APPENDIX I

SOIL ANALYSIS RESULTS

SOIL RESOURCE ANALYSTS, INC.
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D. P. WAGNER
PRESIDENT

(301) 345-6384

October 12, 1982

Mr. Kevin Cunningham
DelDOT Archeologist
Delaware Dept. of Transportation
Division of Highways
P.O. Box 778
Dover, Delaware 19901

Dear Kevin:

This letter and the accompanying soil descriptions summarize my observations of the soils at the Hawthorn and Lewden Greene Sites, New Castle Co., Delaware. These sites were visited on September 29,1982. Soil profiles were observed on test pit walls and by means of hand augering.

Hawthorn Site

The Hawthorn Site is situated on a gently to moderately sloping Coastal Plain upland. Soil parent materials consist of Coastal Plain sediments and locally transported slope wash. Man-deposited fill materials are extensive in the area of the house foundation.

The soil profile description for Square 37 is typical of the disturbed soils near the house foundation. The upper 85 cm consits of four layers of historic fill which were distinguishable on the bases of color, texture or structure. The four layers suggest four periods of filling; however, the soil in each of the layers is similar and appears to be of local origin. Dark colors of the surficial fill are indicative of high organic matter contents. This may be attributed to gradual filling allowing for incorporation of organic matter from vegetation or wastes, or may simply indicate a surface horizon origin for the materials deposited.

Underlying the historic fill are natural subsoil (B) horizons. The original surface horizon of the buried natural soil was either lost through erosion or mixed with the overburden. A moderately developed argillic horizon formed in the sandy parent material suggests an age of at least several thousand years for the soil.

Existing topography of the site is the result of substantial modifications to the original topography. Swale positions to the west and east of the ridge where the foundation is located have undergone extensive filling due mostly to erosion of cultivated slopes. Square 31 is located in a swale position west of the foundation. The profile exposed in this square contains a buried soil similar to that in Square 37. Overlying silty fill appears to have originated from the field to the west of the site. Similarly, deposits of probable agricultural origin overly a buried soil profile in Square 40.

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Lower landscape positions also display evidence of surface accretion due to geologic erosion. In Square 40 the B1 horizon directly below the former surface horizon (Ap3) has color characteristics indicating irregular distributions of small amounts of finely disseminated organic matter. This property together with the low landscape position of the profile suggest gradual accumulations of slope wash-type deposits have occurred in geologic time. Similar properties are present in the soil profile observed in Square 57. This profile is also situated at the base of a slope, and the B1 horizon beneath the disturbed surface horizons (Ap1, Ap2) appears to be developed in materials derived from natural, prehistoric slope wash. The argillic horizon (B2t) beneath the B1 has a degree of development compatible with a soil age of several thousand years.

Lewden Greene Site

The Lewden Greene Site is situated on a terrace of the Christina River. Most of the soils are fine sandy material over a gravelly substratum. The surficial sands are possibly of eolian origin.

Soils of the site contain moderately to weakly developed argillic horizons, suggesting a maximum age of perhaps 5,000 years. The fine sandy soils are highly erosive, and there has been substantial alteration to soil horizonation at the site due to agricultural erosion. Lower-lying soils have overthickened A horizons resulting from deposition of soil eroded from higher landscape positions. Several of the soils examined in the higher positions contained relatively thin surface horizons, indicating erosive losses. Erosion may also account for the mixture of weakly and moderately developed soils in the higher positions. Profile truncation of upper B horizons leaving only the more weakly developed lower B horizons could have produced the existing soil pattern. This would mean that the former topography may have been more hummocky or undulating than presently exists.

If you have any questions or would like further clarification of any of the points addressed, please feel free to call me.

Sincerely,

Daniel P. Wagner

Daniel P. Wagner
C.P.S.S.

Horizon	Depth (cm)	Texture	Color	Structure	Consistence	Remarks
Square 37						
A11	0-16	fsl	10YR 3/2	1msbk	fr	10% gravel
A12	16-39	sl	10YR 3/2	2mgr	fr	15% gravel
A13	39-66	fsl	10YR 4/3, 4/4	1msbk	fr	15% gravel
A14	66-85	fsl	10YR 4/4, 4/3	1msbk	fr	10% gravel
IIB1	85-96	sl	10YR-7.5YR 4/4	1cosbk	fr	
IIB2t	96-133	sl	10YR-7.5YR 4/6	2cosbk	fr	clay bridging
IIB3	133-150	ls	10YR-7.5YR 4/6	1cosbk	vfr	large iron stone fragments
IIC1	150-165	ls	10YR 5/6	0sg	l	
Square 40						
Ap1		l				
Ap2		l				
Ap3	51-67	sil				original surface color varies, OM
B1	67-100	sil				clay films
B2t	100-120+	sil				
Square 57						
Ap1	0-34	l	10YR 3/3	1msbk	fr	
Ap2	34-46	sl	10YR 4/3, 4/4	1fsbk	fr	
B1	46-78	ls-sl	10YR 4/4	1cosbk	vfr	
B2t	78-98	sl	7.5YR 4/6	2cosbk	fr	thin clay films
B3	98-108	sl	7.5YR 4/4	1cosbk	fr	few Mn mottles
C1	108-118	sl, scl	7.5YR 5/6	1msbk	fr	
C2	118-125	ls	7.5YR 5/6	0sg	l	
C3	125-129	gls	7.5YR 5/6	0sg	l	auger refusal

SOIL SAMPLE AVERAGES

J. CUSTER

OCTOBER 7, 1983.

LAB NUMBER RANGE 8159 - 8190

MECHANICAL ANALYSIS BY BOUYOUCOS HYDROMETER METHOD

BAG NUMBER	LAB NUMBER	PH	PHOSPHORUS INDEX	PHOSPHORUS NG/DM3	POTASSIUM INDEX	POTASSIUM NG/DM3	CALCIUM INDEX	CALCIUM NG/DM3	MAGNESIUM INDEX	MAGNESIUM NG/DM3	Total Sand (USDA) %	Total Sand (ISSS) %	Silt (USDA) 50-2 microns %	Silt (ISSS) 20-2 microns %	Clay %	Textural Class USDA	Textural Class ISSS	Sample I.D. cm.	
44509	8159	6.7	39	29	124	194	149	1490	156	190	71	81	23	13	6	SaLo	LoSa	0- 5	Below Surface
44510	8160	7.0	27	20	25	39	68	680	124	151	83	89	14	8	3	LoSa	Sand	5- 10	"
44511	8161	7.2	25	19	21	33	39	385	83	101	91	93	3	1	6	Sand	Sand	10- 15	"
44512	8162	7.2	5	4	136	213	37	365	51	61	77	82	14	9	9	SaLo	LoSa	40- 45	Drway founder
44513	8163	6.4	33	25	31	48	70	700	126	153	37	40	46	43	17	Loam	Loam	62- 67	St of slope (SLWD WASH)
44514	8164	6.1	28	21	13	20	45	450	116	141	42	61	44	25	14	Loam	SaLo	67- 72	End of slope WASH
44515	8165	5.2	23	17	9	14	19	190	38	46	49	62	36	23	15	Loam	SaLo	72- 77	St of P.Z.
44516	8166	4.8	20	15	10	16	15	150	9	10	52	65	37	24	11	SaLo	SaLo	77- 82	Mid of P.Z.
44517	8167	4.7	17	13	11	17	13	130	2	2	62	71	28	19	10	SaLo	LoSa	82- 87	Below Surface
44518	8168	4.8	16	12	10	15	9	90	2	2	63	71	27	19	10	SaLo	LoSa	87- 92	"
44519	8169	4.9	17	12	15	23	9	90	1	1	74	82	20	12	6	SaLo	SaLo	92- 97	"
44520	8170	5.0	15	11	12	18	11	105	8	10	71	80	20	11	9	SaLo	LoSa	97-102	"
44521	8171	5.1	14	11	14	21	12	120	26	32	75	81	14	8	11	SaLo	SaLo	102-107	"
44522	8172	5.3	14	11	15	23	14	140	44	53	82	85	9	6	9	LoSa	LoSa	107-112	"
44523	8173	5.3	14	10	16	24	14	140	45	55	86	87	8	7	6	LoSa	LoSa	112-117	"
44524	8174	5.7	10	8	14	22	12	120	39	47	94	94	3	3	3	Sand	Sand	117-122	"
44525	8175	5.7	6	5	9	14	8	80	19	22	91	91	6	6	3	Sand	Sand	122-127	"
44576	8176	6.1	6	5	7	10	8	75	2	2	97	97	0	0	3	Sand	Sand	127-132	"
44577	8177	6.2	6	5	8	12	8	75	9	11	94	94	3	3	3	Sand	Sand	132-137	"
44578	8178	6.6	6	4	11	16	8	75	6	7	94	94	3	3	3	Sand	Sand	137-142	"
44579	8179	6.5	7	5	14	21	8	75	8	10	94	94	3	3	3	Sand	Sand	142-147	"
44580	8180	6.6	6	5	17	26	8	80	11	13	94	94	3	3	3	Sand	Sand	147-152	"
44581	8181	6.6	9	6	25	39	13	125	44	54	94	96	3	1	3	Sand	Sand	152-157	"
44582	8182	6.5	7	5	23	36	12	120	47	57	92	92	5	5	3	Sand	Sand	157-162	"
44583	8183	6.4	5	3	16	25	8	80	14	17	94	94	3	3	3	Sand	Sand	162-167	"
44584	8184	6.3	7	5	22	34	12	120	38	46	92	92	5	5	3	Sand	Sand	167-172	"
44585	8185	6.3	5	4	21	32	12	115	34	41	93	94	4	3	3	Sand	Sand	172-177	"
44586	8186	6.3	6	4	20	31	10	100	27	32	92	92	5	5	3	Sand	Sand	177-182	"
44587	8187	6.4	3	2	15	23	6	60	1	1	97	97	0	0	3	Sand	Sand	182-187	"
44588	8188	6.4	1	1	8	13	5	50	1	1	94	94	3	3	3	Sand	Sand	187-192	"
44589	8189	6.4	1	1	7	10	4	40	1	1	97	97	0	0	3	Sand	Sand	192-197	"
44590	8190	6.4	1	1	7	10	4	40	1	1	97	97	3	3	0	Sand	Sand	197-202	"

UNIVERSITY OF MINNESOTA
TWIN CITIES

Limnological Research Center
220 Pillsbury Hall
310 Pillsbury Drive S.E.
Minneapolis, Minnesota 55455
(612) 373-4508

October 10, 1983

Mr. Jay Custer
Department of Anthropology
University of Delaware
Newark, Del. 19711

Dear Mr. Custer,

The five samples you sent from site 7NC-E-46 contain no pollen, except for an occasional poorly preserved grain in sample 1. The sandy texture and lack of organic matter make it unlikely that pollen is preserved well enough for useful analysis.

You may send the check for $50 made out to the Limnological Research Center.

Sincerely,

HEWright

H.E. Wright

HEW:rmf