LL = liquid limit, PL = plastic limit, and PI = plasticity index.

## Hyde Series supplemental profile 1

Location: About 1 mile south of junction of Sandbridge Road and Princess Anne Road, 1,650 feet east of Princess Anne Road.

Ap-0 to 7 inches; black (10YR 2/1) silt loam; weak fine granular structure; sticky, slightly plastic; very strongly acid; abrupt smooth boundary.

A--7 to 16 inches; black (10YR 2/1) silt loam; common fine and medium prominent yellowish brown (10YR 4/4) and few fine prominent yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; sticky, plastic; extremely acid; clear smooth boundary.

B2tg--16 to 28 inches; dark grayish brown (10YR 4/2) silt loam; common fine and medium prominent yellowish brown (10YR 5/8) and grayish brown (10YR 5/2) mottles; weak medium subangular blocky structure becoming massive in lower 1/3 of horizon; extremely acid; clear smooth boundary.

B3tg--28 to 35 inches; black (10YR 2/1) silty clay loam; common fine and medium faint dark grayish brown (10YR 4/2) mottles; massive; sticky, slightly plastic; organic matter content higher than B2tg horizon; very strongly acid; abrupt smooth boundary.

IIAbg--35 to 42 inches; very dark brown (10YR 2/2) sandy loam; massive; sticky, slightly plastic; high organic matter content (approx. 2-5 percent plant material partially decomposed); very strongly acid; abrupt smooth boundary.

IIICg--42 to 60 inches; dark gray (10YR 4/1) silty clay loam; many coarse distinct black (10YR 2/1) and common fine and medium distinct dark brown (10YR 3/3) mottles; massive; sticky, plastic; few fine roots (1 percent) extremely acid.

Table A: Particle-size distribution for Hyde silt loam

Depth	Sand					Total	Silt	Clay
	VC	C	M	F	VF			
inches	g kg <sup>-1</sup> of soil							
0-7	0	0	5	5	21	31	708	261
7-16	0	0	1	8	11	20	713	267
16-28	0	0	3	7	1	11	735	254
28-35	33	49	21	18	12	133	586	281
35-42	147	150	124	74	29	524	310	166
42-60	20	41	33	39	21	154	498	348

Table C. Chemical properties for Hyde silt loam

Depth	Exchangeable cations				CEC	BS
	Ca <sup>2+</sup>	Mg <sup>2+</sup>	K <sup>+</sup>	H <sup>+</sup>		
inches	cmol ( + ) kg <sup>-1</sup> soil					%
0-7	3.50	3.00	0.27	29.46	36.23	18.69
7-16	0.26	0.72	0.12	28.73	29.83	3.69
16-28	0.33	1.09	0.08	18.76	20.26	7.40
28-35	0.49	1.59	0.09	30.01	32.18	6.74
35-42	1.65	5.00	0.11	43.00	49.76	13.59
42-60	0.26	7.00	0.17	36.14	43.57	17.05

Table D. Chemical properties for Hyde silt loam

Depth	Organic matter	pH	Al <sup>3+</sup>	ECEC	EBS
inches	g kg <sup>-1</sup>		cmol ( + ) kg <sup>-1</sup> soil		%
0-7	14.08	5.0	2.25	9.00	75.00
7-16	8.53	4.4	7.54	8.64	12.73
16-28	4.66	4.4	5.09	6.59	22.76
28-35	18.98	4.5	5.19	7.36	29.48
35-42	28.01	4.6	5.58	12.34	54.78
42-60	3.75	2.9	21.92	29.35	25.32

## Lakehurst Variant

The soils of the Lakehurst Variant are deep and moderately well drained. They formed in sandy marine and eolian sediments. Lakehurst Variant soils are on low Coastal dunes on the lower part of the Coastal Plain. Slopes range from 0 to 4 percent.

Typical pedon of Lakehurst Variant sand, about 5,700 feet southeast of intersection of Shore Drive and Atlantic Avenue, 1,500 feet south of Shore Drive in Seashore State Park:

A1--0 to 4 inches; dark grayish brown (10YR 4/2) sand; single grain; loose; common very fine, fine, and medium roots; many clear and few pink sand grains; common organic stained sand grains; extremely acid; clear smooth boundary.

A2--4 to 24 inches; light brownish gray (10YR 6/2) sand; single grain; loose; few very fine and fine, and common medium and coarse roots; many clear, few pink and light brown sand grains; extremely acid; clear wavy boundary.

Bhir--24 to 32 inches; dark reddish brown (5YR 3/3) sand; single grains; loose; few fine and medium roots; common opaque, few clear and pink, and many iron-stained sand grain; extremely acid; gradual wavy boundary.

C1--32 to 45 inches; yellowish brown (10YR 5/6) sand; few medium distinct light gray (10YR 7/2) mottles; single grain; loose; few fine roots; few medium distinct dark reddish brown (5YR 3/2) weakly cemented brittle concretion 2 to 10 millimeters in diameter; few light brown and opaque, and common clear sand grains; very strongly acid; clear wavy boundary.

C2--45 to 53 inches; mottled yellowish brown (10YR 5/6) and dark reddish brown (5YR 3/3) sand; single grain; loose; darker material is stratified, pocketed and weakly cemented; few light brown, common clear and iron-stained sand grains; very strongly acid; gradual wavy boundary.

Q3--53 to 72 inches; mottled yellowish brown (10YR 5/4) and yellowish red (5YR 5/8) sand; single grain; loose; few light brown, common clear and iron-stained sand grains; very strongly acid.

Table A: Particle-size distribution for Lakehurst Variant sand

Depth	Sand						Silt	Clay
	VC	C	M	F	VF	Total		
inches	g kg <sup>-1</sup> of soil							
0-4	1	57	631	300	4	993	7	0
4-24	0	24	522	449	1	996	4	0
24-32	0	19	634	346	1	1000	0	0
32-45	0	116	656	225	1	998	2	0
45-53	0	37	603	358	1	999	1	0

Table B. Chemical properties for Lakehurst Variant sand

Depth	CaO	MgO	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	Zn	Mn
inches	lbs acre <sup>-1</sup>				ppm	
0-4	72	10	6	8	ND	0.4
4-24	72	10	4	6	ND	0.2
24-32	96	10	4	6	ND	0.6
32-45	72	4	8	6	ND	0.7
45-53	72	6	10	12	ND	0.4

Table C. Chemical properties for Lakehurst Variant sand

Depth	Exchangeable cations				CEC	BS
	Ca <sup>2+</sup>	Mg <sup>2+</sup>	K <sup>+</sup>	H <sup>+</sup>		
inches	cmol (+) kg <sup>-1</sup> soil					%
0-4	0.08	0.07	0.02	5.20	5.37	3.17
4-24	0.04	0.03	0.01	2.20	2.28	3.51
24-32	0.06	0.04	0.01	7.80	7.91	1.39
32-45	0.03	0.01	0.02	2.60	2.66	2.26
45-53	0.05	0.02	0.01	3.80	3.88	2.06

Table D. Chemical properties for Lakehurst Variant sand

Depth	Organic matter	pH	Al <sup>3+</sup>	ECEC	EBS
inches	g kg <sup>-1</sup>		cmol (+) kg <sup>-1</sup> soil		%
0-4	1.14	4.0	0.55	0.72	23.61
4-24	0.24	3.9	0.35	0.43	18.60
24-32	0.48	4.1	0.75	0.86	12.79
32-45	0.28	4.5	0.45	0.51	11.76
45-53	0.24	4.6	0.35	0.43	18.60

Table E: Mineralogy of the sand fraction for Lakehurst Variant sand

Depth	Minerals Present*					
	Quartz	Feldspar	Mica	Opaques	Heavies	Misc.
inches	g kg <sup>-1</sup> of sand					
4-24	920	60	0	0	20	0
24-32	950	30	Tr	0	10	0

\*Opaques = iron minerals including ilmenite, magnetite, hematite, etc. Misc. = rock fragments.

### Lakehurst Variant supplemental profile 1

Location: About 2,000 feet south of Shore Drive and 1,600 feet west of Shore Drive and Atlantic Avenue.

A1--0 to 4 inches; dark grayish brown (10YR 4/2) sand; single grain; loose; common very fine, fine, medium, and coarse roots; many clear sand grains, many coated with organic material; few rust and pink grains; extremely acid; clear smooth boundary.

A2--4 to 24 inches; grayish brown (10YR 5/2) fine sand; single grain; loose; common fine and very fine and few medium and coarse roots; many clear and few pink and rust grains; very strongly acid; clear smooth boundary.

Bhir--24 to 30 inches; dark brown (7.5YR 4/4) fine sand; single grain; loose; few very fine and fine roots; few pink and rust grains; common clear grains, and many grains coated with iron; very strongly acid; gradual wavy boundary.

C1--30 to 42 inches; yellowish brown (10YR 5/6) fine sand; single grain; loose; few very fine roots; common clear and few pink and rust grains; strongly acid; clear wavy boundary.

C2--42 to 48 inches; yellowish brown (10YR 5/4) sand; single grain; loose; many clear and few pink and rust grains.

Table A: Particle-size distribution for Lakehurst Variant sand

Depth	Sand						Silt	Clay
	VC	C	M	F	VF	Total		
inches	g kg <sup>-1</sup> of soil							
0-4	2	100	543	339	6	990	10	0
4-24	1	10	389	586	8	994	6	0
24-30	0	10	414	562	3	989	11	0
30-42	0	17	426	545	7	995	5	0
42-48	0	47	596	350	7	1000	0	0

Table B. Chemical properties for Lakehurst Variant sand

Depth	CaO	MgO	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	Zn	Mn
inches	lbs acre <sup>-1</sup>				ppm	
0-4	120	24	2	8	ND	0.4
4-24	48	10	2	6	ND	0.1
24-30	72	10	6	2	ND	0.5
30-42	72	6	22	2	ND	0.9

## Munden Series

The soils of the Munden series are deep and moderately well drained. They formed in loamy fluvial and marine sediments. Munden soils are on inland ridges and on the lower part of the Coastal Plain. Slopes range from 0 to 2 percent.

Typical pedon of Munden fine sandy loam, about 1 1/4 miles southwest of Princess Anne and 4 1/4 miles southeast of Stumpy Lake, 136 feet due south of North Landing Road and 100 feet southeast of small cemetery:

Ap-- 0 to 8 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak fine granular structure; very friable; common fine roots; slightly acid; abrupt smooth boundary.

B21t--8 to 15 inches; yellowish brown (10YR 5/6) sandy loam; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; few thin discontinuous clay films on faces of peds; many sand grains coated and bridged with clay; strongly acid; clear smooth boundary.

B22t--15 to 25 inches; yellowish brown (10YR 5/6) loam; common medium faint light brown (7.5YR 6/4) mottles; moderate medium subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; common thin discontinuous clay films on faces of peds; many sand grains coated and bridged with clay; very strongly acid; clear smooth boundary.

B23t--25 to 32 inches; brown (10YR 5/3) and yellowish brown (10YR 5/8) sandy loam; common fine distinct light brownish gray (10YR 6/2) mottles; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; few thin discontinuous clay films on faces of peds; many sand grains coated and bridged with clay; few small pockets of sand up to 1 1/2 inches in diameter; very strongly acid; clear smooth boundary.

C--32 to 62 inches; mottled yellowish brown (10YR 5/8), light brownish gray (10YR 6/2), and yellowish red (5YR 5/6) sand; single grain; loose; many sand grains stained; strongly acid.

Table A: Particle-size distribution for Munden fine sandy loam

Depth	Sand					Total	Silt	Clay
	VC	C	M	F	VF			
inches	g kg <sup>-1</sup> of soil							
0-8	1	34	390	206	13	644	285	71
8-15	0	22	296	196	7	521	332	147
15-25	2	36	289	187	6	520	321	159
25-32	0	27	389	268	6	690	143	167
32-62	1	47	549	338	5	940	18	42



Table C. Chemical properties for Munden fine sandy loam

Depth	Exchangeable cations				CEC	BS
	Ca <sup>2+</sup>	Mg <sup>2+</sup>	K <sup>+</sup>	H <sup>+</sup>		
inches	cmol ( + ) kg <sup>-1</sup> soil					%
0-8	2.12	0.83	0.37	4.09	7.41	44.80
8-15	1.04	0.97	0.25	5.26	7.52	30.05
15-25	1.24	0.62	0.19	5.40	7.45	27.52
25-32	1.47	0.64	0.17	5.11	7.39	30.85
32-62	0.39	0.15	0.08	2.34	2.96	20.95

Table D. Chemical properties for Munden fine sandy loam

Depth	Organic matter	pH	Al <sup>3+</sup>	ECEC	EBS
inches	g kg <sup>-1</sup>		cmol ( + ) kg <sup>-1</sup> soil		%
0-8	1.28	6.3	0	3.32	100.00
8-15	0.43	5.2	0.64	2.90	77.93
15-25	0.17	4.8	1.27	3.32	61.75
25-32	0.20	4.6	1.18	3.46	65.90
32-62	0.11	5.2	0.18	0.80	77.50

Table G: Engineering properties for Munden fine sandy loam

Depth	PVC*	Atterburg Limits		PI*
		LL*	PL*	
inches	lb foot <sup>-2</sup>			
0-8	190	0	0	--
8-15	450	16.7	13.2	3.55
15-25	632	19.5	14.1	5.40
25-32	829	19.3	14.0	5.33
32-62	174	0	0	--

\*PVC = potential volume change, LL = liquid limit, PL = plastic limit, and PI = plasticity index.

## Munden Series supplemental profile 1

Location: About 2450 feet southwest of Vaughan Road and Princess Anne Road, 1,200 feet west of Princess Anne Road, and 75 feet north of farm lane.

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

B2lt--10 to 16 inches; light olive brown (2.5Y 5/4) loam; common medium distinct yellowish brown (10YR 5/8) mottles; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; many sand grains coated and bridged with clay; few very fine roots; strongly acid; clear smooth boundary.

B22t--16 to 24 inches; yellowish brown (10YR 5/6) loam; many coarse faint yellowish brown (10YR 5/8) and few medium distinct yellowish red (5YR 5/6) mottles; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; many sand grains coated and bridged with clay; few very fine roots; very strongly acid; clear smooth boundary.

B23t--24 to 29 inches; mottled pale brown (10YR 6/3) and yellowish brown (10YR 5/8) and yellowish red (5YR 5/6) fine sandy loam; weak fine subangular blocky structure; friable; slightly sticky, slightly plastic; many sand grains coated and bridged with clay; few very fine roots; few clean sand grains; very strongly acid; clear smooth boundary.

B24t--29 to 34 inches; mottled pale brown (10YR 6/3) and yellowish brown (10YR 5/8) and yellowish red (5YR 5/6) fine sandy loam; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; many sand grains coated and bridged with clay; few very fine roots; common medium pockets of clean sand grains; very strongly acid; clear smooth boundary.

B3t--34 to 39 inches; mottled yellowish brown (10YR 5/8) and pale brown (10YR 6/3) fine sandy loam; weak fine subangular blocky structure; friable; slightly sticky, nonplastic; many sand grains coated and few bridged with clay; few very fine roots; common medium and coarse pockets of clean sand grains; very strongly acid; gradual smooth boundary.

C1--39 to 51 inches; brownish yellow (10YR 6/6) sand; few coarse faint pale brown (10YR 6/3) mottles; single grain; loose; many sand grains stained; few very fine roots; strongly acid; gradual smooth boundary.

C2--51 to 60 inches; dark reddish brown (5YR 3/2) sand; single grain; loose, many sand grains stained; strongly acid.

Table A: Particle-size distribution for Munden fine sandy loam

Depth	Sand						Silt	Clay
	VC	C	M	F	VF	Total		
inches	g kg <sup>-1</sup> of soil							
0-10	2	18	268	326	14	628	297	75
10-16	0	10	208	262	8	488	340	172
16-24	0	8	196	246	6	456	336	208
24-29	0	10	220	300	8	538	290	172
29-34	0	10	270	374	10	664	209	127
34-39	0	16	302	424	10	752	148	100
39-51	0	17	382	485	10	894	80	26
51-60	1	20	443	479	10	953	25	22

Table B. Chemical properties for Munden fine sandy loam

Depth	CaO	MgO	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	Zn	Mn
inches	lbs acre <sup>-1</sup>				ppm	
0-10	1315	352	174	171	ND	ND
10-16	448	202	9	75	ND	ND
16-24	532	264	4	48	ND	ND
24-29	532	202	4	31	ND	ND
29-34	434	119	7	24	ND	ND
34-39	420	80	7	24	ND	ND
39-51	196	26	39	17	ND	ND
51-60	112	10	31	14	ND	ND

## Munden Series supplemental profile 2

Location: About 500 feet north of Princess Anne Road and Sandbridge Road and 880 feet north-northeast of Painters Lane and Sandbridge Road.

Ap--0 to 8 inches; brown (10YR 4/3) fine sandy loam; weak fine granular; friable, slightly sticky, slightly plastic; common very fine roots; slightly acid; abrupt smooth boundary.

B21t--8 to 22 inches; light yellowish brown (2.5Y 6/4) loam; weak fine subangular blocky structure; friable; slightly sticky, slightly plastic; few very fine roots; few thin discontinuous clay films on faces of peds; many sand grains coated and bridged with clay; strongly acid; clear smooth boundary.

B22t--22 to 28 inches; light yellowish brown (2.5Y 6/4) loam; many medium distinct brownish yellow (10YR 6/6) and few fine prominent reddish yellow (7.5YR 6/8) mottles; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; few very fine roots; few thin discontinuous clay films on faces of peds; many sand grains coated and bridged with clay; very strongly acid; clear smooth boundary.

B3t--28 to 37 inches; pale brown (10YR 6/3) fine sandy loam; common medium and coarse distinct strong brown (7.5YR 5/8) and common medium faint light gray (10YR 7/1) mottles; weak fine subangular blocky structure; friable, slightly sticky, nonplastic; many sand grains coated and bridged with clay; very strongly acid; clear wavy boundary.

C1--37 to 45 inches; light yellowish brown (2.5Y 6/4) fine sand; few fine prominent strong brown (7.5YR 5/8) mottles; single grain; loose; many clean sand grains; very strongly acid; abrupt wavy boundary.

C2--45 to 65 inches; dark reddish brown (5YR 3/2) sand; single grain; loose; nonsticky, nonplastic; many sand grains stained; very strongly acid.

Table A: Particle-size distribution for Munden fine sandy loam

Depth	Sand						Silt	Clay
	VC	C	M	F	VF	Total		
inches	g kg <sup>-1</sup> of soil							
0-8	2	12	206	336	14	570	330	100
8-22	0	4	148	260	10	422	370	208
22-28	0	6	172	254	8	440	385	175
28-37	0	8	246	442	12	708	171	121
37-45	1	14	365	505	11	896	67	37
45-65	0	21	572	379	3	975	16	9

Table B. Chemical properties for Munden fine sandy loam

Depth	CaO	MgO	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	Zn	Mn
inches	lbs acre <sup>-1</sup>				ppm	
0-8	2686	398	275	217	ND	ND
8-22	588	242	92	137	ND	ND
22-28	434	192	22	137	ND	ND
28-37	362	156	17	118	ND	ND
37-45	112	36	84	67	ND	ND
45-65	56	3	31	17	ND	ND

### Munden Series supplemental profile 3

Location: Located 2,600 feet west southwest of junction of Jarvis Road and Princess Anne Road in south edge of 5-acre tract of woods on Munden's farm.

A1--0 to 5 inches; brown (10YR 5/3) fine sandy loam; weak fine granular structure; friable, slightly sticky, nonplastic; many fine and medium and common coarse roots; extremely acid; abrupt smooth boundary.

A2--5 to 8 inches; yellowish brown (10YR 5/4) fine sandy loam; weak fine granular structure; friable, slightly sticky, slightly plastic; many fine, common medium and few coarse roots; many sand grains partially coated; very strongly acid; clean smooth boundary.

B1t--8 to 13 inches, dark yellowish brown (10YR 4/6) fine sandy loam; weak fine and medium subangular blocky structure; friable, slightly sticky, slightly plastic; common fine medium, and coarse roots; many sand grains coated and weakly bridged with clay; very strongly acid; clear smooth boundary.

B21t--13 to 21 inches; yellowish brown (10YR 5/4) loam; common, fine and medium faint pale brown (10YR 6/3) and few, fine faint yellowish brown (10YR 5/8) mottles; moderate medium subangular blocky structure; friable, slightly sticky, slightly plastic; common fine and medium roots; many sand grains coated and bridged with clay; common iron and manganese concretions up to 1 1/4 inches in diameter; very strongly acid; gradual smooth boundary.

B22t--21 to 28 inches; yellowish brown (10YR 5/4) loam; with common fine and medium distinct pale brown (10YR 6/3), common fine and medium distinct yellowish brown (10YR 5/8), few fine distinct strong brown (7.5YR 5/8), and few fine distinct light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; many sand grains coated and bridged with clay; few to common iron and manganese concretions; very strongly acid; clear smooth boundary.

B3t--28 to 32 inches; yellowish brown (10YR 5/4) fine sandy loam; many medium faint pale brown (10YR 6/3), common medium distinct yellowish brown (10YR 5/8), few fine distinct light brownish gray (10YR 6/2) mottles; weak moderate subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; many sand grains coated and weakly bridged with clay; few concretions, mainly iron; strongly acid; abrupt smooth boundary.

IIC1--32 to 48 inches; brown to dark brown (7.5YR 4/4) fine sand; many yellowish brown (10YR 5/6) and strong brown (7.5YR 5/8) mottles; single grain; loose; few fine and medium roots; common to many iron and manganese concretions; strongly acid; clear smooth boundary.

IIC2--48 to 58 inches; yellowish brown (10YR 5/8) fine sand; single grain; loose; black rounded mineral grains, possibly titanium oxide; moderately acid; clear smooth boundary.

IIC3--58 to 119 inches; light yellowish brown (2.5Y 6/4) fine sand; single grain; loose; common black rounded mineral grains and many clear sand grains; strongly acid.

Table A: Particle-size distribution for Munden fine sandy loam

Depth	Sand					Total	Silt	Clay
	VC	C	M	F	VF			
inches	g kg <sup>-1</sup> of soil							
0-5	2	35	207	300	9	553	316	131
5-8	0	11	199	350	12	572	281	147
8-13	0	7	177	340	9	533	292	175
13-21	0	7	179	309	12	509	307	184
21-28	2	8	189	300	11	510	282	208
28-32	5	8	184	350	11	558	271	171
32-48	1	10	301	622	4	938	16	46
48-58	0	7	396	567	3	973	17	10
58-119	0	14	372	585	10	981	1	18

Table C. Chemical properties for Munden fine sandy loam

Depth	Exchangeable cations				CEC	BS
	Ca <sup>2+</sup>	Mg <sup>2+</sup>	K <sup>+</sup>	H <sup>+</sup>		
inches	cmol ( + ) kg <sup>-1</sup> soil					%
0-5	0.19	0.29	0.14	15.37	15.99	3.88
5-8	0.03	0.02	0.05	7.87	7.97	1.25
8-13	0.00	0.14	0.16	6.77	7.07	4.24
13-21	0.00	0.45	0.08	5.67	6.20	8.55
21-28	0.03	0.76	0.06	7.69	8.54	9.95
28-32	0.00	0.84	0.06	7.14	8.04	11.19
32-48	0.00	0.04	0.01	7.50	7.55	0.66
48-58	0.00	0.01	0.01	4.03	4.05	0.49
58-119	0.00	0.02	0.01	1.46	1.49	2.01

Table D. Chemical properties for Munden fine sandy loam

Depth	Organic matter	pH	Al <sup>3+</sup>	ECEC	EBS
inches	g kg <sup>-1</sup>		cmol ( + ) kg <sup>-1</sup> soil		%
0-5	6.50	4.4	3.09	3.71	16.71
5-8	1.46	4.8	1.16	1.26	7.54
8-13	0.40	4.9	1.64	1.94	15.21
13-21	0.28	4.8	1.93	2.46	21.34
21-28	0.19	4.9	2.03	2.88	29.51
28-32	0.23	5.1	1.74	2.64	33.90
32-48	0.51	5.5	0.00	0.05	100.00
48-58	0.31	5.6	0.00	0.02	100.00
58-119	0.19	5.5	0.00	0.03	100.00

## Munden Series supplemental profile 4

Location: About 100 feet southeast of Malbon Road and Princess Anne Road.

Ap--0 to 8 inches; dark brown (10YR 4/3) fine sandy loam; weak fine granular structure; friable, nonsticky, nonplastic; many very fine and fine roots, common medium roots; common very fine and fine pores, few medium pores; moderately acid; abrupt smooth boundary.

B21t--8 to 15 inches; yellowish brown (10YR 5/6) loam; moderate medium subangular blocky structure; friable, slightly sticky, slightly plastic; common very fine and fine roots; common very fine and fine pores; few thin discontinuous clay films on faces of peds; very strongly acid; clear smooth boundary.

B22t--15 to 24 inches; yellowish brown (10YR 5/6) loam; few fine faint reddish yellow (7.5YR 6/8) mottles; moderate medium subangular blocky structure; friable, slightly sticky, slightly plastic; few very fine and fine roots; common very fine and fine pores, few medium pores; few thin discontinuous clay films on faces of peds; very strongly acid; clear smooth boundary.

B23t--24 to 31 inches; yellowish brown (10YR 5/8) sandy loam; common medium distinct reddish yellow (7.5YR 5/8) and few fine faint grayish brown (10YR 5/2) mottles; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; few very fine and fine roots; common very fine, fine pores and few medium pores; few thin discontinuous clay films on faces of peds; very strongly acid; clear wavy boundary.

IIC1--31 to 66 inches; yellowish brown (10YR 5/6) loamy sand; common medium faint yellowish red (7.5YR 6/8) and common medium distinct light brownish gray (10YR 6/2) mottles; massive; very friable, nonsticky, nonplastic; few very fine roots; few very fine and fine pores; many small pockets of clean sand grains; very strongly acid; clear wavy boundary.

IIC2--66 to 72 inches; yellowish brown (10YR 5/4) fine sand; single grain; loose; common small pockets of clean sand grains; strongly acid.

Table A: Particle-size distribution for Munden fine sandy loam

Depth	Sand						Silt	Clay
	VC	C	M	F	VF	Total		
inches	g kg <sup>-1</sup> of soil							
0-8	3	16	267	382	18	686	246	68
8-15	1	8	178	228	11	426	386	188
15-24	0	7	181	242	11	441	375	184
24-31	1	7	240	274	13	535	305	160
31-66	0	6	347	450	16	819	99	82
66-72	0	8	264	684	15	971	13	16

Table B. Chemical properties for Munden fine sandy loam

Depth	CaO	MgO	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	Zn	Mn
inches	lbs acre <sup>-1</sup>				ppm	
0-8	576	96	120	186	ND	ND
8-15	168	52	10	106	ND	ND
15-24	192	58	8	94	ND	ND
24-31	408	52	6	44	ND	ND
31-66	240	22	12	18	ND	ND
66-72	144	18	22	24	ND	ND

Table C. Chemical properties for Munden fine sandy loam

Depth	Exchangeable cations				CEC	BS
	Ca <sup>2+</sup>	Mg <sup>2+</sup>	K <sup>+</sup>	H <sup>+</sup>		
inches	cmol ( + ) kg <sup>-1</sup> soil					%
0-8	1.01	0.33	0.27	5.20	6.81	23.64
8-15	0.58	0.30	0.27	10.60	11.75	9.79
15-24	0.73	0.32	0.24	9.00	10.29	12.54
24-31	1.50	0.29	0.10	7.80	9.69	19.50
31-66	0.72	0.08	0.03	5.00	5.83	14.24
66-72	0.17	0.01	0.02	3.20	3.40	5.88

Table D. Chemical properties for Munden fine sandy loam

Depth	Organic matter	pH	Al <sup>3+</sup>	ECEC	EBS
inches	g kg <sup>-1</sup>		cmol ( + ) kg <sup>-1</sup> soil		%
0-8	1.00	5.6	0.05	1.66	96.99
8-15	0.48	4.8	2.35	3.50	32.86
15-24	0.22	4.6	2.05	3.34	38.62
24-31	0.25	4.8	1.45	3.34	56.59
31-66	0.19	4.9	0.75	1.58	52.53
66-72	0.19	5.2	0.05	0.25	80.00

## Nawney Series

The soils of the Nawney series are deep and very poorly drained. They formed in loamy fluvial sediments. Nawney soils are in inland drainageways and on flood plains on the lower part of the Coastal Plain. Slopes range from 0 to 2 percent.

Typical pedon of Nawney silt loam, about 3,200 feet south of junction of Princess Anne Road and Holland Road, and about 4,500 feet southwest of junction of Princess Anne Road and Seaboard Road:

02--4 to 0 inches; partially decomposed roots; leaves and twigs and highly decomposed very dark grayish brown (10YR 3/2) organic material; many very fine and medium roots; very strongly acid; abrupt wavy boundary.

A1--0 to 5 inches; dark gray (10YR 4/1) silt loam; few fine prominent yellowish brown (10YR 5/8) mottles; weak fine granular structure; very friable; slightly sticky, slightly plastic; many fine and medium roots; strongly acid; clear wavy boundary.

C1g--5 to 43 inches; gray (10YR 6/1) loam; massive; friable, slightly sticky, slightly plastic; common fine and medium roots; strongly acid; gradual wavy boundary.

C2g--43 to 60 inches; gray (10YR 6/1) stratified sand, loamy sand, and sandy loam; massive; slightly sticky, slightly plastic; strongly acid.

Table A: Particle-size distribution for Nawney silt loam

Depth	Sand						Silt	Clay
	VC	C	M	F	VF	Total		
inches	g kg <sup>-1</sup> of soil							
10-40	0	8	74	214	104	400	400	200

Table B. Chemical properties for Nawney silt loam

Depth	CaO	MgO	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	Zn	Mn
inches	lbs acre <sup>-1</sup>				ppm	
4-0	2064	240	22	126	ND	ND
0-5	1560	240	12	88	ND	ND
5-43	960	240	10	78	ND	ND
43-60	338	158	10	34	ND	ND

## Nawney Series supplemental profile 1

Location: About 600 feet north of end of Leroy Drive and 200 feet east of old railroad bed.

O2--5 to 0 inches; partially decomposed roots, leaves, twigs, and highly decomposed very dark grayish brown (10YR 3/2) organic material; strongly acid; abrupt clear boundary.

C1g--0 to 16 inches; very dark gray (10YR 3/1) silt loam; massive; friable, sticky, slightly plastic; common fine and medium roots; moderately acid; clear smooth boundary.

C2g--16 to 33 inches; very dark gray (10YR 3/1) loam; massive; friable, slightly sticky, slightly plastic; common medium roots; moderately acid; clear smooth boundary.

C3g--33 to 45 inches; gray (5Y 6/1) loam; massive; friable, slightly sticky, slightly plastic; few fine roots; strongly acid;

Table A: Particle-size distribution for Nawney silt loam

Depth	Sand						Silt	Clay
	VC	C	M	F	VF	Total		
inches	g kg <sup>-1</sup> of soil							
10-40	0	8	258	90	74	430	370	200



Table B. Chemical properties for Nawney silt loam

Depth	CaO	MgO	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	Zn	Mn
inches	lbs acre <sup>-1</sup>				ppm	
5-0	2400	240	16	110	ND	ND
0-16	2400	240	12	150	ND	ND
16-33	1104	240	10	88	ND	ND
33-45	960	240	10	100	ND	ND

## Nawney Series supplemental profile 2

Location: About 750 feet south of Pleasant Ridge Road and 2,900 feet west-northwest of Pleasant Ridge Road and Muddy Creek Road.

02--5 to 0 inches; partially decomposed roots, leaves, and twigs and highly decomposed dark brown (10YR 3/3) organic material; very strongly acid; abrupt smooth boundary.

C1g--0 to 25 inches; gray (10YR 5/1) silt loam; massive; friable; sticky, slightly plastic; common fine and medium roots; strongly acid; clear smooth boundary.

IIC2--25 to 55 inches; mottled dark brown (10YR 3/3) and light brownish gray (10YR 6/2) pocketed sandy loam and loam; massive; friable; slightly sticky, slightly plastic; few fine roots; extremely acid.

Table A: Particle-size distribution for Nawney silt loam

Depth	Sand						Silt	Clay
	VC	C	M	F	VF	Total		
inches	g kg <sup>-1</sup> of soil							
10-40	2	12	130	204	12	360	410	230

Table B. Chemical properties for Nawney silt loam

Depth	CaO	MgO	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	Zn	Mn
inches	lbs acre <sup>-1</sup>				ppm	
5-0	2400	240	40	150	ND	ND
0-25	624	240	46	88	ND	ND
25-55	552	240	18	44	ND	ND

## Newhan series

The soils of the Newhan series are deep and excessively drained. They formed in sandy marine and eolian sediments. Newhan soils are on coastal dunes on the lower part of the Coastal Plain. Slopes range from 2 to 30 percent.

## Newhan Series supplemental profile 1

Location: Cape Henry on west side of old dune behind Camp Farrar; 1/4 mile north of east entrance to Ft. Story; at the end of 85th Street.

A--0 to 3 inches; pale brown (10YR 6/3) and light brownish gray (10YR 6/2) fine sand; single grain; loose; many fine and medium roots; few sand grains stained; common, black, rounded sand size mineral grains; very strongly acid; clear smooth boundary.

C1--3 to 17 inches; light yellowish brown (10YR 6/4) fine sand; single grain; loose; many fine and medium roots; few sand grains stained; common black rounded sand size mineral grains; moderately acid; diffuse smooth boundary.

C2--17 to 65 inches; light yellowish brown (10YR 6/4) fine sand; with white (2.5Y 8/2) common streaks and splotches; single grain; loose; common fine and medium roots and few, coarse roots; few sand grains stained; common black rounded sand size mineral grains; moderately acid; diffuse smooth boundary (black grains occur throughout and as horizontal streaks).

C3--65 to 120 inches; light yellowish brown (10YR 6/4) fine sand; with white (2.5Y 8/2) common streaks and splotches; single grain; loose; few sand grains stained; common black rounded sand size mineral grains; black grains occur throughout and as horizontal streaks; moderately acid.

Table A: Particle-size distribution for Newhan fine sand

Depth	Sand					Total	Silt	Clay
	VC	C	M	F	VF			
inches	g kg <sup>-1</sup> of soil							
0-3	4	12	183	719	4	922	69	9
3-17	0	2	278	696	18	994	2	4
17-65	0	20	328	629	9	986	10	4
65-120	1	27	353	602	13	998	2	0

Table C. Chemical properties for Newhan fine sand

Depth	Exchangeable cations				CEC	BS
	Ca <sup>2+</sup>	Mg <sup>2+</sup>	K <sup>+</sup>	H <sup>+</sup>		
inches	cmol ( + ) kg <sup>-1</sup> soil					%
0-3	0.47	0.24	0.04	2.78	3.53	21.25
3-17	0.26	0.13	0.02	1.04	1.45	28.28
17-65	0.16	0.14	0.01	1.04	1.35	22.96
65-120	0.20	0.18	0.02	0.87	1.27	31.50

Table D. Chemical properties for Newhan fine sand

Depth	Organic matter	pH	Al <sup>3+</sup>	ECEC	EBS
inches	g kg <sup>-1</sup>		cmol ( + ) kg <sup>-1</sup> soil		%
0-3	0.26	5.0	0.09	0.84	89.29
3-17	0.05	5.7	0.09	0.50	82.00
17-65	0.05	5.7	0.00	0.31	100.00
65-120	0.02	6.0	0.00	0.40	100.00

Table E: Mineralogy of the sand fraction for Newhan fine sand

Depth	Minerals Present*					
	Quartz	Feldspar	Mica	Opaques	Heavies	Misc.
inches	g kg <sup>-1</sup> of sand					
3-17	860	70	10	0	60	0

\*Opaques = iron minerals including ilmenite, magnetite, hematite, etc. Misc. = rock fragments.

## Newhan Series supplemental profile 2

Location: About 300 feet west of Atlantic Ocean and 3,200 feet north of Virginia-North Carolina state line.

C1--0 to 47 inches; very pale brown (10YR 7/3) fine sand; single grain, loose; many fine and medium roots; extremely acid; diffuse smooth boundary.

C2--47 to 72 inches; very pale brown (10YR 7/3) fine sand; single grain, loose; common fine and medium roots; extremely acid.

Table A: Particle-size distribution for Newhan fine sand

Depth	Sand						Silt	Clay
	VC	C	M	F	VF	Total		
inches	g kg <sup>-1</sup> of soil							
0-47	0	14	224	734	28	1000	0	0
47-72	0	13	272	697	18	1000	0	0

Table C. Chemical properties for Newhan fine sand

Depth	Exchangeable cations				CEC	BS
	Ca <sup>2+</sup>	Mg <sup>2+</sup>	K <sup>+</sup>	H <sup>+</sup>		
inches	cmol ( + ) kg <sup>-1</sup> soil					%
10-40	0.06	0.12	0.03	0.20	0.41	51.22

Table D. Chemical properties for Newhan fine sand

Depth	Organic matter	pH	Al <sup>3+</sup>	ECEC	EBS
<u>inches</u>	<u>g kg<sup>-1</sup></u>		<u>cmol ( + ) kg<sup>-1</sup> soil</u>		<u>%</u>
10-40	0.00	4.7	0.15	0.36	58.33

### Newhan Series supplemental profile 3

Location: In False Cape State Park, about 1,800 feet west of Atlantic Ocean and 2.3 miles north of Virginia-North Carolina state line.

C--0 to 72 inches; very pale brown (10YR 7/3) fine sand; single grain, loose; common fine and medium roots; extremely acid.

Table A: Particle-size distribution for Newhan fine sand

Depth	Sand						Silt	Clay
	VC	C	M	F	VF	Total		
<u>inches</u>	<u>g kg<sup>-1</sup> of soil</u>							
10-40	0	12	288	671	29	1000	0	0

Table C. Chemical properties for Newhan fine sand

Depth	Exchangeable cations				CEC	BS
	Ca <sup>2+</sup>	Mg <sup>2+</sup>	K <sup>+</sup>	H <sup>+</sup>		
<u>inches</u>	<u>cmol ( + ) kg<sup>-1</sup> soil</u>					<u>%</u>
10-40	0.01	0.01	0.01	0.80	0.83	3.61

Table D. Chemical properties for Newhan fine sand

Depth	Organic matter	pH	Al <sup>3+</sup>	ECEC	EBS
<u>inches</u>	<u>g kg<sup>-1</sup></u>		<u>cmol ( + ) kg<sup>-1</sup> soil</u>		<u>%</u>
10-40	0.00	3.9	0.10	0.13	23.08

Table E: Mineralogy of the sand fraction for Newhan fine sand

Depth	Minerals Present*					
	Quartz	Feldspar	Mica	Opauques	Heavies	Misc.
<u>inches</u>	<u>g kg<sup>-1</sup> of sand</u>					
10-40	870	40	Tr	0	90	0

\*Opauques = iron minerals including ilmenite, magnetite, hematite, etc. Misc. = rock fragments.

## Newhan Series supplemental profile 4

Location: In False Cape State Park, about 500 feet west of Atlantic Ocean and 3.4 miles north of Virginia-North Carolina state line.

C--0 to 72 inches; light gray (10YR 7/2) fine sand; single grain, loose; few fine roots; extremely acid.

Table A: Particle-size distribution for Newhan fine sand

Depth	Sand						Silt	Clay
	VC	C	M	F	VF	Total		
<u>inches</u>	<u>g kg<sup>-1</sup> of soil</u>							
10-40	0	6	323	649	16	994	6	0

Table C. Chemical properties for Newhan fine sand

Depth	Exchangeable cations				CEC	BS
	Ca <sup>2+</sup>	Mg <sup>2+</sup>	K <sup>+</sup>	H <sup>+</sup>		
<u>inches</u>	<u>cmol ( + ) kg<sup>-1</sup> soil</u>					<u>%</u>
10-40	0.02	0.04	0.01	0.20	0.27	25.93

Table D. Chemical properties for Newhan fine sand

Depth	Organic matter	pH	Al <sup>3+</sup>	ECEC	EBS
<u>inches</u>	<u>g kg<sup>-1</sup></u>		<u>cmol ( + ) kg<sup>-1</sup> soil</u>		<u>%</u>
10-40	0.00	4.1	0.05	0.12	58.33

Table E: Mineralogy of the sand fraction for Newhan fine sand

Depth	Minerals Present*					
	Quartz	Feldspar	Mica	Opakes	Heavies	Misc.
<u>inches</u>	<u>g kg<sup>-1</sup> of sand</u>					
10-40	870	40	Tr	0	90	0

\*Opakes = iron minerals including ilmenite, magnetite, hematite, etc. Misc. = rock fragments.

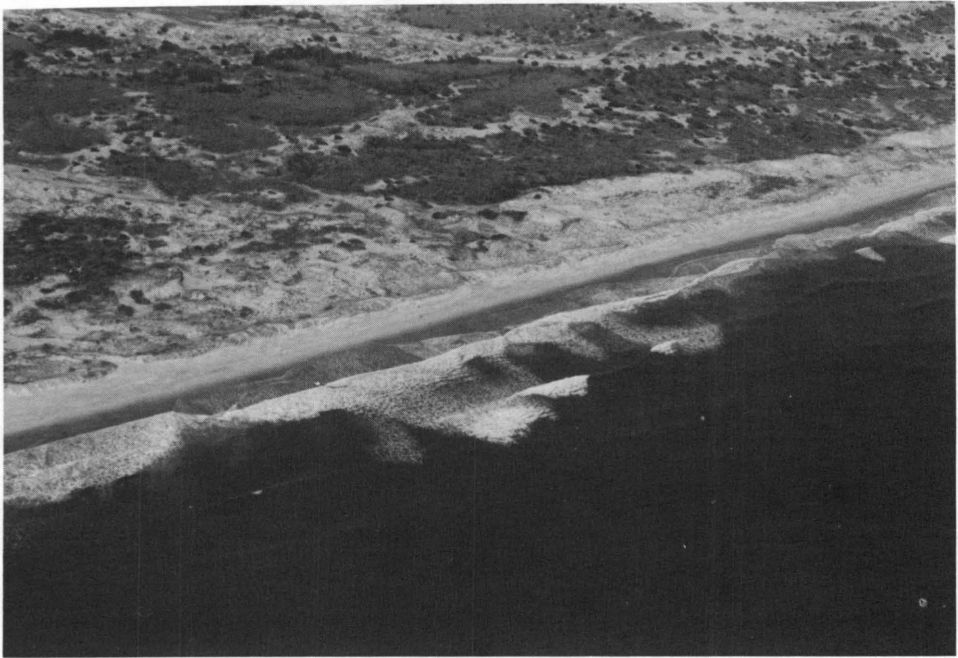


Figure 5: An area of Newhan fine sand on the foredune with Corolla - Duckston fine sand in vegetated areas on the Outer Banks.

## Nimmo Series

The soils of the Nimmo series are deep and poorly drained. They formed in loamy fluvial and marine sediments overlying sandy sediments. Nimmo soils are on inland flats on the lower part of the Coastal Plain. Slopes range from 0 to 2 percent.

Typical pedon of Nimmo loam, 4.5 miles south of Pungo; about 0.85 mile southeast of the junction of Vaughan Road and Princess Anne Road, and 0.8 mile northeast of the junction of Mill Landing Road and Princess Anne Road:

Ap--0 to 7 inches; dark gray (10YR 4/1) loam; weak fine granular structure; friable, nonsticky, slightly plastic; many fine roots; common clean sand grains; strongly acid; abrupt smooth boundary.

B21tg--7 to 14 inches; light gray (10YR 6/1) fine sandy loam; common medium prominent yellowish brown (10YR 5/6) mottles; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; many fine and few medium and coarse roots; many sand grains coated and bridged with clay; strongly acid; clear smooth boundary.

B22tg--14 to 25 inches; gray (10YR 5/1) loam; many medium prominent yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable, slightly sticky, slightly plastic; common fine medium and coarse roots; many sand grains coated and bridged with clay; few thin discontinuous clay films on faces of peds; very strongly acid; clear smooth boundary.

B23tg--25 to 33 inches; gray (10YR 5/1) fine sandy loam; many medium prominent yellowish brown (10YR 5/6) mottles; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; common fine and medium roots; many sand grains coated and bridged with clay; few thin discontinuous clay films on faces of peds; very strongly acid; clear smooth boundary.

IICg--33 to 60 inches; light gray (10YR 7/1) fine sand; single grain; loose; common very fine black mineral grains; few medium yellowish brown (10YR 5/4) sand grains; few coarse sand grains; strongly acid.

Table A: Particle-size distribution for Nimmo loam

Depth	Sand						Silt	Clay
	VC	C	M	F	VF	Total		
inches	g kg <sup>-1</sup> of soil							
0-7	10	61	164	271	10	516	373	111
7-14	10	57	183	324	12	586	268	146
14-25	5	42	132	245	12	437	375	188
25-33	11	68	173	371	11	634	203	163
33-60	4	53	146	777	7	987	9	4

Table C. Chemical properties for Nimmo loam

Depth	Exchangeable cations				CEC	BS
	Ca <sup>2+</sup>	Mg <sup>2+</sup>	K <sup>+</sup>	H <sup>+</sup>		
inches	cmol ( + ) kg <sup>-1</sup> soil					%
0-7	2.24	1.07	0.36	8.28	11.95	30.71
7-14	1.26	0.54	0.07	3.72	5.59	33.45
14-25	1.27	0.23	0.06	7.60	9.16	17.03
25-33	0.74	0.13	0.04	5.41	6.32	14.40
33-60	0.06	0.02	0.02	1.01	1.11	9.01

Table E: Mineralogy of the sand fraction for Nimmo loam

Depth	Minerals Present*					
	Quartz	Feldspar	Mica	Opauques	Heavies	Misc.
inches	g kg <sup>-1</sup> of sand					
7-25	830	150	10	0	10	0

\*Opauques = iron minerals including ilmenite, magnetite, hematite, etc. Misc. = rock fragments.

## Nimmo Series supplemental profile 1

Location: About 3,300 feet north-northwest of Charity Neck Road and Nawney Creek Road and about 4,600 feet south-southwest of Charity Neck Road and Gum Bridge Road.

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

B1tg--9 to 14 inches; light brownish gray (10YR 6/2) fine sandy loam, few fine distinct yellowish brown (10YR 5/8) mottles; massive in place, parting to weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; common very fine roots; common fine and few very fine pores; common sand grains coated and bridged with clay; very strongly acid; clear smooth boundary.

B2tg--14 to 25 inches; light gray (10YR 6/1) loam; few medium distinct yellowish brown (10YR 5/8) mottles; massive in place, parting to weak coarse subangular blocky structure; friable, slightly sticky, slightly plastic; few very fine roots, common fine, very fine and medium pores; many sand grains coated and few bridged with clay; pockets of light gray (5Y 6/1) siltier material (still loam texture); very strongly acid; clear smooth boundary.

IIC1--25 to 32 inches; light brownish gray (2.5Y 6/2) fine sandy loam; common medium faint light yellowish brown (2.5Y 6/4) and common medium distinct olive yellow (2.5Y 6/6) mottles; massive; very friable, nonsticky, nonplastic; few very fine roots; common fine and very fine pores; strongly acid; clear smooth boundary.

IIC2--32 to 48 inches; mottled light yellowish brown (2.5Y 6/4), brown (7.5YR 4/2) and strong brown (7.5YR 5/8) sand; single grain; loose; lower 6 inches brown (7.5YR 4/2) loamy sand; few gravel in lower part of horizon; very stratified; strongly acid; clear smooth boundary.

IIC3--48 to 60 inches; light yellowish brown (2.5Y 6/4) fine sand; few fine distinct reddish yellow (7.5YR 6/8) mottles; single grain; loose; very strongly acid.



Table A: Particle-size distribution for Nimmo fine sandy loam

Depth	Sand						Silt	Clay
	VC	C	M	F	VF	Total		
inches	g kg <sup>-1</sup> of soil							
0-9	10	46	222	220	12	510	460	30
9-14	16	34	230	244	6	530	330	140
14-25	10	30	170	184	6	400	450	150
25-32	13	53	300	342	18	730	140	130
32-48	38	101	378	360	13	890	80	30
48-60	20	45	234	671	10	980	20	0

Table B. Chemical properties for Nimmo fine sandy loam

Depth	CaO	MgO	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	Zn	Mn
inches	lbs acre <sup>-1</sup>				ppm	
0-9	1914	398	250	266	ND	ND
9-14	134	44	134	45	ND	ND
14-25	202	68	53	41	ND	ND
25-32	101	20	61	19	ND	ND
32-48	101	12	28	15	ND	ND
48-60	67	8	37	12	ND	ND

## Nimmo Series supplemental profile 2

Location: About 1,700 feet southwest of Stone Road and Morris Neck Road, 1,100 feet west of Morris Neck Road and 50 feet north of farm lane.

Ap--0 to 11 inches; dark gray (10YR 4/1) loam; weak fine granular structure; friable, slightly sticky, slightly plastic; many very fine and common fine pores; few fine and common very fine roots; moderately acid; abrupt smooth boundary.

B2tg--11 to 27 inches; dark gray (10YR 4/1) fine sandy loam; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; many very fine and fine and common medium pores; few fine and common very fine roots; many sand grains coated and bridged with clay; strongly acid; clear smooth boundary.

C1--27 to 34 inches; mottled gray (10YR 6/1), grayish brown (2.5Y 5/2), and light olive brown (2.5Y 5/4) loamy sand; single grain; friable, nonsticky, nonplastic; strongly acid; clear smooth boundary.

C2--34 to 54 inches; mottled olive (5Y 5/3), dark grayish brown (2.5Y 4/2), and light yellowish brown (2.5Y 6/4) sand; single grain; loose; strongly acid.

IIC3g--54 to 65 inches; mottled and streaked light gray (N 7/), dark gray (N 4/), and strong brown (7.5YR 5/6) loam; massive; friable, sticky, slightly plastic; extremely acid.

Table A: Particle-size distribution for Nimmo loam

Depth	Sand					Total	Silt	Clay
	VC	C	M	F	VF			
inches	g kg <sup>-1</sup> of soil							
0-11	2	26	246	226	10	510	340	150
11-27	0	18	254	272	6	550	300	150
27-34	1	22	362	367	8	760	170	70
34-54	1	38	441	400	10	890	100	10
54-65	2	20	150	112	36	320	440	240

Table B. Chemical properties for Nimmo loam

Depth	CaO	MgO	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	Zn	Mn
inches	lbs acre <sup>-1</sup>				ppm	
0-11	1780	251	250	270	1.0	ND
11-27	336	76	108	34	0.3	ND
27-34	235	64	77	15	0.2	ND
34-54	168	28	79	8	0.3	ND
54-65	403	108	42	52	1.5	ND

### Nimmo Series supplemental profile 3

Location: About 900 feet west of junction of Pleasant Ridge Road and old abandoned railroad bed, about 15 feet from southern field boundary, and 65 feet west of abandoned railroad bed.

Ap--0 to 8 inches; grayish brown (10YR 5/2) loam; weak fine subangular blocky structure; friable, nonsticky, nonplastic; many fine and medium roots; moderately acid; abrupt smooth boundary.

B2tg--8 to 23 inches; grayish brown (2.5Y 5/2) loam; many medium prominent brownish yellow (10YR 6/8) mottles; moderate medium subangular blocky structure; friable, slightly sticky, slightly plastic; common fine, few medium, and few coarse roots; many sand grains coated and bridged with clay; few thin discontinuous clay films on faces of peds; few krotovina partially filled with material from Ap horizon; very strongly acid; gradual smooth boundary.

B3g--23 to 28 inches; gray (10YR 5/1) fine sandy loam; few fine light yellowish brown (10Y 6/4) mottles; weak fine subangular blocky structure; friable; slightly sticky, slightly plastic; common fine and medium roots; many sand grains coated and bridged with clay; many sand grains clean; strongly acid; clear smooth boundary.

C1g--28 to 38 inches; grayish brown (10YR 5/2) loamy fine sand; many medium prominent yellowish brown (10YR 5/6) mottles; massive; very friable, nonsticky, nonplastic; few fine roots; many sand grains stained; few lamella up to 2 inches thick that are light gray to gray (N/6) sandy clay loam; many flakes of mica; many sand grains clean; few very fine, sand-sized, black, rounded mineral grains; strongly acid; abrupt smooth boundary.

IIC2g--38 to 52 inches; light gray (5Y 7/1) fine sand; single grain; loose; few fine roots; common flakes of mica; many black rounded mineral grains, some occurring as thin bands; slightly acid.

IIIC3g--52 to 60 inches; dark gray (N/4) loamy fine sand; massive; very friable; slightly sticky, nonplastic; common flakes of mica; moderately acid; abrupt smooth boundary.

IVC4g--60 to 80 inches; dark gray (N/4) loam; massive; very friable, very sticky, nonplastic; few fine flakes of mica; neutral; abrupt smooth boundary.

VC5g--80 to 100 inches; dark gray (N/4) fine sand; single grain; loose; many sand grains clean; common fine flakes of mica; neutral.

Table A: Particle-size distribution for Nimmo loam

Depth	Sand					Total	Silt	Clay
	VC	C	M	F	VF			
inches	g kg <sup>-1</sup> of soil							
0-8	0	4	47	382	28	459	412	129
8-23	0	1	37	361	24	423	421	156
23-28	0	2	87	613	33	735	146	119
28-38	0	0	41	704	67	812	138	50
38-52	0	1	38	845	59	943	45	12
52-60	0	0	9	690	90	789	154	57
60-80	0	1	8	213	118	340	445	215
80-100	0	0	16	807	67	890	81	29

Table C. Chemical properties for Nimmo loam

Depth	Exchangeable cations				CEC	BS
	Ca <sup>2+</sup>	Mg <sup>2+</sup>	K <sup>+</sup>	H <sup>+</sup>		
inches	cmol ( + ) kg <sup>-1</sup> soil					%
0-8	1.90	1.27	0.09	5.57	8.83	36.92
8-23	0.98	0.56	0.03	6.33	7.90	19.87
23-28	0.70	0.33	0.02	6.58	7.63	13.76
28-38	0.89	0.45	0.03	2.53	3.90	35.13
38-52	0.68	0.19	0.02	1.52	2.41	36.93
52-60	1.90	0.34	0.07	2.28	4.59	50.33
60-80	4.40	0.99	0.22	9.87	15.48	36.24
80-100	1.00	0.30	0.05	8.61	9.96	13.55

Table D. Chemical properties for Nimmo loam

Depth	Organic matter	pH	Al <sup>3+</sup>	ECEC	EBS
inches	g kg <sup>-1</sup>		cmol ( + ) kg <sup>-1</sup> soil		%
0-8	1.83	5.8	0.10	3.36	97.02
8-23	0.75	5.0	0.89	2.46	63.82
23-28	0.75	5.4	0.29	1.34	78.36
28-38	0.23	5.5	0.10	1.47	93.20
38-52	0.08	6.2	0.00	0.89	100.00
52-60	0.41	5.9	0.00	2.31	100.00
60-80	1.05	7.1	0.00	5.61	100.00
80-100	0.23	7.3	0.00	1.35	100.00

Table G: Engineering properties for Nimmo loam

Depth	PVC*	Atterburg Limits		PI*
		LL*	PL*	
inches	lb foot <sup>-2</sup>			
0-8	ND	22.0	17.4	4.6
8-23	ND	22.4	16.5	5.9
60-80	ND	25.1	16.4	8.7

\*PVC = potential volume change, LL = liquid limit, PL = plastic limit, and PI = plasticity index.

### Nimmo Series supplemental profile 4

Location: About 3,200 feet northeast of Oceana Boulevard and Princess Anne Road and 3,700 feet south of Ocean Boulevard and Culver Road.

Ap--0 to 13 inches; dark grayish brown (10YR 4/2) loam; weak fine granular structure; friable; slightly sticky, slightly plastic; few fine and common very fine roots; common very fine and fine pores; strongly acid; abrupt smooth boundary.

B21tg--13 to 23 inches; mottled light gray (10YR 6/1), light brownish gray (2.5Y 6/2) and yellowish brown (10YR 5/8) silt loam; weak coarse prismatic parting to weak subangular blocky structure; friable, slightly sticky, slightly plastic; few very fine roots; common fine and many very fine pores; many sand grains coated and bridged with clay along faces of prisms; extremely acid; clear smooth boundary.

B22tg--23 to 29 inches; mottled light gray (10YR 6/1), light brownish gray (2.5Y 6/2) and yellowish brown (10YR 5/8) loam; weak medium subangular blocky structure; friable; slightly sticky, slightly plastic; few very fine roots; few fine and common very fine pores; many sand grains coated and bridged with clay; extremely acid; clear smooth boundary.

C1--29 to 34 inches; mottled light gray (10YR 6/1), pale brown (10YR 6/3), and brownish yellow (10YR 6/6) fine sandy loam; massive; very friable, nonsticky, nonplastic; extremely acid; clear smooth boundary.

C2--34 to 60 inches; very pale brown (10YR 7/3) sand; common medium distinct yellow (10YR 7/6) mottles; single grain; loose; very strongly acid.

Table A: Particle-size distribution for Nimmo loam

Depth	Sand						Silt	Clay
	VC	C	M	F	VF	Total		
inches	g kg <sup>-1</sup> of soil							
0-13	0	8	208	276	8	500	410	90
13-23	0	2	130	162	6	300	510	190
23-29	0	6	188	210	6	410	460	130
29-34	0	6	302	380	12	700	230	70
34-60	0	5	448	490	7	950	40	10

Table B. Chemical properties for Nimmo loam

Depth	CaO	MgO	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	Zn	Mn
inches	lbs acre <sup>-1</sup>				ppm	
0-13	1108	259	194	139	ND	ND
13-23	672	151	13	60	ND	ND
23-29	336	80	11	41	ND	ND
29-34	235	56	7	30	ND	ND
34-60	168	36	44	19	ND	ND

## *Pamlico Series*

The soils of the Pamlico series are deep and very poorly drained. They formed in partially decomposed organic matter over sandy marine sediments. Pamlico soils are in depressions between Coastal dunes on the lower part of the Coastal Plain.

Typical pedon of Pamlico mucky peat, ponded, about 6,400 feet south-southeast of the junction of Igloo Road and Shore Drive in the central part of Seashore State Park:

Oe--0 to 6 inches; very dark brown (10YR 2/2) mucky peat (hemic material) consisting of partially decomposed roots, leaves, twigs, and moss; 40 percent rubbed fiber; friable; extremely acid; gradual wavy boundary.

Oa--6 to 30 inches; very dark brown (10YR 2/2) muck (sapric material); about 4 percent rubbed fiber; massive; friable; dark yellowish brown (10YR 3/4) sodium pyrophosphate extract; extremely acid; gradual wavy boundary.

IIC--30 to 60 inches; dark grayish brown (10YR 4/2) sand; single grain; loose, nonsticky, nonplastic; very strongly acid.

Table A: Particle-size distribution for Pamlico mucky peat

Depth	Sand						Silt	Clay
	VC	C	M	F	VF	Total		
inches	g kg <sup>-1</sup> of soil							
30-60	1	13	408	439	1	862	120	18

Table C. Chemical properties for Pamlico mucky peat

Depth	Exchangeable cations				CEC	BS
	Ca <sup>2+</sup>	Mg <sup>2+</sup>	K <sup>+</sup>	H <sup>+</sup>		
inches	cmol ( + ) kg <sup>-1</sup> soil					%
0-6	1.37	2.90	1.30	58.60	64.17	8.68
6-30	0.68	2.40	0.24	47.60	50.92	6.52
30-60	0.21	0.27	0.05	7.80	8.33	6.36

Table D. Chemical properties for Pamlico mucky peat

Depth	Organic matter	pH	Al <sup>3+</sup>	ECEC	EBS
inches	g kg <sup>-1</sup>		cmol ( + ) kg <sup>-1</sup> soil		%
0-6	43.33	4.5	1.08	6.65	83.76
6-30	42.99	4.5	0.73	4.05	81.98
30-60	3.21	5.1	0.45	0.98	54.08

Table E: Mineralogy of the sand fraction for Pamlico mucky peat

Depth	Minerals Present*					
	Quartz	Feldspar	Mica	Opauques	Heavies	Misc.
inches	g kg <sup>-1</sup> of sand					
30-60	920	50	0	0	20	0

\*Opauques = iron minerals including ilmenite, magnetite, hematite, etc. Misc. = rock fragments.

## Pamlico Series supplemental profile 1

Location: In Seashore State Park, about 450 feet south of Shore Drive and 1.1 mile east-southeast of Atlantic Avenue and Shore Drive.

Oe--0 to 18 inches; dark reddish brown (5YR 3/3) mucky peat (hemic material); 32 percent rubbed fiber; massive; friable; extremely acid; gradual wavy boundary.

C--18 to 40 inches; very dark grayish brown (10YR 3/2) sand; single grain, loose; nonsticky, nonplastic; extremely acid.

Table A: Particle-size distribution for Pamlico mucky peat

Depth	Sand						Silt	Clay
	VC	C	M	F	VF	Total		
inches	g kg <sup>-1</sup> of soil							
18-40	5	32	519	408	1	965	13	22

Table C. Chemical properties for Pamlico mucky peat

Depth	Exchangeable cations				CEC	BS
	Ca <sup>2+</sup>	Mg <sup>2+</sup>	K <sup>+</sup>	H <sup>+</sup>		
inches	cmol ( + ) kg <sup>-1</sup> soil					%
0-18	2.33	5.40	0.30	53.60	61.63	13.03
18-40	0.15	0.36	0.03	8.00	8.54	6.32

Table D. Chemical properties for Pamlico mucky peat

Depth	Organic matter	pH	Al <sup>3+</sup>	ECEC	EBS
inches	g kg <sup>-1</sup>		cmol ( + ) kg <sup>-1</sup> soil		%
0-18	55.13	4.0	0.83	8.86	90.63
18-40	2.32	4.4	1.05	1.59	33.96

Table E: Mineralogy of the sand fraction for Pamlico mucky peat

Depth	Minerals Present*					
	Quartz	Feldspar	Mica	Opauques	Heavies	Misc.
inches	g kg <sup>-1</sup> of sand					
18-40	940	50	0	0	10	0

\*Opauques = iron minerals including ilmenite, magnetite, hematite, etc. Misc. = rock fragments.

## Pamlico Series supplemental profile 2

Location: In Seashore State Park, about 4,200 feet east of Atlantic Avenue and Shore Drive and 300 feet south of Shore Drive.

Oe--0 to 10 inches; dark brown (7.5YR 3/2) mucky peat (hemic material) consisting of partially decomposed roots, leaves, twigs, and moss; 40 percent rubbed fiber; friable; extremely acid; gradual wavy boundary.

Oa--10 to 38 inches; dark yellowish brown (10YR 3/4) muck (sapric material); about 5 percent rubbed fiber; massive; friable; light yellowish brown (10YR 6/4) sodium pyrophosphate extract; extremely acid; gradual wavy boundary.

IIC--38 to 52 inches; very dark grayish brown (10YR 3/2) sand; single grain, loose; nonsticky, nonplastic; extremely acid.

Table A: Particle-size distribution for Pamlico mucky peat

Depth	Sand						Silt	Clay
	VC	C	M	F	VF	Total		
inches	g kg <sup>-1</sup> of soil							
38-52	2	45	562	321	2	932	38	30

Table C. Chemical properties for Pamlico mucky peat

Depth	Exchangeable cations				CEC	BS
	Ca <sup>2+</sup>	Mg <sup>2+</sup>	K <sup>+</sup>	H <sup>+</sup>		
inches	cmol ( + ) kg <sup>-1</sup> soil					%
0-10	4.46	5.00	1.20	20.00	30.66	34.77
10-38	0.22	1.20	0.17	34.60	36.19	4.39
38-52	0.08	0.37	0.13	9.60	10.18	5.70

Table D. Chemical properties for Pamlico mucky peat

Depth	Organic matter	pH	Al <sup>3+</sup>	ECEC	EBS
inches	g kg <sup>-1</sup>		cmol ( + ) kg <sup>-1</sup> soil		%
0-10	55.48	4.3	0.93	11.59	91.98
10-38	53.75	4.0	2.85	4.44	35.81
38-52	6.52	4.3	1.45	2.03	28.57

Table E: Mineralogy of the sand fraction for Pamlico mucky peat

Depth	Minerals Present*					
	Quartz	Feldspar	Mica	Opauques	Heavies	Misc.
inches	g kg <sup>-1</sup> of sand					
38-52	950	50	0	0	Tr	0

\*Opauques = iron minerals including ilmenite, magnetite, hematite, etc. Misc. = rock fragments.

### Pamlico Series supplemental profile 3

Location: In Seashore State Park, about 1.2 mile south of Shore Drive and 1.3 mile west of Atlantic Avenue.

Oa--0 to 19 inches; very dark brown (10YR 2/2) muck (sapric material); about 6 percent rubbed fiber; dark yellowish brown (10YR 4/4) sodium pyrophosphate extract; extremely acid; gradual wavy boundary.

Oa-C--19 to 32 inches; very dark brown (10YR 2/2) loamy sand high in organic material; massive; friable; extremely acid; gradual wavy boundary.

IIC--32 to 40 inches; very dark grayish brown (10YR 3/2) sand; single grain, loose; nonsticky, nonplastic; extremely acid.



Table A: Particle-size distribution for Pamlico muck

Depth	Sand						Silt	Clay
	VC	C	M	F	VF	Total		
inches	g kg <sup>-1</sup> of soil							
19-32	29	81	400	267	1	778	127	95
32-40	4	73	552	320	3	952	26	22

Table C. Chemical properties for Pamlico muck

Depth	Exchangeable cations				CEC	BS
	Ca <sup>2+</sup>	Mg <sup>2+</sup>	K <sup>+</sup>	H <sup>+</sup>		
inches	cmol ( + ) kg <sup>-1</sup> soil					%
0-19	3.51	6.20	0.37	52.20	62.28	16.18
19-32	0.76	4.40	0.08	28.40	33.64	15.58
32-40	0.25	0.56	0.03	5.80	6.64	12.65

Table D. Chemical properties for Pamlico muck

Depth	Organic matter	pH	Al <sup>3+</sup>	ECEC	EBS
inches	g kg <sup>-1</sup>		cmol ( + ) kg <sup>-1</sup> soil		%
0-19	55.13	4.3	0.68	10.76	93.68
19-32	42.99	4.0	2.65	7.89	66.41
32-40	2.73	4.3	0.85	1.69	49.70

## Pamlico Series supplemental profile 4

Location: In Seashore State Park, about 1.2 mile south of Shore Drive and 1.3 mile west of Atlantic Avenue.

Oe--0 to 4 inches; very dark brown (10YR 2/2) mucky peat (hemic material); 36 percent rubbed fiber; extremely acid; gradual wavy boundary.

Oa--4 to 40 inches; very dark brown (10YR 2/2) muck (sapric material); about 12 percent rubbed fiber; massive; dark yellowish brown (10YR 4/4) sodium pyrophosphate extract; very strongly acid; gradual wavy boundary.

IIC--40 to 50 inches; grayish brown (10YR 5/2) fine sand; single grain, loose; nonsticky, nonplastic; very strongly acid.

Table A: Particle-size distribution for Pamlico mucky peat

Depth	Sand					Total	Silt	Clay
	VC	C	M	F	VF			
inches	g kg <sup>-1</sup> of soil							
40-50	12	34	430	502	3	981	1	18

Table C. Chemical properties for Pamlico mucky peat

Depth	Exchangeable cations				CEC	BS
	Ca <sup>2+</sup>	Mg <sup>2+</sup>	K <sup>+</sup>	H <sup>+</sup>		
inches	cmol ( + ) kg <sup>-1</sup> soil					%
0-4	3.32	5.10	1.50	27.50	37.42	26.51
4-40	1.88	6.30	0.25	41.00	49.43	17.05
40-50	0.13	0.42	0.03	5.40	5.98	9.70

Table D. Chemical properties for Pamlico mucky peat

Depth	Organic matter	pH	Al <sup>3+</sup>	ECEC	EBS
inches	g kg <sup>-1</sup>		cmol ( + ) kg <sup>-1</sup> soil		%
0-4	53.13	4.2	1.03	10.95	90.59
4-40	52.79	4.6	1.03	9.46	89.11
40-50	2.62	5.0	0.55	1.13	51.33

## Pocaty Series

The soils of the Pocaty series are deep and very poorly drained. They formed in partially decomposed plant remains and are in the lower part of the Coastal Plain. Slopes range from 0 to 1 percent.

Typical pedon of Pocaty peat, about 4,800 feet east of the intersection of Indian Creek Road and Blackwater Road, 900 feet north of Milldam Creek:

Oi--0 to 12 inches; very dark brown (10YR 2/2) peat (fibric material) comprised of partially decomposed leaves, stems, and roots; about 75 percent fiber rubbed; massive; many fine and medium roots; weak sulfide odor; strongly acid; gradual smooth boundary.

Oe--12 to 20 inches; very dark brown (10YR 2/2) mucky peat (hemic material); about 35 percent rubbed fiber; massive; many fine and medium roots; moderate sulfide odor; moderately acid; clear smooth boundary.

Oa1--20 to 41 inches; black (10YR 2/1) muck (sapric material); about 15 percent fiber rubbed; massive; common fine and medium roots; flows easily between fingers when squeezed; moderate sulfide odor; slightly acid; clear smooth boundary.

Oa2--41 to 48 inches; black (10YR 2/1) muck (sapric material); less than 5 percent fiber rubbed; massive; few fine and medium roots; flows easily between fingers when squeezed; moderate sulfide odor; slightly acid; clear smooth boundary.

Oa3--48 to 60 inches; dark gray (10YR 4/1) muck (sapric material); less than 5 percent fiber rubbed; massive; flows easily between fingers when squeezed; moderate sulfide odor; slightly acid; clear smooth boundary.

IICg--60 to 80 inches; dark gray (10YR 4/1) silt loam; massive; slightly sticky, nonplastic; flows easily between fingers when squeezed; slightly acid.

Table H: Chemical properties for Pocaty peat

Depth	Sulfur	CaCO <sub>3</sub>	pH
<u>inches</u>	<u>g kg<sup>-1</sup> of soil</u>		
0-12	23.9	ND	5.1
12-20	30.0	ND	5.7
20-41	36.3	ND	6.1
41-48	ND	ND	6.2
48-60	ND	ND	6.1
60-80	ND	ND	6.1

## Pocaty Series supplemental profile 1

Location: About 1.0 mile east-southeast of Hungarian Road and Blackwater Road and 200 feet west of Blackwater Creek.

Oi--0 to 17 inches, very dark grayish brown (10YR 3/2) peat (fibric material) comprised of partially decomposed leaves, stems, and roots; about 72 percent fiber rubbed; massive; many fine and medium roots; weak sulfide odor; extremely acid; gradual smooth boundary.

Oa--17 to 80 inches, dark brown (10YR 3/3) muck (sapric material); about 15 percent fiber rubbed; massive; common fine and medium roots; flows easily between fingers when squeezed; moderate sulfide odor; extremely acid.

Note: Mild sulfur odor, vegetation of needlerush and cordgrass.

Table I: Chemical properties for Pocaty peat

Depth	Unrubbed	Rubbed	pH	Sulfur
<u>inches</u>	<u>% Fiber Volume</u>			<u>g kg<sup>-1</sup></u>
0-17	32	24	4.2	14.2
17-80	40	4	3.9	14.3

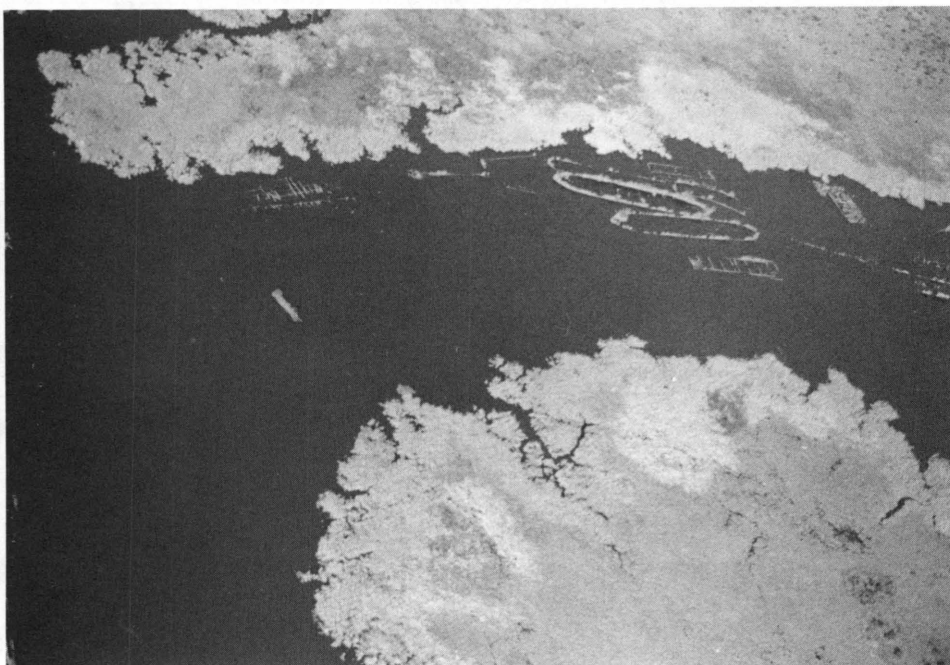


Figure 6: An area of Pocaty peat in marshes along North Landing River.

## Portsmouth Series

The soils of the Portsmouth series are deep and very poorly drained. They formed in loamy marine and fluvial sediments overlying sandy sediments. Portsmouth soils are in inland depressions and on flats on the lower part of the Coastal Plain. Slopes range from 0 to 2 percent.

Typical pedon of Portsmouth loam, about 3,650 feet southeast of junction of Gum Bridge and Charity Neck Roads, 4,000 feet northeast of junction of Charity Neck and Nawney Creek Roads:

A1--0 to 13 inches; very dark gray (10YR 3/1) loam; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; common very fine and fine roots; many fine pores; extremely acid; clear smooth boundary.

B21tg--13 to 21 inches; dark grayish brown (10YR 4/2) silt loam; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; common very fine, and few fine roots; few fine pores; few sand grains coated and bridged with clay; extremely acid; clear wavy boundary.

B22tg--21 to 25 inches; grayish brown (2.5Y 5/2) silt loam; few medium faint light yellowish brown (10YR 6/4) mottles; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; few fine and common very fine pores; thin patchy clay films on faces of peds; extremely acid; clear smooth boundary.

IIB23tg--25 to 32 inches; dark brown (10YR 4/2) sandy loam; weak fine and medium subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; common very fine and fine pores; thin patchy clay films on faces of peds; extremely acid; clear smooth boundary.

IIB3tg--32 to 36 inches; grayish brown (10YR 5/2) sandy loam; many coarse distinct brownish yellow (10YR 6/6), and few fine prominent red (2.5YR 4/8) mottles; moderate medium subangular blocky structure; firm, slightly sticky, plastic; few fine roots; common very fine and fine pores; few sand grains coated and bridged with clay; thin layer of silty clay loam in lower part; extremely acid; clear smooth boundary.

IIC1--36 to 42 inches; mottled olive yellow (2.5Y 6/6), grayish brown (2.5Y 5/2), and light gray (10YR 7/2) fine sand; single grain; loose; extremely acid; abrupt smooth boundary.

IIC2--42 to 60 inches; stratified light gray (10YR 7/1), yellowish brown (10YR 5/8), and gray (N 6/0) loamy sand and sandy loam; sandy loam is massive, friable, and slightly plastic; loamy sand is single grain, loose, nonsticky, and nonplastic; extremely acid.

Table A: Particle-size distribution for Portsmouth loam

Depth	Sand					Total	Silt	Clay
	VC	C	M	F	VF			
inches	g kg <sup>-1</sup> of soil							
0-13	2	6	74	181	12	275	459	266
13-21	0	5	43	136	9	193	564	243
21-25	0	4	43	163	10	220	541	239
25-32	0	13	111	427	24	575	253	172
32-36	0	11	139	621	49	820	102	78
36-42	1	13	256	602	7	879	75	46
42-60	2	49	374	345	11	781	97	122

Table B. Chemical properties for Portsmouth loam

Depth	CaO	MgO	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	Zn	Mn
inches	lbs acre <sup>-1</sup>				ppm	
0-13	302	151	29	26	ND	ND
13-21	34	28	26	12	ND	ND
21-25	34	24	26	12	ND	ND
25-32	34	32	31	12	ND	ND
32-36	34	24	24	8	ND	ND
36-42	34	24	28	8	ND	ND
42-60	108	346	48	26	ND	ND

Table C. Chemical properties for Portsmouth loam

Depth	Exchangeable cations				CEC	BS
	Ca <sup>2+</sup>	Mg <sup>2+</sup>	K <sup>+</sup>	H <sup>+</sup>		
inches	cmol ( + ) kg <sup>-1</sup> soil					%
0-13	0.51	0.70	0.13	37.60	38.94	3.44
13-21	0.00	0.06	0.03	19.20	19.29	0.47
21-25	0.00	0.04	0.03	20.80	20.87	0.34
25-32	0.00	0.12	0.03	12.60	12.75	1.18
32-36	0.00	0.04	0.01	4.20	4.25	1.18
36-42	0.00	0.05	0.00	2.40	2.45	2.04
42-60	0.13	1.09	0.05	2.80	4.07	31.20

Table D. Chemical properties for Portsmouth loam

Depth	Organic matter	pH	Al <sup>3+</sup>	ECEC	EBS
inches	g kg <sup>-1</sup>		cmol ( + ) kg <sup>-1</sup> soil		%
0-13	13.73	3.9	8.85	10.19	13.15
13-21	3.05	4.0	5.45	5.54	1.62
21-25	2.70	4.1	4.65	4.72	1.48
25-32	1.26	4.0	4.55	4.70	3.19
32-36	0.00	4.0	1.65	1.70	2.94
36-42	0.03	4.2	0.85	0.90	5.56
42-60	0.03	4.2	1.15	2.42	52.48

## Portsmouth Series supplemental profile 1

Location: About 2,500 feet east-northeast of Pungo Ferry Road and Princess Anne Road and 120 feet north of gravel road.

Ap--0 to 11 inches; very dark gray (10YR 3/1) loam; weak fine granular structure; friable, slightly sticky, slightly plastic; few fine pores; common fine and medium roots; strongly acid; clear smooth boundary.

B2ltg--11 to 20 inches; light gray (10YR 7/1) silty clay loam; common medium distinct yellow (10YR 7/8) and common coarse faint gray (10YR 6/1) mottles; weak fine subangular blocky structure; friable; slightly sticky, slightly plastic; few medium pores; few fine roots; few thin dis-

continuous clay films on faces of peds; many sand grains coated and bridged with clay; strongly acid; clear smooth boundary.

IIB2ltg--20 to 30 inches; gray (10YR 6/1) loam; weak fine subangular blocky structure; friable; slightly sticky, slightly plastic; common fine and medium pores; few fine roots; many sand grains coated and bridged with clay; strongly acid; clear smooth boundary.

IICg--30 to 60 inches; light gray (10YR 7/1) fine sand; single grain; loose; have few pockets of fine sandy loam up to 4 inches in diameter in 45 to 51 inch layer; strongly acid.

Table A: Particle-size distribution for Portsmouth loam

Depth	Sand					Total	Silt	Clay
	VC	C	M	F	VF			
inches	g kg <sup>-1</sup> of soil							
0-11	0	22	188	230	22	462	330	208
11-20	0	4	56	78	12	150	522	328
20-30	0	8	132	180	32	352	460	188
30-60	2	35	400	519	6	925	36	39

Table B. Chemical properties for Portsmouth loam

Depth	CaO	MgO	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	Zn	Mn
inches	lbs acre <sup>-1</sup>				ppm	
0-11	1281	288	147	67	ND	ND
11-20	196	43	17	14	ND	ND
20-30	168	36	22	14	ND	ND
30-60	84	16	39	10	ND	ND

## Portsmouth Series supplemental profile 2

Location: About 700 feet east-northeast of Princess Anne Road and Landing Road and 1,800 feet southeast of Princess Anne Road and Munden Point Road in center of Carolina Bay.

Ap--0 to 11 inches; very dark gray (10YR 3/1) loam; weak fine granular structure; friable, slightly sticky, slightly plastic; many fine roots; moderately acid; abrupt smooth boundary.

A1--11 to 15 inches; mottled very dark gray (10YR 3/1) and dark grayish brown (10YR 4/2) loam; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; many very fine and fine pores; common very fine and fine roots; very strongly acid; clear smooth boundary.

B2tg--15 to 30 inches; gray (10YR 5/1) loam; few fine prominent strong brown (7.5YR 5/6) and common coarse faint light gray (10YR 6/1) mottles; weak coarse prismatic parting to weak medium subangular blocky structure; friable; slightly sticky, slightly plastic; common very fine, fine, and medium pores; few very fine and fine roots; roots are along vertical prism faces; many sand grains coated and bridged with clay; very strongly acid; abrupt smooth boundary.

IICg--30-60 inches; light gray (10YR 7/1) fine sand; single grain; loose; strongly acid.

Table A: Particle-size distribution for Portsmouth loam

Depth	Sand					Total	Silt	Clay
	VC	C	M	F	VF			
inches	g kg <sup>-1</sup> of soil							
0-11	1	16	120	233	20	390	490	120
11-15	4	18	124	204	20	370	440	190
15-30	2	14	106	182	16	320	470	210
30-60	4	50	385	514	17	970	5	25

Table B. Chemical properties for Portsmouth loam

Depth	CaO	MgO	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	Zn	Mn
inches	lbs acre <sup>-1</sup>				ppm	
0-11	3358	398	250	375	ND	ND
11-15	739	259	55	63	ND	ND
15-30	403	173	29	48	ND	ND
30-60	34	16	28	12	ND	ND

### Portsmouth Series supplemental profile 3

Location: About 100 feet south of junction of Pocahontas Road and Princess Anne Road, and 100 feet south of Princess Anne Road.

Ap--0 to 11 inches; black (10YR 2/1) fine sandy loam; weak fine granular structure; friable; slightly sticky, slightly plastic; many fine and medium roots; strongly acid; abrupt smooth boundary.

B21tg--11 to 19 inches; dark grayish brown (10YR 4/2) sandy loam; many medium distinct grayish brown (2.5Y 5/2) and black (10YR 2/1) mottles; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; common fine and medium roots; common thin discontinuous clay films on faces of peds; many sand grains bridged with clay; very strongly acid; diffuse smooth boundary.

B22tg--19 to 27 inches; dark grayish brown (10YR 4/2) fine sandy loam; many medium distinct grayish brown (2.5Y 5/2) mottles; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; common fine and medium roots; common thin discontinuous clay films on faces of peds; many sand grains bridged with clay; strongly acid; clear smooth boundary.

IIC1--27 to 31 inches; very dark grayish brown (10YR 3/2) sand, many medium distinct dark yellowish brown (10YR 3/4) and light brownish gray (10YR 6/2) mottles; single grain loose; few fine roots; strongly acid; diffuse smooth boundary.

IIC2--31 to 49 inches; dark reddish brown (5YR 3/4) fine sand; common medium distinct brownish yellow (10YR 6/6) lamella; single grain, loose; few medium roots; strongly acid; diffuse smooth boundary.

IIC3--49 to 68 inches; dark yellowish brown (10YR 3/4) sand; single grain; loose; strongly acid; gradual smooth boundary.



Table A: Particle-size distribution for Portsmouth fine sandy loam

Depth	Sand						Silt	Clay
	VC	C	M	F	VF	Total		
inches	g kg <sup>-1</sup> of soil							
0-11	1	39	297	328	7	672	232	96
11-19	1	43	270	291	6	610	235	155
19-27	0	34	235	260	5	535	312	153
27-31	1	67	404	406	5	883	67	50
31-49	0	48	409	512	5	974	10	16
49-68	2	79	405	489	9	984	5	11

Table C. Chemical properties for Portsmouth fine sandy loam

Depth	Exchangeable cations				CEC	BS
	Ca <sup>2+</sup>	Mg <sup>2+</sup>	K <sup>+</sup>	H <sup>+</sup>		
inches	cmol ( + ) kg <sup>-1</sup> soil					%
0-11	2.15	1.04	0.12	9.04	12.35	26.80
11-19	0.58	0.32	0.07	9.39	10.36	9.36
19-27	0.50	0.24	0.06	11.13	11.93	6.71
27-31	0.22	0.06	0.02	7.13	7.43	4.04
31-49	0.22	0.04	0.01	5.91	6.18	4.37
49-68	0.08	0.02	0.01	3.83	3.94	2.79

Table D. Chemical properties for Portsmouth fine sandy loam

Depth	Organic matter	pH	Al <sup>3+</sup>	ECEC	EBS
inches	g kg <sup>-1</sup>		cmol ( + ) kg <sup>-1</sup> soil		%
0-11	1.13	5.2	0.60	3.91	84.65
11-19	0.39	4.7	2.32	3.29	29.48
19-27	0.48	5.1	1.80	2.60	30.77
27-31	0.35	5.2	0.69	0.99	30.30
31-49	0.25	5.4	0.43	0.70	38.57
49-68	0.17	5.5	0.26	0.37	29.73

Table E: Mineralogy of the sand fraction for Portsmouth fine sandy loam

Depth	Minerals Present*					
	Quartz	Feldspar	Mica	Opaques	Heavies	Misc.
inches	g kg <sup>-1</sup> of sand					
11-19	870	60	40	0	30	0
19-27	910	70	10	0	10	0
49-68	890	70	0	0	40	0

\*Opaques = iron minerals including ilmenite, magnetite, hematite, etc. Misc. = rock fragments.

Table F: Mineralogy of the clay fraction for Portsmouth fine sandy loam

Depth	Minerals Present*							
	Kao	HIV	Verm	Mont	Mica	Fld	Qtz	Gibb
inches	g kg <sup>-1</sup> of clay							
11-19	350	500	0	0	0	0	100	50
19-27	300	500	0	0	0	0	125	75
49-68	200	500	0	0	0	0	200	100

\*Kao = kaolinite, HIV = hydroxy interlayered vermiculite, Verm = vermiculite, Mont = montmorillonite, Fld = feldspar, Qtz = quartz, and Gibb = gibbsite.

Table G: Engineering properties for Portsmouth fine sandy loam

Depth	PVC*	Atterburg Limits		PI*
		LL*	PL*	
inches	lb foot <sup>-2</sup>			
11-19	750	19.1	15.0	4.13
19-27	800	23.9	20.7	3.19
31-49	0	0	0	0

\*PVC = potential volume change, LL = liquid limit, PL = plastic limit, and PI = plasticity index.

## *Rappahannock Series*

The soils of the Rappahannock series are deep and very poorly drained. They formed from partially decomposed organic materials and strata of loamy marine and fluvial sediments. The Rappahannock soils are on tidal marshes on the lower part of the Coastal Plain. Slopes are less than 1 percent.

### **Rappahannock Series supplemental profile 1**

Location: In marsh next to Lynnhaven River.

Oe--0 to 13 inches; dark grayish brown (10YR 4/2) mucky peat (hemic material); about 44% rubbed fiber; massive; nonsticky; many fine and medium roots; strong sulfide odor; moderately alkaline; clear smooth boundary.

Oa--13 to 41 inches; very dark grayish brown (10YR 3/2) muck (sapric material); about 8 percent fiber rubbed; massive; nonsticky; common fine and medium roots; flows easily between fingers when squeezed; strong sulfide odor; moderately alkaline; abrupt smooth boundary.

IIC--41 to 52 inches; dark greenish gray (5GY 4/1) silty clay; massive; slightly sticky, non-plastic; flows easily between fingers when squeezed; moderately alkaline; abrupt smooth boundary.

IIIOa--52 to 80 inches; black (10YR 2/1) muck (sapric material); about 11 percent fiber rubbed; massive; flows easily between fingers when squeezed; strong sulfide odor; light yellowish brown (10YR 6/4) sodium pyrophosphate extract; moderately alkaline.

Table A: Particle-size distribution for Rappahannock mucky peat

Depth	Sand					Total	Silt	Clay
	VC	C	M	F	VF			
inches	g kg <sup>-1</sup> of soil							
41-52	23	32	38	33	19	145	421	434

## Rappahannock Series supplemental profile 2

Location: In marsh next to Lynnhaven River.

C--0 to 12 inches; dark gray (5Y 4/1) clay; massive; slightly sticky, nonplastic; many fine and medium roots; strong sulfide odor; abrupt smooth boundary.

IIOe--12 to 20 inches; very dark grayish brown (10YR 3/2) mucky peat (hemic material); about 32% rubbed fiber; massive; common fine and medium roots; strong sulfide odor; clear smooth boundary.

IIOa--20 to 36 inches; very dark gray (10YR 3/1) muck (sapric material); about 10 percent rubbed fiber; massive; common fine and medium roots; flows easily between fingers when squeezed; strong sulfide odor; abrupt smooth boundary.

IIIC--36 to 48 inches; dark gray (10YR 4/1) clay; massive slightly sticky, nonplastic; strong sulfide odor; abrupt smooth boundary.

IVC--48 to 55 inches; very dark gray (10YR 3/1) loamy fine sand; massive; slightly sticky, slightly plastic; strong sulfide odor; abrupt smooth boundary.

VOa--55 to 80 inches; very dark gray (10YR 3/1) muck (sapric material); about 10 percent rubbed fiber; massive; flows easily between fingers when squeezed; strong sulfide odor.

Table A: Particle-size distribution for Rappahannock clay

Depth	Sand					Total	Silt	Clay
	VC	C	M	F	VF			
inches	g kg <sup>-1</sup> of soil							
36-48	8	32	101	215	19	375	190	435
48-55	13	33	221	554	21	842	59	99

## Rappahannock Series supplemental profile 3

Location: In marsh next to Lynnhaven River.

C--0 to 8 inches; dark gray (5Y 4/1) silty clay; massive; slightly sticky, nonplastic; many fine and medium roots; strong sulfide odor; abrupt smooth boundary.

IIOa--8 to 34 inches; very dark grayish brown (10YR 3/2) muck (sapric material); about 10 percent fiber rubbed; massive; flows easily between fingers when squeezed; common fine and medium roots; strong sulfide odor; abrupt smooth boundary.

IICg--34 to 69 inches; dark greenish gray (5GY 4/1) silty clay loam; massive; slightly sticky, nonplastic; few fine roots; strong sulfide odor; abrupt smooth boundary.

IVOa--69 to 80 inches; dark gray (10YR 4/1) muck (sapric material); about 9 percent fiber rubbed; massive; flows easily between fingers when squeezed; strong sulfide odor.

Table A: Particle-size distribution for Rappahannock silty clay

Depth	Sand					Total	Silt	Clay
	VC	C	M	F	VF			
inches	g kg <sup>-1</sup> of soil							
34-69	4	9	13	20	23	69	504	427

## Rappahannock Series supplemental profile 4

Location: In marsh next to Elizabeth River.

Oe--0 to 15 inches; very dark grayish brown (10YR 3/2) mucky peat (hemic material); about 46 percent fiber rubbed; massive; many fine and medium roots; strong sulfide odor; clear smooth boundary.

Oa--15 to 32 inches; very dark grayish brown (10YR 3/2) muck (sapric material); about 10 percent fiber rubbed; massive; common fine and medium roots; flows easily between fingers when squeezed; strong sulfide odor; abrupt smooth boundary.

IIC1--32 to 42 inches; dark gray (5Y 4/1) clay; massive; slightly sticky, slightly plastic; few fine and medium roots; strong sulfide odor; clear smooth boundary.

IIC2--42 to 60 inches; dark greenish gray (5GY 4/1) silty clay; massive; slightly sticky, slightly plastic; few fine roots; strong sulfide odor; clear smooth boundary.

IIC3--60 to 80 inches; dark greenish gray (5GY 4/1) silty clay high in organic matter; massive; flows easily between fingers when squeezed; strong sulfide odor.

Table A: Particle-size distribution for Rappahannock mucky peat

Depth	Sand					Total	Silt	Clay
	VC	C	M	F	VF			
inches	g kg <sup>-1</sup> of soil							
32-42	8	21	27	30	17	103	279	618
42-60	1	11	10	11	14	47	479	474
60-80	15	24	21	28	27	115	446	439

## Rumford Series

The soils of the Rumford series are deep and well drained. They formed in sandy fluvial and marine sediments. Rumford soils are on inland areas on the lower part of the Coastal Plain. Slopes range from 6 to 35 percent.

Typical pedon of Rumford fine sandy loam, 6 to 35 percent slope, 2,700 feet northeast of intersection of First Colonial and Old Donation Parkway and 6000 feet southeast of the intersection of First Colonial Road and Great Neck Road:

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

A2--3 to 10 inches; yellowish brown (10YR 5/4) fine sandy loam; weak medium subangular blocky structure; friable, nonsticky, nonplastic; few fine and common medium and coarse roots; common medium and fine pores; extremely acid; gradual wavy boundary.

B21t--10 to 16 inches; strong brown (7.5YR 5/6) sandy clay loam; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; few fine and medium roots; common fine and medium pores; many sand grains coated and bridged with clay; extremely acid; clear smooth boundary.

B22t--16 to 27 inches; strong brown (7.5YR 5/6) fine sandy loam; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; few fine and medium roots; few fine pores; many sand grains coated and bridged with clay; few pockets up to 2 inches in diameter of brownish yellow (10YR 6/6) loamy coarse sand; very strongly acid; clear smooth boundary.

B23t--27 to 41 inches; strong brown (7.5YR 5/6) fine sandy loam; weak medium subangular blocky structure; friable, nonsticky, slightly plastic; few fine roots; few fine pores; many sand grains coated and bridged with clay; few pockets up to 1 inch in diameter of brownish yellow (10YR 6/6) loamy coarse sand; very strongly acid; gradual wavy boundary.

B3--41 to 46 inches; strong brown (7.5YR 5/6) loamy fine sand; weak medium subangular blocky structure; friable, nonsticky, nonplastic; few fine pores; few pockets up to 1 inch in diameter of brownish yellow (10YR 6/6) loamy coarse sand; strongly acid; clear wavy boundary.

C1--46 to 54 inches; yellowish brown (10YR 5/8) fine sand; single grain; loose; few strata of strong brown (7.5YR 5/6) fine sand; strongly acid; clear wavy boundary.

C2--54 to 72 inches; light yellowish brown (10YR 6/4) fine sand; few fine distinct light gray (10YR 6/1) mottles; single grain; loose; strongly acid.

Table A: Particle-size distribution for Rumford fine sandy loam

Depth	Sand					Total	Silt	Clay
	VC	C	M	F	VF			
inches	g kg <sup>-1</sup> of soil							
0-3	16	37	303	322	13	691	255	54
3-10	10	30	309	359	11	719	195	86
10-16	37	60	272	314	5	688	74	238
16-27	115	143	253	312	3	826	24	150
27-41	5	11	104	734	5	859	4	137
41-46	0	2	28	824	9	863	13	124
46-54	0	1	43	860	4	908	1	91
54-72	1	2	29	904	12	948	0	52

Table B. Chemical properties for Rumford fine sandy loam

Depth	CaO	MgO	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	Zn	Mn
inches	lbs acre <sup>-1</sup>				ppm	
0-3	384	114	20	50	ND	ND
3-10	96	34	16	34	ND	ND
10-16	168	148	18	88	ND	ND
16-27	144	208	22	88	ND	ND
27-41	120	240	24	84	ND	ND
41-46	120	240	26	62	ND	ND
46-54	96	198	36	56	ND	ND
54-72	96	86	44	34	ND	ND

Table C. Chemical properties for Rumford fine sandy loam

Depth	Exchangeable cations				CEC	BS
	Ca <sup>2+</sup>	Mg <sup>2+</sup>	K <sup>+</sup>	H <sup>+</sup>		
inches	cmol ( + ) kg <sup>-1</sup> soil					%
0-3	0.89	0.64	0.11	19.20	20.84	7.87
3-10	0.18	0.17	0.05	7.80	8.20	4.88
10-16	0.47	0.84	0.18	12.20	13.69	10.88
16-27	0.28	0.97	0.16	10.20	11.61	12.14
27-41	0.25	1.34	0.17	8.00	9.76	18.03
41-46	0.19	1.47	0.15	7.00	8.81	20.54
46-54	0.19	0.91	0.08	8.00	9.18	12.85
54-72	0.12	0.41	0.04	6.60	7.17	7.95

Table D. Chemical properties for Rumford fine sandy loam

Depth	Organic matter	pH	Al <sup>3+</sup>	ECEC	EBS
inches	g kg <sup>-1</sup>		cmol ( + ) kg <sup>-1</sup> soil		%
0-3	7.07	3.7	2.95	4.59	35.73
3-10	0.94	4.3	1.65	2.05	19.51
10-16	0.77	4.4	4.25	5.74	25.96
16-27	0.48	4.6	2.25	3.66	38.52
27-41	0.24	4.9	1.75	3.51	50.14
41-46	0.44	5.1	0.95	2.76	65.58
46-54	0.35	5.1	0.65	1.83	64.48
54-72	0.31	5.2	0.35	0.92	61.96

## Rumford Series supplemental profile 1

Location: About 440 feet northwest of Bayside Junior High School and 4,700 feet southeast of Diamond Spring Road and Northampton Boulevard.

A1--0 to 6 inches; black (10YR 2/1) loamy coarse sand; single grain; loose, common very fine, fine, and medium roots; common very fine pores; extremely acid; clear smooth boundary.

C1--6 to 16 inches; yellowish brown (10YR 5/4) loamy coarse sand; single grain; loose; common very fine, fine, and medium roots; common very fine, fine, and medium pores; extremely acid; gradual wavy boundary.

C2--16 to 27 inches; light yellowish brown (10YR 6/4) loamy sand; single grain; friable, nonsticky, nonplastic; few fine and very fine roots and few fine and very fine pores; extremely acid; gradual wavy boundary.

C3--27 to 72 inches; light gray (10YR 7/2) sand; single grain; loose; yellowish brown (10YR 5/6) discontinuous lamella less than 1/4 inch thick; lamella are usually loamy sand and have a total thickness of less than 6 inches; very strongly acid.

Table A: Particle-size distribution for Rumford loamy coarse sand

Depth	Sand						Silt	Clay
	VC	C	M	F	VF	Total		
inches	g kg <sup>-1</sup> of soil							
0-6	76	227	260	247	1	811	151	38
6-16	101	187	258	282	18	846	113	41
16-27	80	97	260	372	35	844	102	54
27-72	12	114	546	288	11	971	5	24

Table B. Chemical properties for Rumford loamy coarse sand

Depth	CaO	MgO	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	Zn	Mn
inches	lbs acre <sup>-1</sup>				ppm	
0-6	216	40	40	44	ND	ND
6-16	96	14	22	22	ND	ND
16-27	48	6	20	22	ND	ND
27-72	72	6	18	12	ND	ND

Table C. Chemical properties for Rumford loamy coarse sand

Depth	Exchangeable cations				CEC	BS
	Ca <sup>2+</sup>	Mg <sup>2+</sup>	K <sup>+</sup>	H <sup>+</sup>		
inches	cmol ( + ) kg <sup>-1</sup> soil					%
0-6	0.42	0.20	0.06	16.00	16.68	4.08
6-16	0.13	0.03	0.02	8.60	8.78	2.05
16-27	0.09	0.02	0.02	6.80	6.93	1.88
27-72	0.04	0.01	0.01	1.20	1.26	4.76

Table D. Chemical properties for Rumford loamy coarse sand

Depth	Organic matter	pH	Al <sup>3+</sup>	ECEC	EBS
inches	g kg <sup>-1</sup>		cmol ( + ) kg <sup>-1</sup> soil		%
0-6	7.07	3.7	2.65	3.33	20.42
6-16	0.87	4.2	1.15	1.33	13.53
16-27	0.44	4.5	0.85	0.98	13.27
27-72	0.35	4.6	0.25	0.31	19.35

## State Series

The soils of the State series are deep and well drained. They formed in loamy fluvial and marine sediments. State soils are on uplands and side slopes on inland areas on the lower Coastal Plain. Slopes range from 0 to 6 percent.

Typical pedon of State loam, 0 to 2 percent slopes, about 110 feet east-northeast of intersection of First Colonial Road and Old Donation Parkway, and 2100 feet southeast of the intersection of Mill Dam Road and First Colonial Road:

Ap--0 to 11 inches; dark brown (10YR 4/3) loam; weak fine granular structure; friable, slightly sticky, nonplastic; many fine and common medium roots; strongly acid; abrupt smooth boundary.

B21t--11 to 25 inches; strong brown (7.5YR 5/6) loam; weak fine and medium subangular blocky structure; friable, sticky, slightly plastic; common fine and medium roots; common thin discontinuous clay films on faces of peds; few krotovina up to 1/2 inch in diameter filled with Ap material; very strongly acid; gradual smooth boundary.

B22t--25 to 33 inches; strong brown (7.5YR 5/6) loam; moderate fine subangular blocky structure; friable, slightly sticky, slightly plastic; common fine roots; common thin discontinuous clay films on faces of peds; few krotovina up to 1/2 inch in diameter filled with Ap materials; very strongly acid; gradual smooth boundary.

B23t--33 to 47 inches; yellowish brown (10YR 5/6) loam; few coarse distinct strong brown (7.5YR 5/6) stains; moderate fine and medium subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; common thin discontinuous clay films on faces of peds; clay bridging between sand grains; very strongly acid; gradual smooth boundary.

B3t--47 to 56 inches; yellowish brown (10YR 5/6) loam; weak fine and medium subangular blocky structure; friable, slightly sticky, nonplastic; few fine roots; few weak clay bridges between sand grains; very strongly acid; gradual smooth boundary.

C--56 to 64 inches; yellowish brown (10YR 5/6) sandy loam; massive; very friable; nonsticky, nonplastic; very strongly acid.



Table A: Particle-size distribution for State loam

Depth	Sand					Total	Silt	Clay
	VC	C	M	F	VF			
inches	g kg <sup>-1</sup> of soil							
0-11	12	49	237	206	7	511	377	112
11-25	2	21	92	138	6	259	499	242
25-33	3	17	100	102	7	229	518	253
33-47	4	27	151	155	12	349	452	199
47-56	8	45	231	211	8	503	349	148
56-64	7	53	292	263	8	623	259	118

Table C. Chemical properties for State loam

Depth	Exchangeable cations				CEC	BS
	Ca <sup>2+</sup>	Mg <sup>2+</sup>	K <sup>+</sup>	H <sup>+</sup>		
inches	cmol ( + ) kg <sup>-1</sup> soil					%
0-11	1.25	0.31	0.35	8.24	10.15	18.82
11-25	2.15	0.57	0.51	7.56	10.79	29.94
25-33	2.05	0.65	0.39	9.05	12.14	25.45
33-47	1.54	0.51	0.29	8.64	10.98	21.31
47-56	1.06	0.39	0.22	7.16	8.83	18.91
56-64	0.66	0.25	0.21	13.91	15.03	7.45

Table D. Chemical properties for State loam

Depth	Organic matter	pH	Al <sup>3+</sup>	ECEC	EBS
inches	g kg <sup>-1</sup>		cmol ( + ) kg <sup>-1</sup> soil		%
0-11	1.26	5.3	0.65	2.56	74.61
11-25	0.55	5.1	1.15	4.38	73.74
25-33	0.41	4.9	2.05	5.14	60.12
33-47	0.30	4.9	2.15	4.49	52.12
47-56	0.21	4.8	1.85	3.52	47.44
56-64	0.17	4.8	1.45	2.57	43.58

Table G: Engineering properties for State loam

Depth	PVC*	Atterburg Limits		PI*
		LL*	PL*	
inches	lb foot <sup>-2</sup>			
11-25	1897	26.1	19.5	6.63
25-33	ND	30.9	21.2	9.45
33-47	2017	27.3	16.9	10.31

\*PVC = potential volume change, LL = liquid limit, PL = plastic limit, and PI = plasticity index.

## State Series supplemental profile 1

Location: About 450 feet southwest of junction of Pungo Ferry Road and Blackwater Road, and 550 feet southeast of large barn on Mansfield Farm; just into soybean field off southwest corner of yard.

Ap--0 to 7 inches; brown to dark brown (10YR 4/3) loam; moderate fine granular structure; friable, slightly sticky, slightly plastic; common fine roots; strongly acid; abrupt smooth boundary.

B21t--7 to 13 inches; brown to dark brown (7.5YR 4/4) loam; weak fine subangular blocky structure; friable, slightly sticky, plastic; few fine roots; common krotovina up to 1 inch filled with Ap material; many sand grains coated; few thin discontinuous clay films on faces of peds; moderately acid; gradual smooth boundary.

B22t--13 to 29 inches; brown to dark brown (7.5YR 4/4) clay loam; moderate fine subangular blocky structure; friable, slightly sticky, plastic; few fine roots; few krotovina up to 1 inch filled with Ap material; many sand grains coated; few thin discontinuous clay films on faces of peds; moderately acid; clear smooth boundary.

B23t--29 to 37 inches; dark yellowish brown (10YR 4/4) clay loam; moderate fine subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; many sand grains coated and bridged with clay; very strongly acid; clear smooth boundary.

B3t--37 to 42 inches; dark yellowish brown (10YR 4/4) sandy clay loam; few fine distinct strong brown (7.5YR 5/8) and few fine distinct light gray to gray (10YR 6/1) mottles; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; many sand grains coated and bridged with clay; very strongly acid; clear smooth boundary.

C1--42 to 57 inches; yellowish brown (10YR 5/6) loamy sand; common pale brown (10YR 6/3) discontinuous layers weakly cemented; massive; friable, (with pockets of brittleness) ; non-sticky, nonplastic; few fine roots; many stained sand grains; few weak clay bridges between sand grains; small streaks of segregated iron in compacted layers; strongly acid; clear wavy boundary.

C2--57 to 65 inches; yellowish brown (10YR 5/6) fine sand; single grain; loose; many sand grains stained; strongly acid.

Table A: Particle-size distribution for State loam

Depth	Sand					Total	Silt	Clay
	VC	C	M	F	VF			
inches	g kg <sup>-1</sup> of soil							
0-7	0	7	177	231	20	435	416	149
7-13	0	5	128	197	20	350	424	226
13-29	0	4	115	187	16	322	333	345
29-37	0	8	161	257	23	449	254	297
37-42	0	10	255	351	21	637	163	200
42-57	0	14	400	429	8	851	40	109
57-65	0	12	284	557	33	886	55	59

Table C. Chemical properties for State loam

Depth	Exchangeable cations				CEC	BS
	Ca <sup>2+</sup>	Mg <sup>2+</sup>	K <sup>+</sup>	H <sup>+</sup>		
inches	cmol ( + ) kg <sup>-1</sup> soil					%
0-7	2.55	0.99	0.54	4.50	8.58	47.55
7-13	2.70	1.31	0.45	2.70	7.16	62.29
13-29	3.50	2.75	0.38	3.90	10.53	62.96
29-37	2.85	1.97	0.35	4.40	9.57	54.02
37-42	1.68	1.15	0.17	3.40	6.40	46.88
42-57	0.81	0.66	0.08	3.48	5.03	30.82
57-65	0.45	0.31	0.05	2.96	3.77	21.48

Table D. Chemical properties for State loam

Depth	Organic matter	pH	Al <sup>3+</sup>	ECEC	EBS
inches	g kg <sup>-1</sup>		cmol ( + ) kg <sup>-1</sup> soil		%
0-7	0.66	5.4	0.17	4.25	96.00
7-13	0.19	5.9	0.00	4.46	100.00
13-29	0.08	5.8	0.00	6.63	100.00
29-37	0.05	4.9	0.43	5.60	92.32
37-42	0.03	5.0	0.77	3.77	79.58
42-57	0.03	5.2	0.43	1.98	78.28
57-65	0.03	5.2	0.43	1.24	65.32

Table E: Mineralogy of the sand fraction for State loam

Depth	Minerals Present*					
	Quartz	Feldspar	Mica	Opauques	Heavies	Misc.
inches	g kg <sup>-1</sup> of sand					
7-13	850	100	30	0	20	0
13-29	880	90	20	0	10	0
29-37	840	110	30	0	20	0

\*Opauques = iron minerals including ilmenite, magnetite, hematite, etc. Misc. = rock fragments.

Table G: Engineering properties for State loam

Depth	PVC*	Atterburg Limits		PI*
		LL*	PL*	
inches	lb foot <sup>-2</sup>			
13-29	2800	40.1	19.9	20.19
29-37	2725	35.5	18.0	17.55
42-57	275	0	0	0

\*PVC = potential volume change, LL = liquid limit, PL = plastic limit, and PI = plasticity index.

## State Series supplemental profile 2

Location: About 2,900 feet west-southwest of junction of West Neck and West Landing Roads; about 1,000 feet due south of West Landing Road.

Ap--0 to 8 inches; brown to dark brown (10YR 4/3) loam; weak fine granular structure; friable, slightly sticky, slightly plastic; common fine and few medium roots; common fine tubular pores; very strongly acid; clear smooth boundary.

B21t--8 to 30 inches; yellowish brown (10YR 5/6) clay loam; few fine distinct strong brown (7.5YR 5/6) mottles; moderate fine and medium subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; common fine tubular pores; few thin discontinuous clay films on faces of peds; many sand grains coated and bridged with clay; strongly acid; gradual smooth boundary.

B22t--30 to 48 inches; yellowish brown (10YR 5/6) clay loam; few fine distinct strong brown (7.5YR 5/6) mottles; moderate fine and medium subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; common fine tubular pores; few thin discontinuous clay films on faces of peds; many sand grains coated and bridged with clay; strongly acid; clear wavy boundary.

B3--48 to 55 inches; mottled light yellowish brown (10YR 5/6), light brownish gray (10YR 6/2), strong brown (7.5YR 5/6), and yellowish red (5YR 4/6) sandy loam; massive in place, parting to weak medium platy structure; friable, slightly sticky, nonplastic; few fine vesicular pores; many sand grains stained and weakly cemented with iron; very strongly acid; abrupt smooth boundary.

C--55 to 72 inches; light yellowish brown (10YR 6/4) loamy fine sand; few fine distinct strong brown (7.5YR 5/6) and yellowish red (5YR 4/6) mottles; massive; friable; nonsticky, nonplastic; few fine vesicular pores; many sand grains clean; many sand grains stained; very strongly acid.

Table A: Particle-size distribution for State loam

Depth	Sand					Total	Silt	Clay
	VC	C	M	F	VF			
inches	g kg <sup>-1</sup> of soil							
0-8	0	6	42	158	54	260	610	130
8-30	0	4	28	118	50	200	450	350
30-48	4	4	40	168	76	292	378	330
48-55	0	4	76	412	118	610	270	120
55-72	0	2	48	740	60	850	70	80

Table B. Chemical properties for State loam

Depth	CaO	MgO	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	Zn	Mn
inches	lbs acre <sup>-1</sup>				ppm	
0-8	705	167	68	184	1.7	ND
8-30	1712	322	13	75	0.5	ND
30-48	1276	382	18	34	0.6	ND
48-55	672	366	20	41	0.4	ND
55-72	403	223	20	30	0.4	ND

Table C. Chemical properties for State loam

Depth	Exchangeable cations				CEC	BS
	Ca <sup>2+</sup>	Mg <sup>2+</sup>	K <sup>+</sup>	H <sup>+</sup>		
<u>inches</u>	<u>cmol ( + ) kg<sup>-1</sup> soil</u>					<u>%</u>
0-8	1.19	0.43	0.31	8.93	10.86	17.77
8-30	4.73	1.22	0.27	9.30	15.52	40.08
30-48	3.71	1.65	0.16	9.42	14.94	36.95
48-55	1.51	1.22	0.11	8.43	11.27	25.20
55-72	0.74	0.72	0.08	4.71	6.25	24.64

Table D. Chemical properties for State loam

Depth	Organic matter	pH	Al <sup>3+</sup>	ECEC	EBS
<u>inches</u>	<u>g kg<sup>-1</sup></u>		<u>cmol ( + ) kg<sup>-1</sup> soil</u>		<u>%</u>
0-8	1.70	5.0	1.01	2.94	65.65
8-30	0.52	5.3	0.37	6.59	94.39
30-48	0.26	5.1	0.92	6.44	85.71
48-55	0.18	4.9	1.29	4.13	68.77
55-72	0.10	5.0	0.74	2.28	67.54



Figure 7: Buildings on the north end of Resort Strip were built on State, Tetotum, and Augusta soils and Psamments.

## Tetotum Series

The soils of the Tetotum series are deep and moderately well drained. They formed in loamy fluvial and marine sediments. The Tetotum soils are on ridges and side slopes in inland areas on the lower part of the Coastal Plain. Slopes range from 0 to 2 percent.

Typical pedon of Tetotum loam, about 3,100 feet north-northwest of junction of Indian River Road and West Neck Road and 6,700 feet south-southeast of West Neck Road and North Landing Road.

Ap--0 to 10 inches; brown (10YR 4/3) loam; weak fine and medium granular structure; friable, slightly sticky, slightly plastic; common fine roots; few fine pores; few krotovina filled with worm casts; strongly acid; clear smooth boundary.

B1t--10 to 15 inches; yellowish brown (10YR 5/6) loam; weak fine and medium subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; few fine tubular pores; few thin discontinuous clay films on faces of peds; strongly acid; clear smooth boundary.

B21t--15 to 20 inches; yellowish brown (10YR 5/6) clay loam; moderate fine and medium subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; few fine tubular pores; few thin discontinuous clay films on faces of peds; strongly acid; clear smooth boundary.

B22t--20 to 26 inches; yellowish brown (10YR 5/6) clay loam; common medium distinct strong brown (7.5YR 5/8) mottles; moderate fine and medium subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; few fine tubular pores; common thin discontinuous clay films on faces of peds; strongly acid; clear smooth boundary.

B23t--26 to 36 inches; yellowish brown (10YR 5/6) clay loam; few fine distinct light brownish gray (10YR 6/2), common medium distinct strong brown (7.5YR 5/8), and many medium distinct pale brown (10YR 6/3) mottles; moderate medium subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; few fine tubular pores; common thin discontinuous clay films on faces of peds; strongly acid; clear smooth boundary.

B3t--36 to 58 inches; mottled yellowish brown (10YR 5/6), pale brown (10YR 6/3), light brownish gray (10YR 6/2), and strong brown (7.5YR 5/8) loam; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; few fine tubular pores; common thin discontinuous clay films on faces of peds; strongly acid; gradual smooth boundary.

IIC--58 to 70 inches; mottled pale brown (10YR 6/3), reddish yellow (7.5YR 6/8), and light brownish gray (10YR 6/2) loamy sand; massive; very friable, nonsticky, nonplastic; many clean sand grains; strongly acid.

Table A: Particle-size distribution for Tetotum loam

Depth	Sand					Total	Silt	Clay
	VC	C	M	F	VF			
inches	g kg <sup>-1</sup> of soil							
0-10	0	8	47	135	138	328	491	181
10-15	1	5	43	136	121	306	455	239
15-20	0	7	42	131	119	299	433	268
20-26	1	5	40	124	122	292	445	263
26-36	5	9	24	120	94	252	481	267
36-58	1	5	42	201	170	419	343	238
58-70	1	47	308	360	156	872	58	70

Table B. Chemical properties for Tetotum loam

Depth	CaO	MgO	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	Zn	Mn
inches	lbs acre <sup>-1</sup>				ppm	
0-10	1007	302	185	193	ND	ND
10-15	700	146	20	116	ND	ND
15-20	1007	222	15	94	ND	ND
20-26	1231	252	7	55	ND	ND
26-36	1567	358	11	60	ND	ND
36-58	728	368	33	55	ND	ND
58-70	308	56	82	10	ND	ND

Table C. Chemical properties for Tetotum loam

Depth	Exchangeable cations				CEC	BS
	Ca <sup>2+</sup>	Mg <sup>2+</sup>	K <sup>+</sup>	H <sup>+</sup>		
inches	cmol ( + ) kg <sup>-1</sup> soil					%
0-10	2.05	0.91	0.32	8.49	11.77	27.87
10-15	1.71	0.67	0.23	7.63	10.24	25.49
15-20	2.70	0.90	0.18	6.89	10.67	35.43
20-26	3.00	0.83	0.13	6.03	9.99	39.64
26-36	3.73	1.14	0.12	6.76	11.75	42.47
36-58	1.80	1.19	0.10	6.52	9.61	32.15
58-70	0.35	0.14	0.02	3.20	3.71	13.75

Table D. Chemical properties for Tetotum loam

Depth	Organic matter	pH	Al <sup>3+</sup>	ECEC	EBS
inches	g kg <sup>-1</sup>		cmol ( + ) kg <sup>-1</sup> soil		%
0-10	2.07	5.3	0.46	3.74	87.70
10-15	0.82	5.1	0.92	3.53	73.94
15-20	0.86	5.2	0.55	4.33	87.30
20-26	0.57	5.3	0.37	4.33	91.45
26-36	0.29	5.3	0.55	5.54	90.07
36-58	0.15	5.1	0.92	4.01	77.06
58-70	0.15	5.2	0.18	0.69	73.91

## Tetotum Series supplemental profile 1

Location: About 2,900 west northwest of Pleasant Ridge Road and Princess Anne Road and 4,400 southwest of Malbon Road and Princess Anne Road.

A1-0 to 3 inches; dark brown (10YR 3/3) loam; weak fine subangular blocky structure; friable; slightly sticky, slightly plastic; many fine medium and coarse roots; extremely acid; abrupt smooth boundary.

A2-3 to 8 inches; yellowish brown (10YR 5/4) loam; weak fine subangular blocky structure; friable; slightly sticky, slightly plastic; common fine and medium roots; extremely acid; clear smooth boundary.



B1t--8 to 12 inches; light olive brown (2.5Y 5/4) loam; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; few fine and medium roots; extremely acid; clear smooth boundary.

B2lt--12 to 22 inches; yellowish brown (10YR 5/6) loam; moderate medium subangular blocky structure; friable; slightly sticky, slightly plastic; few thin discontinuous clay films on faces of peds; common fine and medium roots; very strongly acid; clear smooth boundary.

B22t--22 to 31 inches; yellowish brown (10YR 5/6) loam; many medium and coarse prominent light gray to gray (10YR 6/1) mottles; moderate medium subangular blocky structure; friable; slightly sticky, slightly plastic; many thin discontinuous clay films on faces of peds; few fine and medium roots; extremely acid; clear smooth boundary.

B3tg--31 to 41 inches; light gray to gray (N6) sandy clay loam; many coarse prominent yellowish brown (10YR 5/8) mottles; moderate medium subangular blocky structure; friable, slightly sticky, slightly plastic; few thin discontinuous clay films on faces of peds; few fine roots; very strongly acid; abrupt smooth boundary.

C1--41 to 47 inches; yellowish brown (10YR 5/8) fine sandy loam; common medium prominent light gray to gray (10YR 6/1) mottles; massive; very friable, nonsticky, slightly plastic; very strongly acid; gradual smooth boundary.

C2--47 to 65 inches; light olive brown (2.5Y 5/4) fine sand; single grain; very friable; non-sticky, nonplastic; few flakes of mica; strongly acid.

Table A: Particle-size distribution for Tetotum loam

Depth	Sand					Total	Silt	Clay
	VC	C	M	F	VF			
inches	g kg <sup>-1</sup> of soil							
0-3	9	7	43	347	49	455	444	101
3-8	1	3	28	341	47	420	461	119
8-12	1	2	24	301	52	380	472	148
12-22	0	2	21	295	46	364	411	225
22-31	0	1	21	375	62	459	288	253
31-41	0	0	31	518	70	619	174	207
41-47	0	0	104	698	14	816	57	127
47-65	0	11	270	624	12	917	31	52

Table C. Chemical properties for Tetotum loam

Depth	Exchangeable cations				CEC	BS
	Ca <sup>2+</sup>	Mg <sup>2+</sup>	K <sup>+</sup>	H <sup>+</sup>		
inches	cmol ( + ) kg <sup>-1</sup> soil					%
0-3	0.19	0.16	0.12	5.82	6.29	7.47
3-8	0.03	0.06	0.05	3.80	3.94	3.55
8-12	0.06	0.09	0.05	1.52	1.72	11.63
12-22	0.16	0.40	0.06	2.03	2.65	23.46
22-31	0.24	0.66	0.08	2.78	3.76	26.06
31-41	0.30	0.66	0.07	1.77	2.80	36.79
41-47	0.30	0.50	0.06	14.69	15.55	5.53
47-65	0.17	0.30	0.04	7.60	8.11	6.29

Table D. Chemical properties for Tetotum loam

Depth	Organic matter	pH	Al <sup>3+</sup>	ECEC	EBS
inches	g kg <sup>-1</sup>		cmol ( + ) kg <sup>-1</sup> soil		%
0-3	5.24	4.1	2.56	3.03	15.51
3-8	1.05	4.3	1.77	1.91	7.33
8-12	0.38	4.1	2.36	2.56	7.62
12-22	0.34	4.6	3.64	4.26	14.55
22-31	0.30	4.3	4.33	5.31	18.36
31-41	0.23	4.6	3.44	4.47	23.04
41-47	0.12	4.9	2.07	2.93	29.35
47-65	0.12	5.1	0.79	1.30	38.85

Table G: Engineering properties for Tetotum loam

Depth	PVC*	Atterburg Limits		PI*
		LL*	PL*	
inches	lb foot <sup>-2</sup>			
0-3	ND	28.6	26.0	2.60
3-8	ND	21.7	17.9	3.80
8-12	ND	23.3	16.6	6.72
12-22	ND	30.5	18.2	12.33
22-31	ND	33.4	18.6	14.74
31-41	ND	29.7	17.9	11.82

\*PVC = potential volume change, LL = liquid limit, PL = plastic limit, and PI = plasticity index.

## Tetotum Series supplemental profile 2

Location: About 1,070 feet north of junction of West Landing Road and West Neck Road, about 180 feet west of telephone pole on the east side of West Neck Road, and 258 feet north of edge of small field.

Ap--0 to 7 inches; dark brown (10YR 4/3) fine sandy loam; weak medium granular structure; friable; slightly sticky, nonplastic; common fine and medium roots; strongly acid; abrupt smooth boundary.

B21t--7 to 17 inches; brown to dark brown (7.5YR 4/4) clay loam; few fine distinct strong brown (7.5YR 5/8) mottles; moderate medium subangular blocky structure; friable; sticky, slightly plastic; few fine roots; few thin discontinuous clay films on faces of peds; many sand grains coated and bridged; strongly acid; gradual smooth boundary.

B22t--17 to 27 inches; dark yellowish brown (10YR 4/4) sandy clay loam; common fine faint yellowish brown (10YR 5/6) and pale brown (10YR 6/3) mottles; moderate medium subangular blocky structure; friable; sticky, slightly plastic; few fine and medium roots; few thin discontinuous clay films on faces of peds; many sand grains coated and bridged with clay; strongly acid; clear smooth boundary.

B23t--27 to 36 inches; yellowish brown (10YR 5/4) sandy clay loam; common medium distinct strong brown (7.5YR 5/6), pale brown (10YR 6/3) and light brownish gray (10YR 6/2)

mottles; moderate medium subangular blocky structure; friable; sticky, slightly plastic; few fine roots; few thin discontinuous clay film on faces of peds; many sand grains coated and bridged with clay; strongly acid; clear smooth boundary.

B3t--36 to 43 inches; mottled pale brown (10YR 6/3), light brownish gray (10YR 6/2), yellowish brown (10YR 5/4) sandy clay loam; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; few fine flakes of mica; sand grains coated and bridged with clay; very strongly acid; clear smooth boundary.

C1g--43 to 50 inches; grayish brown (10YR 5/2) fine sandy loam; many coarse prominent yellowish brown (10YR 5/6) mottles; massive parting to weak coarse platy structure; friable, non-sticky, nonplastic; few fine roots; thin lenses of clear sand grains; few fine flakes of mica; very strongly acid; clear smooth boundary.

C2g--50 to 62 inches; grayish brown (10YR 5/2) fine sandy loam; many coarse distinct yellowish brown (10YR 5/4) mottles; massive parting to weak coarse platy structure; friable, non-sticky, nonplastic; few fine roots; common fine flakes of mica; very strongly acid; clear smooth boundary.

C3--62 to 83 inches; brownish yellow (10YR 6/6) fine sand; single grain; friable, nonsticky, nonplastic; common fine flakes of mica, strongly acid.

C4--83 to 104 inches; very pale brown (10YR 7/4) fine sand; single grain; loose; strongly acid.

Table A: Particle-size distribution for Tetotum fine sandy loam

Depth	Sand					Total	Silt	Clay
	VC	C	M	F	VF			
inches	g kg <sup>-1</sup> of soil							
0-7	1	5	94	380	56	536	369	95
7-17	0	4	82	316	38	438	258	304
17-27	0	6	97	332	36	471	246	283
27-36	1	6	120	350	39	516	181	303
36-43	1	4	94	446	33	578	148	274
43-50	0	3	96	520	63	682	118	200
50-62	0	1	28	591	94	714	114	172
62-83	0	9	297	567	31	904	62	34

Table C. Chemical properties for Tetotum fine sandy loam

Depth	Exchangeable cations				CEC	BS
	Ca <sup>2+</sup>	Mg <sup>2+</sup>	K <sup>+</sup>	H <sup>+</sup>		
inches	cmol ( + ) kg <sup>-1</sup> soil					%
0-7	1.85	0.47	0.45	5.31	8.08	34.28
7-17	3.00	1.57	0.33	8.05	12.95	37.84
17-27	2.60	1.42	0.19	8.78	12.98	32.43
27-36	2.00	1.89	0.14	8.42	12.45	32.37
36-43	1.70	1.72	0.13	8.05	11.60	30.60
43-50	1.10	1.55	0.11	6.59	9.35	29.52
50-62	0.77	1.57	0.12	5.31	7.77	31.66
62-83	0.28	0.38	0.05	1.65	2.36	30.08

Table D. Chemical properties for Tetotum fine sandy loam

Depth	Organic matter	pH	Al <sup>3+</sup>	ECEC	EBS
inches	g kg <sup>-1</sup>		cmol ( + ) kg <sup>-1</sup> soil		%
0-7	1.58	5.3	0.29	3.06	90.52
7-17	0.60	5.3	0.29	5.19	94.41
17-27	0.40	5.1	0.96	5.17	81.40
27-36	0.40	5.1	0.96	4.99	80.72
36-43	0.28	5.0	0.96	4.51	78.71
43-50	0.28	4.9	0.96	3.72	74.19
50-62	0.28	4.9	0.87	3.33	73.87
62-83	0.02	5.3	0.10	0.81	87.65

### Tetotum Series supplemental profile 3

Location: About 3,100 feet west-southwest of junction of West Neck Road and West Landing Road, and 100 feet due north of West Landing Road.

Ap--0 to 8 inches; brown to dark brown (10YR 4/3) loam; weak fine granular structure; friable, slightly sticky, slightly plastic; few fine and common very fine roots; few fine tubular pores; strongly acid; abrupt smooth boundary.

B21t--8 to 18 inches; yellowish brown (10YR 5/3) loam; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; common very fine roots; common fine tubular pores; many sand grains coated and bridged with clay; many krotovina up to 1/2 inch in diameter filled with Ap material; strongly acid; clear smooth boundary.

B22t--18 to 30 inches; yellowish brown (10YR 5/8) loam; common fine distinct strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; few very fine roots; common fine tubular pores; many sand grains coated and bridged with clay; many krotovina up to 1/2 inch in diameter filled with Ap material; strongly acid; clear smooth boundary.

B23t--30 to 48 inches; brownish yellow (10YR 6/6) loam; few fine distinct strong brown (7.5YR 5/8) and few fine distinct light gray (10YR 7/1) mottles; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; few very fine roots; common fine tubular pores; many sand grains coated and bridged with clay; very strongly acid; clear smooth boundary.

C--48 to 60 inches; mottled brownish yellow (10YR 6/6), light gray (10YR 7/1) and yellowish brown (10YR 5/8) loamy sand; single grain; loose; few fine vesicular pores; very strongly acid.

Table A: Particle-size distribution for Tetotum loam

Depth	Sand					Total	Silt	Clay
	VC	C	M	F	VF			
inches	g kg <sup>-1</sup> of soil							
0-8	0	10	70	186	44	310	490	200
8-18	0	8	74	236	82	400	370	230
18-30	2	8	82	258	90	440	330	230
30-48	2	8	92	304	114	520	300	180
48-60	1	32	227	453	77	790	130	80

Table B. Chemical properties for Tetotum loam

Depth	CaO	MgO	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	Zn	Mn
inches	lbs acre <sup>-1</sup>				ppm	
0-8	1007	255	90	317	1.9	ND
8-18	907	330	13	154	0.4	ND
18-30	1209	354	13	56	0.4	ND
30-48	1679	318	11	45	0.4	ND
48-60	336	187	13	37	0.8	ND

Table C. Chemical properties for Tetotum loam

Depth	Exchangeable cations				CEC	BS
	Ca <sup>2+</sup>	Mg <sup>2+</sup>	K <sup>+</sup>	H <sup>+</sup>		
inches	cmol ( + ) kg <sup>-1</sup> soil					%
0-8	1.79	0.74	0.41	8.06	11.00	26.73
8-18	2.06	1.09	0.27	7.44	10.86	31.49
18-30	2.91	1.22	0.15	6.94	11.22	38.15
30-48	1.81	1.20	0.13	6.70	9.84	31.91
48-60	0.80	0.65	0.09	3.97	5.51	27.95

Table D. Chemical properties for Tetotum loam

Depth	Organic matter	pH	Al <sup>3+</sup>	ECEC	EBS
inches	g kg <sup>-1</sup>		cmol ( + ) kg <sup>-1</sup> soil		%
0-8	1.92	5.4	0.46	3.40	86.47
8-18	0.52	5.1	0.74	4.16	82.21
18-30	0.22	5.1	0.55	4.83	88.61
30-48	0.14	4.9	0.92	4.06	77.34
48-60	0.10	4.8	0.64	2.18	70.64

## Tetotum Series supplemental profile 4

Location: About 4,200 feet northwest of junction of Mill Dam Road and Great Neck Road and 50 feet north of Shorehaven Road.

Ap--0 to 7 inches; dark brown (10YR 3/3) silt loam; weak very fine granular structure; friable, nonsticky, nonplastic; common very fine, fine, and medium and few coarse roots; few fine, medium, and coarse pores; extremely acid; clear smooth boundary.

A2--7 to 16 inches; light yellowish brown (10YR 6/4) silt loam; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; few very fine and fine, common medium, and few coarse roots; many very fine and fine and few medium and coarse pores; very strongly acid; clear smooth boundary.

B2lt--16 to 24 inches; yellowish brown (10YR 5/6) silt loam; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; few fine and medium roots; few fine and

common medium pores; few thin discontinuous clay films on faces of peds; few sand grains coated and bridged with clay; very strongly acid; gradual smooth boundary.

B22t--24 to 31 inches; yellowish brown (10YR 5/6) silty clay loam; moderate medium subangular blocky structure; friable, slightly sticky, plastic; few fine and medium roots; few fine and medium pores; few thin discontinuous clay films on faces of peds; few sand grains coated and bridged with clay; very strongly acid; gradual smooth boundary.

B23t--31 to 38 inches; yellowish brown (10YR 5/4) clay loam; few fine distinct strong brown (7.5YR 5/6) and common medium prominent grayish brown (10YR 5/2) mottles; moderate medium subangular blocky structure; friable, slightly sticky, plastic; few fine and medium roots; few fine pores; few thin discontinuous clay films on faces of peds; common sand grains coated and bridged with clay; very strongly acid; gradual smooth boundary.

B24t--38 to 46 inches; mottled dark greenish gray (5GY 4/1) and yellowish brown (10YR 5/4) and yellowish red (5YR 5/8) clay loam; moderate medium subangular blocky structure; friable; slightly sticky, slightly plastic; few fine roots; few very fine pores; few thin discontinuous clay films on faces of peds; common sand grains coated and bridged with clay; very strongly acid; gradual smooth boundary.

IIC1--46 to 52 inches; yellowish brown (10YR 5/4) fine sandy loam; common medium prominent dark greenish gray (5GY 4/1), and yellowish red (5YR 5/8) and common medium distinct pale brown (10YR 6/3) mottles; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; few very fine pores; few sand grains coated and bridged with clay; (texture is pocketed loamy sand and loam; weakly brittle); very strongly acid; gradual smooth boundary.

IIC2--52 to 64 inches; mottled light yellowish brown (10YR 6/4) and yellowish brown (10YR 5/4) loamy sand; single grain; friable, nonsticky, nonplastic; very fine pores; very strongly acid; gradual smooth boundary.

IIC3--64 to 80 inches; mottled yellowish brown (10YR 5/6) and brownish yellow (10YR 6/6) loamy sand; single grain; friable, nonsticky, nonplastic; very strongly acid.

Table A: Particle-size distribution for Tetotum silt loam

Depth	Sand						Silt	Clay
	VC	C	M	F	VF	Total		
inches	g kg <sup>-1</sup> of soil							
0-7	6	52	152	100	10	320	560	120
7-16	4	28	148	122	8	310	550	140
16-24	2	18	98	88	4	210	530	260
24-31	1	12	84	79	4	180	520	300
31-38	2	12	116	114	6	250	470	280
38-46	2	12	158	188	10	370	320	310
46-52	1	18	340	397	24	780	90	130
52-64	4	38	396	396	16	850	70	80
64-80	60	200	398	194	8	860	30	110

Table B. Chemical properties for Tetotum silt loam

Depth	CaO	MgO	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	Zn	Mn
inches	lbs acre <sup>-1</sup>			ppm		
0-7	168	50	20	80	ND	ND
7-16	72	12	20	28	ND	ND
16-24	144	198	18	68	ND	ND
24-31	96	240	18	88	ND	ND
31-38	48	240	18	102	ND	ND
38-46	48	240	16	90	ND	ND
46-52	48	186	16	52	ND	ND
52-64	48	156	18	44	ND	ND
64-80	48	144	16	36	ND	ND

## Tomotley Series

The soils of the Tomotley series are deep and poorly drained. They formed in loamy marine and fluvial sediments. Tomotley soils are on inland flats on the lower part of the Coastal Plain. Slopes range from 0 to 2 percent.

Typical pedon of Tomotley loam, about 2,100 feet North of Indian River Road, 2,000 feet west of West Neck Road, 3,000 feet North of junction of Indian River and West Neck Roads.

Ap--0 to 7 inches; dark grayish brown (10YR 4/2) loam; weak fine granular structure; friable, slightly sticky, slightly plastic; common very fine and fine roots; few fine pores; moderately acid; abrupt smooth boundary.

B2ltg--7 to 31 inches; gray (10YR 6/1) and light brownish gray (10YR 6/2) loam; common fine and medium distinct yellowish brown (10YR 5/8) and common coarse distinct light yellowish brown (2.5Y 6/4) mottles; weak fine and medium subangular blocky structure; friable, slightly sticky, slightly plastic; few very fine and fine roots; common fine and medium pores; common sand grains coated and bridged with clay; very strongly acid; gradual smooth boundary.

B22tg--31 to 45 inches; gray (10YR 6/1) sandy clay loam; few fine distinct strong brown (7.5YR 5/6) and common coarse prominent brownish yellow (10YR 6/6) mottles; weak fine and medium subangular blocky structure; friable, slightly sticky, slightly plastic; few very fine roots; few fine pores; few thin discontinuous clay films on faces of peds; many sand grains coated and bridged with clay; very strongly acid; clear smooth boundary.

IICg--45 to 66 inches; light brownish gray (10YR 6/2) and light gray (2.5Y 7/2) loamy sand; many coarse distinct pale yellow (2.5Y 7/4) and common medium prominent brownish yellow (10YR 6/8) mottles; massive; very friable; nonsticky, nonplastic; many clean sand grains; small pockets of white sand and gray sandy loam; few fine flakes of mica; very strongly acid.

Table A: Particle-size distribution for Tomotley loam

Depth	Sand						Silt	Clay
	VC	C	M	F	VF	Total		
inches	g kg <sup>-1</sup> of soil							
0-7	2	13	117	207	118	457	390	153
7-31	0	9	78	200	101	388	381	231
31-45	0	6	58	278	158	500	213	287
45-66	2	82	483	291	25	883	14	103

Table B. Chemical properties for Tomotley loam

Depth	CaO	MgO	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	Zn	Mn
inches	lbs acre <sup>-1</sup>				ppm	
0-7	1477	398	192	152	1.4	ND
7-31	705	162	42	55	0.4	ND
31-45	403	192	11	41	0.4	ND
45-66	269	139	13	36	0.3	ND

Table C. Chemical properties for Tomotley loam

Depth	Exchangeable cations				CEC	BS
	Ca <sup>2+</sup>	Mg <sup>2+</sup>	K <sup>+</sup>	H <sup>+</sup>		
inches	cmol ( + ) kg <sup>-1</sup> soil					%
0-7	2.87	1.58	0.37	6.52	11.34	42.50
7-31	1.16	0.49	0.09	7.75	9.49	18.34
31-45	0.97	0.83	0.08	7.50	9.38	20.04
45-66	0.27	0.41	0.05	3.20	3.93	18.58

Table D. Chemical properties for Tomotley loam

Depth	Organic matter	pH	Al <sup>3+</sup>	ECEC	EBS
inches	g kg <sup>-1</sup>		cmol ( + ) kg <sup>-1</sup> soil		%
0-7	2.86	5.7	0.00	4.82	100.00
7-31	0.54	4.9	2.94	4.68	37.18
31-45	0.19	4.7	3.22	5.10	36.86
45-66	0.11	4.8	1.20	1.93	37.82

## Tomotley Series supplemental profile 1

Location: About 3,600 feet west-southwest of junction of West Neck Road and West Landing Road and 900 feet due north of West Landing Road.



Ap--0 to 7 inches; grayish brown (10YR 5/2) loam; weak fine granular structure; friable, slightly sticky, slightly plastic; few fine pores, common very fine and few fine roots; moderately acid; abrupt smooth boundary.

B2ltg--7 to 30 inches; gray (10YR 6/1) loam; many medium prominent yellowish brown (10YR 5/8) mottles; moderate fine and medium subangular blocky structure; friable, slightly sticky, slightly plastic; many fine and common medium tubular pores; few fine and very fine roots; few thin discontinuous clay films on faces of peds; many sand grains coated and bridged with clay; few krotovina up to 1/2 inch in diameter; very strongly acid; clear smooth boundary.

B22tg--30 to 44 inches; gray (10YR 6/1) clay loam; many medium prominent yellowish brown (10YR 5/8) mottles; moderate fine and medium subangular blocky structure; friable, slightly sticky, slightly plastic; common fine tubular pores; few very fine roots; many sand grains coated and bridged with clay; gray colors are almost blue gray; has pockets of sandier material; faces of peds appear to be coated with silt instead of clay; extremely acid.

IIC1--44 to 52 inches; mottled light brownish gray (2.5Y 6/2) and yellowish brown (10YR 5/8) pocketed loamy sand and sandy loam; friable, nonsticky, nonplastic; many sand grains stained; extremely acid.

IIC2g--52 to 63 inches; gray (10YR 6/1) pocketed loamy sand and fine sandy loam; friable, nonsticky, nonplastic; many sand grains stained; very strongly acid.

Table A: Particle-size distribution for Tomotley loam

Depth	Sand					Total	Silt	Clay
	VC	C	M	F	VF			
inches	g kg <sup>-1</sup> of soil							
0-7	6	18	94	200	32	350	490	160
7-30	2	16	90	152	30	290	480	230
30-44	0	8	84	102	36	230	440	330
44-52	4	28	172	445	61	710	150	140
52-63	4	24	126	527	79	760	100	140

Table B. Chemical properties for Tomotley loam

Depth	CaO	MgO	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	Zn	Mn
inches	lbs acre <sup>-1</sup>				ppm	
0-7	1444	398	97	208	0.9	ND
7-30	504	167	28	48	0.5	ND
30-44	571	267	33	71	0.3	ND
44-52	336	151	26	41	0.4	ND
52-63	403	215	48	52	0.4	ND

Table C. Chemical properties for Tomotley loam

Depth	Exchangeable cations				CEC	BS
	Ca <sup>2+</sup>	Mg <sup>2+</sup>	K <sup>+</sup>	H <sup>+</sup>		
inches	cmol ( + ) kg <sup>-1</sup> soil					%
0-7	2.94	1.38	0.36	7.41	12.09	38.71
7-30	1.07	0.57	0.14	9.26	11.04	16.12
30-44	1.28	0.93	0.21	12.21	14.63	16.54
44-52	0.66	0.52	0.13	7.41	8.72	15.02
52-63	0.78	0.76	0.14	7.19	8.87	18.94

Table D. Chemical properties for Tomotley loam

Depth	Organic matter	pH	Al <sup>3+</sup>	ECEC	EBS
inches	g kg <sup>-1</sup>		cmol ( + ) kg <sup>-1</sup> soil		%
0-7	2.29	5.6	0.09	4.77	98.11
7-30	0.44	4.5	2.94	4.72	37.71
30-44	0.33	4.3	4.23	6.65	36.39
44-52	0.29	4.2	2.12	3.43	38.19
52-63	0.22	4.5	2.21	3.89	43.19

## Tomotley Series supplemental profile 2

Location: About 700 feet northeast of junction of Dawley Road and Gum Bridge Road and 550 feet north of Gum Bridge Road.

Ap--0 to 7 inches; dark grayish brown (10YR 4/2) loam; weak fine granular structure; friable; slightly sticky, slightly plastic; many fine roots; strongly acid; clear smooth boundary.

B2ltg--7 to 38 inches; gray (10YR 5/1) loam; common coarse prominent yellowish brown (10YR 5/6) and few fine prominent strong brown (7.5YR 5/8) mottles; weak coarse prismatic parting to weak fine angular and subangular blocky structure; friable, slightly sticky, slightly plastic; common fine roots; common thin discontinuous clay films on faces of peds; many sand grains coated and bridged with clay; very strongly acid; gradual broken boundary.

B22tg--38 to 45 inches; light gray (N 7/) clay loam; many coarse prominent reddish yellow (7.5YR 6/8) mottles; weak medium angular blocky structure; friable; slightly sticky, plastic; many sand grains coated and bridged with clay; very strongly acid; gradual smooth boundary.

IIC--45 to 50 inches; mottled reddish yellow (7.5YR 6/8) and brownish yellow (10YR 6/6) sand; single grain; loose; strongly acid.

Table A: Particle-size distribution for Tomotley loam

Depth	Sand						Silt	Clay
	VC	C	M	F	VF	Total		
inches	g kg <sup>-1</sup> of soil							
0-7	6	21	160	254	16	457	407	136
7-38	6	22	135	242	22	427	365	208
38-45	0	8	88	208	44	348	345	307
45-50	5	68	615	290	8	986	14	0

Table B. Chemical properties for Tomotley loam

Depth	CaO	MgO	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	Zn	Mn
inches	lbs acre <sup>-1</sup>				ppm	
0-7	1007	222	275	164	ND	ND
7-38	588	179	28	36	ND	ND
38-45	783	398	7	118	ND	ND
45-50	140	56	4	14	ND	ND

### Tomotley Series supplemental profile 3

Location: About 2,400 feet north of junction of West Neck Road and Indian River Road and 130 feet east of West Neck Road.

A1-0 to 7 inches; light brownish gray (10YR 6/2) silt loam; weak fine granular structure; friable; slightly sticky, slightly plastic; many fine and medium roots, extremely acid; clear smooth boundary.

B1t-7 to 14 inches; light brownish gray (2.5Y 6/2) silt loam; common medium distinct brownish yellow (10YR 6/6) mottles; weak fine subangular blocky structure; friable; slightly sticky, slightly plastic, common fine and medium roots; few thin discontinuous clay films on faces of peds; very strongly acid; clear wavy boundary.

B21tg-14 to 24 inches; light brownish gray (10YR 6/2) silt loam; many medium, prominent, yellowish brown (10YR 5/8) mottles; weak medium subangular blocky structure; friable; slightly sticky, slightly plastic; few fine roots; few fine flakes of mica; common thin discontinuous clay films on faces of peds; very strongly acid; clear smooth boundary.

B22tg-24 to 30 inches; light gray to gray (10YR 6/1) silt loam; many medium, prominent strong brown (7.5YR 5/8) mottles; weak medium subangular blocky structure; friable; slightly sticky, nonplastic, few fine roots; few fine flakes of mica; many thin discontinuous clay films on faces of peds; very strongly acid; clear smooth boundary.

B23tg-30 to 45 inches; light gray to gray (5Y 6/1) loam; common medium and coarse prominent yellowish brown (10YR 5/8) mottles; massive parting to weak fine subangular blocky structure; friable, slightly sticky, nonplastic; few fine flakes of mica; very strongly acid; clear smooth boundary.

IIC1g-45 to 56 inches; light gray to gray (5Y 6/1) loamy fine sand; many coarse, distinct brownish yellow (10YR 6/8) mottles; single grain; loose, few fine flakes of mica; strongly acid; abrupt smooth boundary.

IIC2g--56 to 80 inches; light gray (5Y 7/1) sand, single grain; loose, few fine flakes of mica; strongly acid.

Table A: Particle-size distribution for Tomotley silt loam

Depth	Sand						Silt	Clay
	VC	C	M	F	VF	Total		
inches	g kg <sup>-1</sup> of soil							
0-7	0	0	8	62	141	211	670	119
7-14	0	0	1	66	154	221	628	151
14-24	0	0	0	61	134	195	525	280
24-30	0	0	2	89	122	213	558	229
30-45	0	0	2	190	246	438	377	185
45-56	0	0	32	675	110	817	92	91
56-80	1	50	500	335	39	925	45	30

Table C. Chemical properties for Tomotley silt loam

Depth	Exchangeable cations				CEC	BS
	Ca <sup>2+</sup>	Mg <sup>2+</sup>	K <sup>+</sup>	H <sup>+</sup>		
inches	cmol ( + ) kg <sup>-1</sup> soil					%
0-7	0.05	0.10	0.04	9.97	10.16	1.87
7-14	0.04	0.32	0.03	7.10	7.49	5.21
14-24	0.04	2.12	0.07	10.48	12.71	17.55
24-30	0.06	3.16	0.07	7.77	11.06	29.75
30-45	0.13	3.72	0.08	4.90	8.83	44.51
45-56	0.08	1.57	0.03	2.20	3.88	43.30
56-80	0.13	0.80	0.03	1.52	2.48	38.71



Figure 8: Poorly drained Tomotley loam is represented by darker areas of of this photograph with well drained State loam in the lighter areas.

## Yeopim Series

The soils of the Yeopim series are deep and moderately well drained. They formed in loamy marine and fluvial sediments. Yeopim soils are on uplands on the lower part of the Coastal Plain. Slopes range from 0 to 2 percent.

Typical pedon of Yeopim silt loam, about 4,200 feet east-northeast of junction of Mill Dam Road and First Colonial Road and 3,800 feet northeast of junction of Old Donation Parkway and First Colonial Road:

A1--0 to 3 inches; very dark grayish brown (10YR 3/2) silt loam; weak fine granular structure; friable, slightly sticky, nonplastic; common fine and medium roots; few fine pores; extremely acid; abrupt smooth boundary.

A2--3 to 8 inches; light yellowish brown (2.5Y 6/4) silt loam; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; common fine, medium, and coarse roots; common fine pores; extremely acid; clear smooth boundary.

B21t--8 to 23 inches; yellowish brown (10YR 5/6) silt loam; moderate medium subangular blocky structure; friable, slightly sticky, slightly plastic; common fine and few medium roots; common fine and very fine pores; few thin discontinuous clay films on faces of peds; extremely acid; clear wavy boundary.

B22t--23 to 33 inches; light olive brown (2.5Y 5/4) silty clay loam; common medium distinct brownish yellow (10YR 6/6) and gray (10YR 5/1) mottles; weak medium subangular blocky structure; friable; slightly sticky, slightly plastic; few fine and medium roots; common fine pores; many thin continuous clay films on faces of peds; very strongly acid; gradual wavy boundary.

B23t--33 to 79 inches; mottled gray (10YR 5/1), light olive brown (2.5Y 5/4) and strong brown (7.5YR 5/8) silty clay loam; weak coarse prismatic structure parting to weak medium subangular blocky structure; firm, slightly sticky, slightly plastic; few fine and medium roots along faces of prisms; few fine pores; many thick continuous clay films on faces of peds; very strongly acid; clear smooth boundary.

IIC--79 to 84 inches; yellowish brown (10YR 5/6) loamy sand; massive; very friable, non-sticky, nonplastic; strongly acid.

Table A: Particle-size distribution for Yeopim silt loam

Depth	Sand					Total	Silt	Clay
	VC	C	M	F	VF			
inches	g kg <sup>-1</sup> of soil							
0-3	0	10	18	23	30	81	826	93
3-8	0	5	16	17	33	71	797	132
8-18	0	3	8	11	40	62	707	231
18-33	0	1	10	8	41	60	533	407
33-79	0	3	13	10	135	161	503	336
79-84	19	185	351	237	29	821	116	63

Table C. Chemical properties for Yeopim silt loam

Depth	Exchangeable cations				CEC	BS
	Ca <sup>2+</sup>	Mg <sup>2+</sup>	K <sup>+</sup>	H <sup>+</sup>		
inches	cmol ( + ) kg <sup>-1</sup> soil					%
0-3	0.70	0.56	0.14	18.40	19.80	7.07
3-8	0.05	0.18	0.05	7.60	7.88	3.55
8-18	0.05	1.55	0.07	9.40	11.07	15.09
18-33	0.04	7.10	0.18	12.20	19.52	37.50
33-79	0.03	8.50	0.18	8.20	16.91	51.51
79-84	0.02	1.50	0.03	2.00	3.55	43.66

Table D. Chemical properties for Yeopim silt loam

Depth	Organic matter	pH	Al <sup>3+</sup>	ECEC	EBS
inches	g kg <sup>-1</sup>		cmol ( + ) kg <sup>-1</sup> soil		%
0-3	5.87	3.8	4.05	5.45	25.69
3-8	1.12	3.8	3.45	3.73	7.51
8-18	0.38	4.1	4.85	6.52	25.61
18-33	0.32	4.5	4.55	11.87	61.67
33-79	0.22	4.6	1.85	10.56	82.48
79-84	0.07	5.4	0.55	2.10	73.81

## Yeopim Series supplemental profile 1

Location: About 3,000 feet southwest of Virginia Beach Expressway and Birdneck Road interchange, 2,700 feet northwest of Virginia Beach Boulevard and Birdneck Road junction in the northern part of the City of Virginia Beach.

A1--0 to 2 inches; dark brown (10YR 3/3) silt loam; weak fine granular structure; friable, slightly sticky, slightly plastic; many very fine, fine, medium, and coarse roots; common very fine and fine pores; extremely acid; clear smooth boundary.

A2--2 to 5 inches; light yellowish brown (2.5Y 6/4) silt loam; few fine distinct brownish yellow (10YR 6/8) mottles (possibly material from B); weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; common fine medium and coarse roots; common fine pores; very thin plates in some areas of the horizon possibly due to compaction; extremely acid; clear smooth boundary.

B1--5 to 9 inches; mixed brownish yellow (10YR 6/6) and light yellowish brown (10YR 6/4) silt loam; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; few fine and very fine roots; common fine pores; very thin plates in some areas of this horizon possibly due to compaction; extremely acid; clear smooth boundary.

B21t--9 to 15 inches; yellowish brown (10YR 5/8) silt loam; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; few very fine and fine roots; common very fine pores; thin patchy clay films on faces of peds; films may be silt; roots along ped faces; extremely acid; gradual smooth boundary.

B22t--15 to 27 inches; brownish yellow (10YR 6/6) silty clay loam; few medium distinct strong brown (7.5YR 5/8) mottles; moderate medium subangular blocky structure; friable, slightly sticky, slightly plastic; few very fine and fine roots; many very fine and fine pores; thin patchy clay

films on faces of peds; some films may be silt; roots along ped faces; small pockets of silt lighter in color but blend in with matrix when moist; very strongly acid; gradual smooth boundary.

B23tg--27 to 62 inches; mixed light gray (10YR 6/1) and brownish yellow (10YR 6/6) silty clay loam; few fine prominent red (2.5YR 5/8) mottles; moderate medium and coarse subangular blocky structure; firm, sticky, slightly plastic; few very fine and fine roots; many very fine and fine pores; thin patchy clay films on faces of peds; some films may be silt, common fine flakes of mica; roots along ped faces; very strongly acid; gradual smooth boundary.

B24t--62 to 85 inches; light yellowish brown (2.5Y 6/4) clay loam; common medium distinct light gray (10YR 6/1) and common medium prominent reddish brown (5YR 4/4) mottles; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; few medium and fine pores, many very fine pores; many fine flakes of mica; few old root channels surrounded by iron concretions, up to 1/4 inch in diameter in upper part of horizon; very strongly acid.

B25t--85 to 114 inches; mottled light gray (10YR 6/1), brownish yellow (10YR 6/6), and yellowish red (5YR 4/6) clay loam; slightly sticky, slightly plastic; common fine flakes of mica; stratified silty clay loam and silt loam, gleyed between 92 inches and 98 inches; very strongly acid.

B3t--114 to 123 inches; yellowish brown (10YR 5/8) fine sandy loam; few medium distinct light gray (10YR 7/1) and common medium distinct strong brown (7.5YR 5/8) mottles; slightly sticky, slightly plastic; common fine flakes of mica; very strongly acid.

C--123 to 128 inches; mottled light yellowish brown (10YR 6/4) and brown (7.5YR 5/4) loamy sand; nonsticky, nonplastic; common fine flakes of mica; auger refusal at 128 inches due to fluid sand; strongly acid.

Table A: Particle-size distribution for Yeopim silt loam

Depth	Sand						Silt	Clay
	VC	C	M	F	VF	Total		
inches	g kg <sup>-1</sup> of soil							
0-2	6	6	12	11	14	49	795	156
2-5	0	3	6	12	14	35	822	143
5-9	0	3	7	12	17	39	790	171
9-15	0	2	5	9	12	28	733	239
15-27	0	1	2	4	18	25	689	286
27-62	1	1	2	6	47	57	611	332
62-85	1	3	5	61	220	290	424	286
85-114	6	21	40	120	168	355	338	307
114-123	7	16	76	552	86	737	112	151
123-128	76	148	147	487	32	890	40	70



Table B. Chemical properties for Yeopim silt loam

Depth	CaO	MgO	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	Zn	Mn
inches	lbs acre <sup>-1</sup>				ppm	
0-2	288	72	8	46	ND	ND
2-5	72	22	6	18	ND	ND
5-9	72	22	14	22	ND	ND
9-15	96	44	10	24	ND	ND
15-27	144	240	6	34	ND	ND
27-62	96	240	4	56	ND	ND
62-85	144	240	6	66	ND	ND
85-114	264	240	8	74	ND	ND
114-123	216	240	10	46	ND	ND
123-128	168	240	8	34	ND	ND

Table C. Chemical properties for Yeopim silt loam

Depth	Exchangeable cations				CEC	BS
	Ca <sup>2+</sup>	Mg <sup>2+</sup>	K <sup>+</sup>	H <sup>+</sup>		
inches	cmol ( + ) kg <sup>-1</sup> soil					%
0-2	0.84	0.47	0.16	16.60	18.07	8.14
2-5	0.00	0.04	0.06	8.60	8.70	1.15
5-9	0.00	0.06	0.05	7.60	7.71	1.43
9-15	0.01	0.51	0.06	9.60	10.18	5.70
15-27	0.26	1.90	0.09	11.20	13.45	16.73
27-62	0.10	5.50	0.19	11.80	17.59	32.92
62-85	0.38	5.50	0.16	9.20	15.24	39.63
85-114	0.84	5.40	0.21	8.60	15.05	42.86
114-123	0.54	2.80	0.09	4.40	7.83	43.81
123-128	0.20	1.16	0.04	3.80	5.20	26.92

Table D. Chemical properties for Yeopim silt loam

Depth	Organic matter	pH	Al <sup>3+</sup>	ECEC	EBS
inches	g kg <sup>-1</sup>		cmol ( + ) kg <sup>-1</sup> soil		%
0-2	6.69	4.2	3.75	5.22	28.16
2-5	1.73	4.1	3.45	3.55	2.82
5-9	0.68	4.1	2.05	2.16	5.09
9-15	0.34	4.3	4.55	5.13	21.98
15-27	0.10	4.6	4.65	6.90	32.61
27-62	0.14	4.7	4.65	10.44	55.46
62-85	0.00	4.8	2.25	8.30	72.89
85-114	0.07	4.5	1.75	8.20	78.66
114-123	0.00	4.9	0.75	4.18	82.06
123-128	0.00	5.2	0.35	1.75	80.00

Table G: Engineering properties for Yeopim silt loam

Depth	PVC*	Atterburg Limits		PI*
		LL*	PL*	
<u>inches</u>	<u>lb foot<sup>-2</sup></u>			
27-62	4191	50.2	23.3	26.81

\*PVC = potential volume change, LL = liquid limit, PL = plastic limit, and PI = plasticity index.

## Yeopim Series supplemental profile 2

Location: About 1,900 feet southeast of junction of Harris Road and Kline Drive.

A1--0 to 2 inches; very dark grayish brown (10YR 3/2) silt loam; weak fine granular structure; friable; slightly sticky, slightly plastic; many very fine and fine pores; common very fine, fine, medium and few coarse roots; very strongly acid; abrupt smooth boundary.

A2--2 to 10 inches; yellowish brown (10YR 5/4) silt loam; weak fine subangular blocky structure; friable; slightly sticky, slightly plastic; many very fine and fine and common medium pores; few coarse, common medium, and few very fine and fine roots; very strongly acid; clear smooth boundary.

B21t--10 to 28 inches; yellowish brown (10YR 5/6) silty clay loam; many medium faint yellowish brown (10YR 5/4) mottles on ped faces; moderate medium subangular blocky structure; friable, slightly sticky, slightly plastic; common very fine, fine, and medium pores; few very fine and medium roots; common thin discontinuous clay films on faces of peds; common sand grains coated and bridged with clay; very strongly acid; clear wavy boundary.

IIB22tg--28 to 45 inches; gray (10YR 5/1) clay loam; common medium prominent reddish brown (5YR 4/4) and common medium distinct strong brown (7.5YR 5/6) mottles; moderate medium angular blocky structure; firm, sticky, slightly plastic; common very fine and few fine pores; few very fine and fine roots; many thin discontinuous clay films on faces of peds; few gravel up to 1/4 inch in diameter; brown (10YR 5/3) coating faces of peds; very strongly acid; gradual smooth boundary.

IIB-C--45 to 56 inches; mottled pale olive (5Y 6/3), light yellowish brown (2.5Y 6/4), light gray (2.5Y 7/2), and strong brown (7.5YR 5/8) fine sandy loam; massive, firm, slightly sticky, slightly plastic; few very fine and fine pores; few very fine and fine roots; thin discontinuous clay films on faces of peds; common sand grains coated and bridged with clay; common fine flakes of mica; few gravel up to 1/4 inch in diameter; horizon compact and slightly brittle; very strongly acid; abrupt smooth boundary.

IIIC1--56 to 65 inches; brownish yellow (10YR 6/6) sand; single grain; loose; yellowish brown (10YR 5/4) lamella very slightly brittle; very strongly acid; clear smooth boundary.

IIIC2--65 to 80 inches; mottled yellow (10YR 7/6), very pale brown (10YR 7/3), light gray (10YR 7/1), and yellowish brown (10YR 5/6) sand; single grain; loose; lamella are very slightly brittle; strongly acid.

Table A: Particle-size distribution for Yeopim silt loam

Depth	Sand					Total	Silt	Clay
	VC	C	M	F	VF			
inches	g kg <sup>-1</sup> of soil							
0-2	16	26	86	92	26	246	664	90
2-10	2	10	58	76	12	158	672	170
10-28	1	4	34	58	12	109	601	290
28-45	1	8	56	115	30	210	460	330
45-56	1	16	166	354	128	665	165	170
56-65	29	171	519	203	13	935	5	60
65-80	98	147	547	192	6	990	0	10

Table B. Chemical properties for Yeopim silt loam

Depth	CaO	MgO	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	Zn	Mn
inches	lbs acre <sup>-1</sup>				ppm	
0-2	772	147	33	127	ND	ND
2-10	101	24	24	34	ND	ND
10-28	269	342	24	23	ND	ND
28-45	202	398	28	30	ND	ND
45-56	101	287	26	30	ND	ND
56-65	101	104	24	15	ND	ND
65-80	101	72	24	15	ND	ND

### Yeopim Series supplemental profile 3

Location: In Camp Pendleton, about 3,150 feet southeast of junction of Croatan Road and General Booth Boulevard and 100 feet east of General Booth Boulevard.

A1--0 to 2 inches; dark brown (10YR 3/3) silt loam; weak fine granular structure; friable, slightly sticky, slightly plastic; few coarse, common medium, and many very fine and fine roots; common fine, very fine, and medium pores; extremely acid; clear smooth boundary.

A2--2 to 6 inches; yellowish brown (10YR 5/4) silt loam; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic common medium and many fine and very fine roots; common medium, fine, and very fine pores; very strongly acid; clear smooth boundary.

B21t--6 to 12 inches; yellowish brown (10YR 5/6) silty clay loam; moderate medium subangular blocky structure; friable, slightly sticky, slightly plastic; few fine and common very fine roots; common very fine and fine pores; few thin discontinuous clay films on faces of peds; very strongly acid; clear smooth boundary.

B22t--12 to 20 inches; brown (10YR 5/3) silty clay loam; few fine prominent yellowish red (5YR 5/6) mottles; moderate medium subangular blocky structure; friable, sticky, plastic; common fine and very fine roots; common very fine and fine pores; few thin discontinuous clay films on faces of peds; very strongly acid; clear wavy boundary.

B23tg--20 to 32 inches; light brownish gray (10YR 6/2) silty clay; common medium distinct brown (10YR 5/3) and common fine prominent yellowish red (5YR 5/6) mottles; moderate medium angular blocky structure; friable, sticky, plastic; few fine and very fine roots; few very fine and fine pores; common thin continuous clay films on faces of peds; very few fine flakes of mica; strongly acid; clear smooth boundary.

IIC1--32 to 38 inches; mottled brownish yellow (10YR 6/8), brown (10YR 5/3), strong brown (7.5YR 5/6), and light brownish gray (10YR 6/2) fine sandy loam; massive; friable, non-sticky, nonplastic; few very fine and fine roots; common very fine and few fine pores; common fine flakes of mica; strongly acid; gradual smooth boundary.

IIIC2--38 to 74 inches; mottled brownish yellow (10YR 6/6), gray (10YR 6/1), and strong brown (7.5YR 5/6) silt loam; massive parting to weak coarse subangular blocky structure; friable, slightly sticky, slightly plastic; few very fine roots; few fine and common very fine pores; common fine flakes of mica; strongly acid.

IIIC3--74 to 81 inches; gray (10YR 6/1) silty clay loam; common medium prominent yellowish red (5YR 5/6) mottles; massive; friable; slightly sticky; slightly plastic; common fine flakes of mica; strongly acid.

IVC4--81 to 91 inches; strong brown (7.5YR 5.6) loamy sand; massive; friable, nonsticky, nonplastic; strongly acid.

VC5--91 to 117 inches; mottled light brownish gray (10YR 6/2) and strong brown (7.5YR 5/6) silty clay loam; massive; friable, slightly sticky, slightly plastic; strongly acid.

Table A: Particle-size distribution for Yeopim silt loam

Depth	Sand						Silt	Clay
	VC	C	M	F	VF	Total		
inches	g kg <sup>-1</sup> of soil							
0-2	6	62	52	44	16	180	710	110
2-6	4	4	18	22	12	60	720	220
6-12	0	4	20	22	14	60	630	310
12-20	0	4	18	18	10	50	610	340
20-32	0	4	18	20	18	60	530	410
32-38	2	10	168	424	66	670	190	140
38-74	0	0	2	12	156	170	590	240
74-81	2	6	16	22	34	80	550	370
81-91	4	78	352	394	12	840	60	100
91-117	1	6	27	44	62	140	490	370

Table B. Chemical properties for Yeopim silt loam

Depth	CaO	MgO	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	Zn	Mn
inches	lbs acre <sup>-1</sup>				ppm	
0-2	480	98	20	94	ND	ND
2-6	144	50	18	40	ND	ND
6-12	96	240	14	30	ND	ND
12-20	120	240	14	40	ND	ND
20-32	120	240	14	62	ND	ND
32-38	120	240	16	34	ND	ND
38-74	216	240	24	50	ND	ND
74-81	432	240	20	72	ND	ND
81-91	192	240	20	30	ND	ND
91-117	648	240	22	90	ND	ND

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