Chapter 6

Soils Report: Keatley Creek 1987

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Introduction

In 1986, the primary goal of excavations was to discover if living floor deposits could be successfully separated from roof deposits. The ability to successfully distinguish living floor deposits from other types of deposits was critical to identifying activity patterns and areas in houses and subsequently inferring social and economic organization in those structures. To determine if living floor deposits could be separated from other deposits, several specialists were incorporated in the research design, including myself, a soil scientist with a background in natural rather than cultural history. The aims and results of the 1986 soils work is briefly summarized below.

Textural Analysis

Since Project personnel theorized that the roof might act as a filter to coarser materials and as well create a dead air space into which fine aeolian materials could fall, it was thought that floor deposits might have fewer gravels than roof deposits. Floor deposits might also be enriched in wind deposited silts and fine sands.

Initial results seemed to indicate that to at least some extent this hypothesis was true. With few exceptions, gravel contents in the housepits examined were at least 10% higher in the sediments identified as roof deposits than in those identified as floor deposits. In fact, the gravel content of the roof was much closer to that of the sterile material.

Analyses of the fine fraction did not show such positive results, as hydrometer textural procedures could not separate the floor from the roof (Appendix, Table 1). Since wind certainly does play a role in sediment formation in the area, these negative results could be explained by several factors. First and foremost, at the time of floor formation, the amount of material deposited by the wind was probably quite small in comparison to that which fell through planks in the roof. Second, biological factors since collapse of the roof (cicadas, root growth) may have served to mix the fine fraction between the strata.

Bulk Density

It was also hypothesized that the trampling of the floor deposits by the original inhabitants of the pithouses could have compressed the sediments to such an extent that bulk density differences could still be noted today. In addition, mixing of roof deposits upon collapse of the roof would have had the opposite effect. Thus, attempts were made to measure bulk densities of housepit sediments.

Unfortunately, differences in gravel content and the often shallow depth of floor deposits made bulk density nearly impossible to measure and compare objectively. However, subjective estimates by excavators often did support this hypothesis.

In 1987, excavation of housepits was continued with slightly broader goals. Work concentrated primarily on the large HP 7 and the much smaller HP 3 structures. Specific goals for sediment analysis were as follows:

1) To analyze samples of roof and floor deposits for gravel content to determine if the differences indicated in 1986 could be confirmed.
2) To measure samples from roofs, floors, and sterile materials for pH to determine if acidic etching of calcites noted in 1986 by Paul Goldberg could be explained by sediment reaction.

In addition to specified assignments, I was also called upon to interpret natural as opposed to cultural phenomena at the site. Some of these are summarized below.

1) Beneath the west half of HP 7 was a sterile loam that contained very few gravels in comparison with other sterile materials. Was this natural or transported on to the site by man?
2) Rim spoils were very hydrophobic. Why was this and how might this affect preservation?
3) Extra Housepit Feature 5 (HP 119) was a flat area of fairly well sorted materials and few gravels. Was this a natural phenomena or transported on to the site by man?
4) Aeolian fine sands and silts were a common veneer over the glacial till parent materials. How does the depth of this veneer vary across the site? In addition, to what depth were cultural materials found in this material?
5) What kinds of soils were found in non-cultural areas.

Materials and Methods

Particle Size

In 1987, the majority of the particle size analysis was carried out only by means of the dry sieve method whereas in 1986 a hydrometer was also used.

Sieve sizes used for mechanical analysis were as follows:

> 63 mm	cobbles
4 mm	course gravels
2 mm	fine gravels
1 mm	very coarse sand
0.500 mm	coarse sand
0.250 mm	medium sand
0.125 mm	fine sand
0.063 mm	very fine sand

Materials that fell through the 0.063 mm sieve were considered to be of the clay and silt size range although technically this range does not begin until .050 mm in the Canadian System of Classification (CSSC 1978).

Sediments were shaken mechanically for 15 minutes through the 63 mm to 1 mm sieves. Material passing through the 1 mm sieve was then shaken through the 500 mm to 63 mm sieves for 15 minutes.

All size fractions were weighed and their percentages determined on an air-dried basis.

Soil Description

Soils were described by digging both shallow and deep pits at various locations across the site. To determine the depth of aeolian capping, the amount of cultural material away from the housepits, and descriptions of natural soils, nine pits were dug in a straight line from HP 7 to HP 1 and others were dug in selected areas (Fig. 1). Type, depth, color, texture, and parent material of the soil horizons were described. Texture was determined by the hand texturing method. Samples were taken and later measured for texture by the dry sieve or hydrometer method. The pH of the sediment was then measured at Pacific Soil Analysis Incorporated (Vancouver).

Results

Particle Size Analysis

The dry sieve method of particle size analysis showed a higher percentage of sand in the fine sediments than found by the hydrometer method employed in 1986 (see Appendix Tables 1 and 4). This would indicate that either a longer shaking time is required to separate the sand from the silt and clay or that calcium carbonate and/or organic matter is binding the smaller particles together. Probably a combination of the above is true and the percentage of sand, silt, and clay reported in the 1987 results should be regarded with some reserve. Gravel contents should be fairly accurate, however.

In most housepits analyzed in 1986, a lower percentage of gravel was found in the floor than in the roof (approximately 10% lower). This was not true for 1987 results from HP 3 (see Appendix Tables 1 and 4). In all but Square I, the percentage of gravels in the floor were greater than in the roof. This may indicate that either this pithouse was not in use for as long a period of time as some of the other housepits, or that it sits on glacial till with a higher gravel content than elsewhere on the site. Gravel content on the floor averaged 47%, while gravel content on the roof averaged 40%.

Except the northeast corner of HP 7 (Squares P, Q, and X), floor deposits from this housepit have much less gravel than the roof, or both the floor and the roof have very low gravel contents. Two explanations could explain this finding: 1) the last inhabitants of the housepit occupied it for a period long enough to allow fines to build up on the floor. These may have been tracked in from outside, sifted through the roof supports, or been introduced as aeolian particles that fell in the dead air space of the entrance, or; 2) the low gravel content of the floor may be a direct result of its origin from the sterile material of low gravel till found directly beneath it (see below).

If the latter case best explains the difference between roof and floor gravels of HP 7, it supplies more evidence that we have actually located the living floor.

Sediment Reaction

In 1986, Goldberg (personal communication) noted that calcites found in the cultural sediments seemed to be etched by acid. Could this etching be explained by a low pH of the sediment?

Measurement of roof, floor, and sterile materials from HP's 3 and 7 revealed a neutral pH in all strata of HP 3, and in the floor of HP 7. The roof of HP 7 was slightly acid but probably not enough to account for etching of calcium carbonate. The sterile till material of this housepit was alkaline (see Appendix Table 3).

Perhaps the etching resulted when organics in localized areas decomposed. Another possibility is that the people that lived in the pithouse were doing something with the calcites to cause their disintegration.

Low Gravel Sterile Material Found Beneath HP 7

The sterile material found beneath much of the floor of HP 7 was loamy in texture and had a very low gravel content (see Appendix Table 2). It has been suggested that this material could have been brought in by the pithouse inhabitants for use as a ceremonial or dance floor. In contrast, a natural explanation for the low gravel content of the sterile material must also be considered.

The sterile material found within all house pits examined was of glacial till origin. Till is deposited directly by glacial ice with little or no sorting by water. Beyond this definition, till is very diverse. It often consists of every size range of soil particle from clay to boulder, but depending upon the source of the debris, the way in which it was laid down, and on fluctuations in the grinding action of ice, all particle sizes my not be represented. For example, assuming pithouses were constructed of the soil materials immediately at hand and not from deposits transported any great distance, HP's 1 and 3 seem to be from tills with greater than 50% gravels, whereas HP 4 is from a till with only 35% gravels.

Evidence that the low gravel sterile material is just an anomaly in the naturally occurring till rather than a floor brought to the site by the pithouse inhabitants includes the following: The loamy nature of the sterile material indicates a till origin. Sand, silt, and clay are all well represented in the fine fraction. This is in contrast to aeolian deposits which consist primarily of silt and fine sand—clay is not carried by the wind as the particles tend to stick together forming aggregates too heavy for the wind to carry. It is also in contrast to materials deposited by water which would be much more sorted—the heavier sand particles deposited in a different strata than the fine clay particles. Also, although this gravel-free sterile loam is found over a large part of HP 7, it is not found at the surface around the outer perimeter. However, along the west wall a pit was dug through a gravely sterile till and after 10–20 cm of gravels, the loamy material was also found. The gravel-free sterile loam could also be found beneath the rim on the north wall and the layer could be seen down postholes that originated in gravel sterile. The layer therefore, occupies a much broader area of the site than just beneath the floor of the pithouse.

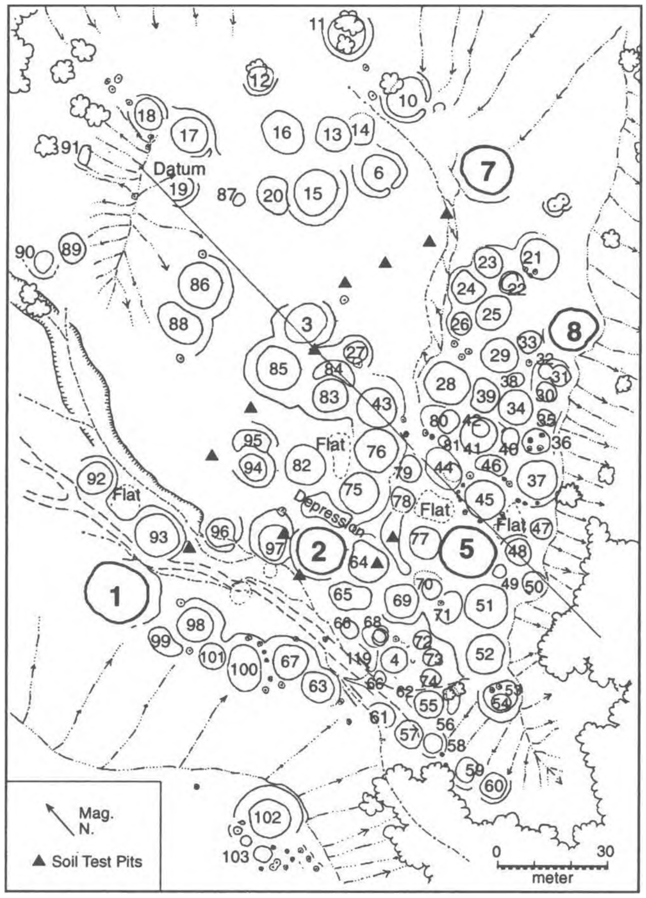

Figure 1. Map of the core of the Keatley Creek site showing the location of soil test pits dug to determine the nature of sediments between housepits.

Hydrophobicity of the Rim Deposits

In the 1986 soils report, the hydrophobicity of the rims was attributed to the high organic content of these deposits. Once the organics were allowed to dry out—

due to their topographic position on the collapsed housepit—they would be difficult to "wet up" again. However, an additional factor contributing to the hydrophobicity of these materials would be their high ash content. In the 1987 report by P. Goldberg, a high proportion of ash was seen in thin sections of the rim. Ash is by its nature hydrophobic. Perhaps the inhabitants of the pithouse regularly cleaned ashes from their fire pits and deposited them, with the rest of their garbage, on the rim. This would certainly add to the hydrophobicity of the entire structure.

Interpretation of the Plaza Area

A flat area (EHPE 5—later redesignated as HP 119—see Vol. III, Chap. 10.21) is found in the southwestern portion of the study site at Keatley Creek. This "plaza" consists of a fairly large and level section of ground surrounded by housepits, but in which no cultural depressions are obvious. A test pit, dug in the northern end of the excavation trench, exposed light and dark layers of fine material in which little cultural material could be found. The fines continued to 110 cm, but below this was a gravely deposit which contained, surprisingly, a great deal of cultural material (see Table 5). The fine material was obviously deposited on top of an occupation layer.

Two theories for the origin of this plaza area were proposed. The fine material may have been transported to the site by the aboriginal peoples for use as a dancing area or the fines may have arrived naturally through aeolian or alluvial deposition over earlier housepit remains.

Scenarios to account for natural deposition may be as follows:

1) Deep fines over till may represent a combination of aeolian deposits and slope wash. The aeolian deposits would have occurred in areas of low activity in periods of intense occupation, i.e., when a large number of people occupied the site, trampling vegetation, and using anything burnable as firewood or kindling. Vegetation would then have been scarce and with nothing to stabilize the soil, fine sands and silts could be picked up by air currents and deposited in depressions. This material may have gradually filled unused and collapsed pithouses. Clays and small gravels and sands may either have been washed or scuffed onto the surface at regular intervals. Also, because this was a winter camp, most of the vegetation and stabilized soil structure may have been destroyed by trampling in the winter, but the actual wind erosion may have occurred in the summer when the soils dried out and there were no occupants to scuff it up once it settled. Between periods of occupation of nearby pithouses, the vegetation would have grown up, stabilizing the soil and adding organic matter to it. This would account for the dark banding.
2) A second scenario for the origin of the fine material could be alluvial deposits made during periods of higher rainfall. In Volume I, Chapter 5, Pierre Friele outlines a network of gulleys that extend southwest across the site. Water may have run down these gulleys carrying clays, silts, and sands with it. These would be deposited as the water pooled in the depression. If this is the case, the gulleys should be examined for large concentrations of gravels and larger stones too heavy for the water to move, and therefore left behind in the gulleys.

If we examine the till material under the sediments, we may find well preserved material left from occupations hundreds of years previous to the final period of occupation.

Depth of Aeolian Capping

With the help of Dr. June Ryder and a visiting geography graduate student, shallow pits were dug from HP 7 to HP 1 (Fig. 1). The variability in the depth of the aeolian capping over the glacial till was measured and cultural remains noted. Actual results are given in the soil descriptions in Table 5 of the Appendix. In summary, aeolian fine sands vary in depth from 0–25 cm, with the shallowest aeolian occurring in areas of heavy traffic and the deepest occurring in more protected areas. Cultural materials were usually limited to a few flakes occurring within the top 10 cm. Soils below this depth appeared undisturbed by man.

Soil Descriptions

Soil descriptions can be found in Table 5 of the Appendix. All soils between housepits appear to be eutric brunisols, although, because of cultural activities, some may meet chernozem criteria. Till ranged from loose and sandy (rare) to compact (common). Many were hard to dig through with a shovel, not to mention with only a digging stick—the only such tool available to the original inhabitants.

Conclusion

In the majority of the house pits examined in 1986 and 1987, living floor deposits (located just above the sterile) could be separated from roof deposits by gravel content. They could not be separated by fine fraction textural analysis or by bulk density procedures. This may be in part due to limitations in the methodology or in the case of textural analysis, be a reality of their formation as both the floor and roof originated from the same parent material.

Soils work was also able to make contributions to the interpretation of archaeological data. By eliminating a natural genesis for site anomalies, cultural origins could be assessed.

Keatley Creek was an extremely interesting project from a pedological viewpoint.

Appendix: Tables

Table 1. 1986 Textural Data on Keatley Creek Sediments (Including percent clay [%C], percent silt [%Si], percent sand [%S], bulk density [B.D.], and percent organic matter [%OM])

Stratum	Level	% gravels	> 25	25–8	8–4	4–2	%C	%Si	%S	B.D.	%OM
Housepit 1, Square A, Subsquare 11											
I	surface	24	53	21	8	18	15	27	68	1.41	9
II-1	roof fill	51	23	35	22	20	20	27	53	1.99	12
II-4	roof fill	45	36	21	22	22	12	18	70	1.89	5
III-1	floor	35	3	25	34	38	12	21	66	1.92	3
III-2	floor	54	21	32	25	22	12	18	70		2
IV?	sterile	54	18	40	19	23	18	21	61		4
Housepit 1, Square B, Subsquare 15											
I	sterile	7	0	16	21	63	17	29	54	1.71	9
II-1	roof fill	48	15	36	25	24	17	27	66		7
IIa	floor	35	4	31	28	37	4	21	75		5
III	floor	38	0	27	34	39	11	17	63		3
IV	sterile	53	31	29	20	20	14	24	62		2
pit fill		41	16	29	26	29	12	22	66		7
Housepit 1, Square D, Subsquare 3											
II-2	roof fill	43	0	26	37	37	12	20	68	1.85	5
III	floor?	56	44	21	16	19	15	21	64		5
IV	roof fill	67	28	41	18	13	13	21	66		7
V	floor	41	19	28	24	29	12	41	47	1.94	5
Housepit 3, Square B, Subsquare 3											
I-2	surface	15	0	28	19	53	33	29	38		18
II-1	roof fill	53	0	42	32	26	18	26	56	1.86	11
II-2	roof fill	47	0	31	35	34	17	25	58		9
Housepit 3, Square B, Subsquare 11											
I	surface	12	0	16	18	66	20	32	48		9
II-1	roof fill	44	0	41	31	28	13	25	62	1.9	8
Housepit 3, Square C, Subsquare 3											
I	surface	18	0	17	18	65	18	23	59	1.53	12
II-1	roof fill	51	0	33	34	33	15	24	61	2.03	10
II-5	roof fill	48	16	28	28	28	12	24	64	1.62	7
III-1	floor	32	0	28	35	37	13	25	62		3
IV	sterile?	43	12	25	31	32	14	28	58	2.43	5
V	fill?	44	12	34	27	27	17	24	59		5
Housepit 3, Square C, Subsquare 11											
I	surface	10	0	4	12	84	15	20	65		9
II-1	roof fill	52	9	28	49	32	19	27	54	1.71	10
II-4	roof fill	48	3	29	31	37	14	25	61		7
II-5	roof fill	35	0	24	45	71	14	28	58		5
III-1	floor	23	21	28	23	28	16	23	61		6
III-2	floor	27	0	9	37	54	16	22	62		5
Housepit 4, Square A, Subsquare 7											
II-2	surface	8	0	19	39	42	20	25	55	1.29	8
III-1	roof fill	56	29	33	20	18	15	22	63	1.80	6
III-2	roof fill	34	0	30	31	39	15	22	63	1.88	5
IV	floor	33	0	33	31	37	13	21	66	1.65	6
Housepit 4, Square B, Subsquare 7											
II-2	surface	17	0	31	24	45	11	27	62		7
III-1	roof fill	35	23	31	20	26	11	22	67	1.79	5
III-2	roof fill	34	5	35	27	33	14	23	63	1.46	4
IV-3	floor	31	5	23	31	41	8	20	72	1.73	3
Housepit 7, Square A, Subsquare 7											
I21	roof fill?	12	0	33	22	45	17	36	47	1.79	8
II	floor	10	0	45	28	27	19	33	48	1.08	6
Housepit 7, Square C, Subsquare 7											
V-1	roof fill	51	8	40	26	26	13	31	56	1.17	12
II	floor	17	17	23	23	37	11	21	68	1.33	6
XII	roof fill	31	14	26	27	33	10	30	60	1.65	5

Table 2. Percentages of Heavy Fractions in Sterile Tills and Loams Under Housepit Floors

Square	Subsquare	63 mm	4 mm	2 mm	Gravels
Sterile Till					
Housepit 3					
A	6		67.8	9.8	77.6
E	11		36.1	12.3	48.4
F	11		31.8	17.9	49.7
F	13		34.7	11.3	46.0
G	2		43.5	13.9	57.4
J	9		14.9	12.8	27.7
AA	14		60.5	9.1	69.7
Housepit 7					
G	7-1		0.0	0.0	0.0
G	7-2		3.6	3.6	7.5
I	4		27.6	9.0	36.6
I	13		45.3	8.8	54.1
J	1		34.3	10.3	44.7
J	10		46.5	8.1	54.6
Q	10		1.7	2.9	4.6
V	5		62.8	9.5	72.3
V	9		5.6	2.9	8.5
R	15		0.0	0.0	0.0

Table 3. pH Values for Housepit Sediments

Sediment Reaction					
HP	**Square**	**Subsquare**	**Stratum**		**pH**
3	EE	7	II/2	roof	6.9
3	I	4	22/1	roof	7.1
3	EE	4	III	floor	7.0
3	E	4	III/1	floor	7.1
3	J	13	III/1	floor	6.6
3	F	11	sterile		7.1
3	E	11	sterile		6.8
7	Y	4	V/2	roof	6.5
7	BB	4	V/1	roof	6.3
7	V	10	V/1	roof	6.6
7	Y	4	II	floor	7.2
7	BB	8	II/1	floor	6.9
7	Z	3	II/1	floor	6.5
7	J	1	sterile		8.2
7	I	13	sterile		8.0
7	V	5	sterile		7.6

Table 4. Percentages of All Soil Fractions in Housepit Deposits

PERCENTAGES—All Fractions												
				Gravels			Fine Fraction (<125 m)					
Square	Subsquare	Stratum		63 mm	4 mm	2 mm	1 mm	500 m	250 m	125 m	63 m	<63 m
Roofs and Floors												
Housepit 3												
A	10	II/1	roof		3.1	8.6	20.0	17.5	14.9	17.3	11.4	18.9
A	10	III	floor		60.8	7.7	21.5	18.5	15.9	16.1	12.2	15.8
A	14	II/2	roof		35.8	13	26.9	17.7	13.2	14.7	11.5	16.0
A	14	III	floor		39.7	12.3	19.6	18.1	16.6	17.3	10.9	17.5
E	4	III/1	floor		29.5	13	18.1	15.2	15.5	18.1	12.7	20.4
E	10	III/1	floor		41.9	12.9	21.3	17.9	16.9	16.6	total	27.3
F	3	II/1	roof		19.7	12.1	20.0	17.4	17.1	17.3	11.1	20.8
F	3	I/1-f1	pit-floor		14.9	11						
F	10	III/1	floor		30.6	12.4	16.3	15.0	16.1	20.7	11.1	20.8
G	4	II/5	roof		26	15.3	20.0	15.5	13.3	15.1	total	36.0
G	4	III/1	floor		32.1	10.9						
G	6	II/4	roof		40.6	16.1	27.9	17.3	11.8	12.8	11.3	18.9
G	6	II/6	roof		23.4	14.3						
G	6	III/1	floor		41.7	11.4						
G	10	II/5	roof		15.7	12						
G	10	III/2	floor		18.1	14.6						
I	4	II/1	roof		28.7	15						
I	4	III/1	floor		12.8	13.6						
I	10	II/1	roof		35.7	15.9						
I	10	III/1	floor		20.6	15.8						
J	4	II	roof		29	14.8	20.0	15.3	14.4	17.5	11.9	20.8
J	4	III	floor		26.3	14.5	19.7	15.5	15.3	19.3	11.6	18.6
J	10	II/1	roof		24.9	14.2	19.2	15.4	13.4	14.7	10.0	27.3
J	13	III/1	floor		33.1	16.2	24.7	17.8	14.7	14.3	10.1	18.4
AA	8	II	roof		28.3	12.8	21.0	15.6	14.9	16.2	8.4	23.9
AA	8	III	floor		33.9	15.8	19.8	15.5	15.5	16.6	total	32.7
AA	10	III	floor		33.1	13.3						
EE	4	III/3	floor		28.9	13.8						
EE	7	II/2	roof		41.6	10.9	17.0	14.8	15.6	17.8	13.7	21.2
EE	10	II/2	roof		16.5	10.8						
EE	10	III	floor		33.3	14.9						
Housepit 7												
F	1	II/1	floor		12.3	8.2	12.2	13.4	13.7	18.0	17.3	25.4
G	4	II	floor		6.4	7.6	11.4	10.8	10.2	18.0	24.9	24.7
G	4	V	roof		21.7	13.6	18.3	11.4	9.4	16.1	19.4	25.5
G	10	II/1	floor		11.7	9.4	13.1	12.0	12.2	18.1	15.2	29.2
G	10	V/1	roof		20.7	7.8	15.7	9.7	14.6	19.5	18.2	22.4
H	4	II/1	floor		8.1	8.7	11.3	11.9	11.9	17.0	total	48.0
H	4	V	roof		15.4	12.4	17.6	12.6	9.2	15.7	22.0	22.8
H	10	V/1	roof		4.1	8.5	15.3	11.9	11.8	21.2	15.3	24.5
H	15	II/1	floor		14.3	10.4	13.9	12.5	12.5	21.0	16.1	23.9
I	4	II	floor		9.7	8.3	14.1	11.9	12.0	19.8	19.7	22.5
I	4	V	roof		9.6	7.3	12.0	11.0	12.4	16.9	13.9	33.8
I	9	II/2	floor		10.2	10.9	21.4	16.4	14.7	18.1	10.9	18.5
I	10	II	floor		15.6	11.8	19.7	17.6	15.6	19.0	12.7	15.5
I	10	V	roof		20.6	10.4	14.1	10.9	10.3	15.8	17.3	31.6
J	4	II/1	floor		9.5	7.5	12.3	12.4	12.8	20.8	20.8	21.0
J	4	V/1	roof		17.8	8.4	12.6	11.1	10.8	17.8	22.6	25.0
J	4	V/1	roof		14.6	10.2	14.3	11.3	11.1	15.3	total	47.9
J	10	II	floor		9.0	7.3	12.0	14.2	13.0	19.3	18.7	22.8
J	10	V	roof		31.1	15.9	23.1	12.3	7.8	14.9	16.3	25.6
N	tr	V	roof	17.2	28.5	8.6	15.1	11.7	13.6	16.9	12.6	30.1
O	4	V	roof		33.3	10.2	13.1	10.9	13.0	17.2	12.0	33.8
P	4	II	floor		17.3	8.9	12.3	11.3	12.4	20.3	12.5	31.1
P	4	V	roof		5.1	10.3						
P	10	II	floor		25.2	7.7	11.6	11.3	12.2	17.0	13.3	34.6
P	14	V/1	roof		18.6	6.8						
Q	4	II	floor		19.5	8.6						

(continued)

Table 4. Percentages of All Soil Fractions in Housepit Deposits *(continued)*

PERCENTAGES—All Fractions											
			Gravels			Fine Fraction (<125 m)					
Square	**Subsquare**	**Stratum**	**63 mm**	**4 mm**	**2 mm**	**1 mm**	**500 m**	**250 m**	**125 m**	**63 m**	**<63 m**
Q	4	V sw/r		11.4	5.7	8.1	8.9	16.9	22.7	16.5	26.9
Q	10	II/1 floor		8.5	8.8	12.5	9.1	13.5	20.2	14.1	30.6
R	1	V roof		14.6	11.9						
R	4	II floor		15.3	9.3						
R	7	II/1 floor		6.7	7.3						
R	14	V/1 roof		13.5	8.9	16.0	17.2	14.5	15.3	total	37.1
V	10	II/1 floor		15.4	8.1	9.8	10.5	10.4	15.0	20.6	33.6
V	10	V/1 roof		43.6	9.6	13.9	12.7	11.6	14.5	13.8	33.5
W	4	V/1 roof		19.1	9.9						
W	10	II floor		10.6	8.9	13.6	14.3	13.0	15.7	total	43.5
W	10	V roof		30.1	9.3	14.3	11.9	10.9	14.8	total	48.5
X	4	II floor		19.7	12.2						
X	10	II floor		23.9	11.3						
X	10	V roof		11.9	9.0						
Y	4	II floor		11.8	9.6	14.3	12.0	12.0	14.1	13.8	33.9
Y	4	V/2 roof		16.2	6.9	14.4	9.9	9.5	15.3	20.2	30.7
Z	3	II/2 floor		10.4	8.3						
Z	3	V/1 roof		31.9	10.9	14.3	10.4	11.9	17.5	15.7	30.2
Z	10	II/2 floor		14.0	9.8						
Z	10	V/1 roof		26.0	11.5	12.8	10.3	12.0	18.3	16.4	30.3
BB	4	V/1 roof		40.1	8.9						
BB	8	II/1 floor		13.2	9.4	14.3	12.3	12.8	17.9	15.6	27.1
BB	10	II/1 floor		10.3	9.2	14.0	12.9	13.4	21.2	15.2	23.4
BB	10	V/1 roof		35.1	10.2						
Rims											
Housepit 7											
D	tr	XIIIC rim		18.8	8.7	13.1	11.7	11.5	17.6	12.2	33.8
D	tr	XIIID rim		28.3	4.9	8.1	8.7	9.4	17.8	16.3	39.7
K	tr	XIIIA rim		19.5	10.5	14.0	11.9	12.1	14.7	21.4	25.8
K	tr	XIIIB rim		21.9	10.3	15.9	14.3	15.1	17.9	21.7	15.1
K	tr	XIIIC rim		31.8	7.5	13.3	16.1	15.9	17.2	15.2	22.3
K	tr	XIIIC7 rim		28.4	8.7	13.6	12.4	11.9	15.3	21.1	25.7
L	tr	XIIIA rim		17.9	8.9	12.7	11.9	10.7	15.4	26.2	23.0
M	tr	XIIIA rim		32.7	10.7	15.8	12.0	11.0	14.2	14.3	32.7
M	tr	XIIIB rim		39.4	9.0	14.8	12.0	11.7	15.2	12.0	34.2
M	tr	XIIID rim		43.5	13.2	21.6	16.2	15.6	16.3	total	30.2
N	tr	XIIIA rim		31.6	9.8	15.5	13.1	12.9	14.7	14.2	29.6
N	tr	XIII? rim		39.4	8.9	18.5	23.1	20.4	17.6	6.8	13.7
Pits											
Housepit 3											
F	3	I/1-f1 pit-floor		14.9	11.0						
F	3	III/1 pit		24.3	14.5						
F	3	IV/1 pit		20.6	13.6						
I	16	4 pit		30.0	14.1						
Housepit 7											
G	1	I/3, 4 pit		19.0	9.7	13.7	11.7	11.2	14.4	26.6	22.4
G	2, 6	I/7 pit		14.9	9.8	13.4	13.5	13.8	17.4	21.4	20.6
Z	10	20 pit		21.3	9.0						

Table 5. Description of Soil Test Pits

Depth	Soil Class	Texture	% cobbles	% gravel	Color	Parent material
Pit 1						
0–7	Ah1	SL	0	5	10 YR 4/2dry 10 YR 2/2moist	aeolian grading to till
7–12	Ah2	gSL	5	25	10 YR 4/2d 10 YR 3/2m	till
12–29	Bm	gSL	5	25	10 YR 4/2d 10 YR 2/2m	till
29–50	Cc	gSL	5	25 0	10 YR 5/4d 10 YR 3/2m	compact till
Cultural deposits: 1 flake in aeolian						
Pit 2						
0–14	Ah	SL	0	2	10 YR 4/1d 10 YR 2/1m	aeolian
14–28	Bm	gSL	5	30	10 YR 6/3d 10 YR 3/2m	till
28–50	Cc	gSL	5	20	10 YR 5/4d	compact till
Cultural deposits: 1 flake in aeolian Notes: aeolian grades to till						
Pit 3						
0–8	Ah	SL	0	5	10 YR 5/2d 10 YR 2/2m	aeolian
8–16	Bm1	gSL	5	20	10 YR 5/2d 10 YR 3/2m	till
16–38	Bm2	gSL	5	20	10 YR 6/3d 10 YR 3/3m	till
38–50+	C	gSL	0	20	2.5 YR 4/4m	loose till
Cultural deposits: None						
Pit 4						
0–12	Ah	SL	0	5	10 YR 4/2d 10 YR 2/2m	aeolian
12–35	Bm	gSL	5	55	2.5 YR 5/4d 2.5 YR 4/4m	loose till
34–66+	Cc	gSL	5	35	2.5 YR 6/4d 2.5 YR 5/4m	compact till
Cultural deposits: None						
Pit 5						
0–10	Ah	SL	0	15	10 YR 4/1d 10 YR 2/1m	till
10–26	Bm	gSL	5	20	10 YR 5/4d 10 YR 3/2m	till
26–54+	C	gSL	5	45	2.5 YR 5/4d 2.5 YR 4/4m	loose till
Cultural deposits: 4 flakes and knife in first 10 cm. Pit is quite close to HP 3, so would expect more cultural material. Notes: no obvious aeolian layer.						

(continued)

Soil Class:

Ah: a mineral soil horizon (layer) formed near the surface, modified from the parent material by an accumulation of organic matter.

Bm: a mineral soil horizon, usually found beneath the A horizon, modified from the parent material by the development of soil structure and a change in color due to the oxidation of iron.

C: a mineral soil horizon that has been relatively unaffected by soil forming processes.

Cc: a C horizon cemented (in this case) by $CaCO_3$.

Texture:

SL = sandy loam
gSL = gravelly sandy loam
SiL = silt loam
L = loam
FSL = fine sandy loam
FLS = fine loamy sand
d = dry
m = moist

Table 5. Description of Soil Test Pits *(continued)*

Extra Housepit Feature 5 (HP 119). Pit into north half of square A. Consists of 1.05 m of fine sediments (few gravels, some sand) over till. Light and dark alternating bands. Light bands have a silt loam texture.

Depth	Soil Characteristics	Texture	% cobbles	% gravel	Color	Parent material
0–10	dark	gSL	0	<5	7.5 YR 5/2dry 10 YR 2/1moist	
10–24	light	SiL	0	<5	10 YR 5/2d 10 YR 3/2m	
24–29	dark	SiL	0	<5	10 YR 4/2d 10 YR 2/1m	
29–33	light	SiL	0	<5	10 YR4.5/2d 10 YR 2/2m	
33–42	dark	SiL	0	<5	10 YR 4/2d 10 YR 2/1m	
42–46	light	SiL	0	<5	10 YR 5/2d 10 YR 3/2m	
46–53	dark	SiL	0	<5	10 YR 4/2d 10 YR 2/1m	
53–56	light	SiL	0	<5	10 YR4.5/2d 10 YR 2/2m	
56–59	dark		0	<5	10 YR 4/2d 10 YR 2/1m	
59–110	light		0	<5	10 YR 5/2d 10 YR 3/2m	

Material appears to be well sorted silts, but occasionally small gravels were found.
110–130, gravelly loam (probably till). Cultural material present, including charcoal, bone, and flakes. Very loose consistency. Many cicada plugs throughout. Occasional bit of bone and charcoal in fine sediment.
Perhaps banding indicates periods of site occupation where vegetation was inhibited by trampling vs. Periods of abandonment when vegetation returned to stabilize aeolian material.

Pit 6

Depth	Soil Characteristics	Texture	% cobbles	% gravel	Color	Parent material
0–10	Ah	SL	0	15	10 YR 4/2d 10 YR 2/2m	till
10–25	Bm	gSL	5	20	10 YR 5/4d 10 YR 3/3m	till
25–40	C	gSL	5	35	2.5 YR 4/4m	till

Cultural deposits: Flakes were found in the top 10 cm. and charcoal was seen from 10–26 cm. The latter could be due to a burnt root.

Pit 7

Depth	Soil Characteristics	Texture	% cobbles	% gravel	Color	Parent material
0–10	Ah	SL	0	2	10 YR 4/3m	aeolian
10+	Bm				10 YR 4/4m	till

Cultural deposits: None
Notes: Aeolian thickness ranges from 9–13 cm. The A horizon is not very dark, perhaps indicating fewer cultural activities occurred here.

Pit 8

Depth	Soil Characteristics	Texture	% cobbles	% gravel	Color	Parent material
0–20	Ah	SL	0	2	10 YR 2/1m	aeolian/till

Cultural deposits: None
Notes: no clear aeolian layer. Seems mixed with till.

(continued)

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Cc: a C horizon cemented (in this case) by $CaCO_3$.

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SiL = silt loam
L = loam
FSL = fine sandy loam
FLS = fine loamy sand
d = dry
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Table 5. Description of Soil Test Pits *(continued)*

Depth	Soil Class	Texture	% cobbles	% gravel	Color	Parent material
Pit 9						
0–25	Ah	SL	0	2	10 YR 2/1	aeolian
Cultural deposits: None						
Notes: Aeolian deposits are composed of fairly well sorted sands with some silt and only very fine gravels. Till deposits have more clay and coarse gravel.						
Pit 10						
0–5		L	0	7	10 YR 3/2dry 10 YR 2/1moist	
5–16		SiL	0	1	10 YR 3/2d 10 YR 2/1m	
16–32		SiL	0	1	10 YR 4/2d 10 YR2/1m	
32–46		SiL	0	1	10 YR4.5/2d 10 YR 3/1m	
46–54		FLS	0	0	10 YR 5/2d 10 YR 3/1m	
54+		SL	0	25		till
46 cm fine sands and silts fairly well sorted over well sorted fine sand over till. Screened 3 buckets of till. Found lots of flakes, charcoal, including a bone awl. Sampled sand over till and silt loam from 16–32 cm.						
Pit 11 (silt loam well sorted over till)						
0–15	Ah1	L-SiL	0	5	10 YR 5/2d 10 YR 3/1m	
15–40	Ah2	L-SiL	0	<5	10 YR 3/2d 10 YR 2/1m	
40+		gSL	0	20	10 YR 2/2m	till
Cultural deposits: Found bone, charcoal, and flakes in till.						
Pit 12						
0–20		CS	0	15	10 YR 2d 10 YR 2/1m	
20–45		FLS*	0	5	10 YR 5/3d 10 YR 2/2m	
45–62		FSL	0	0	10 YR 3/2m 2.5 YR 4/4d	
62–73		FSL	0	0	10 YR 3/3m	
* well sorted sand with a few lines of gravel indicating working by water. 73+ loose till cultural material with both large and small gravels. Cultural deposits: Found bone, lithics, and charcoal in till.						

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SiL = silt loam
L = loam
FSL = fine sandy loam
FLS = fine loamy sand
d = dry
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