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R.Inman, D.R.Brown, R.E.Goddard and D.A.Spratt

Roxby Iron Age settlement and the Iron Age in North-east Yorkshire

Microfiche pages 1-35

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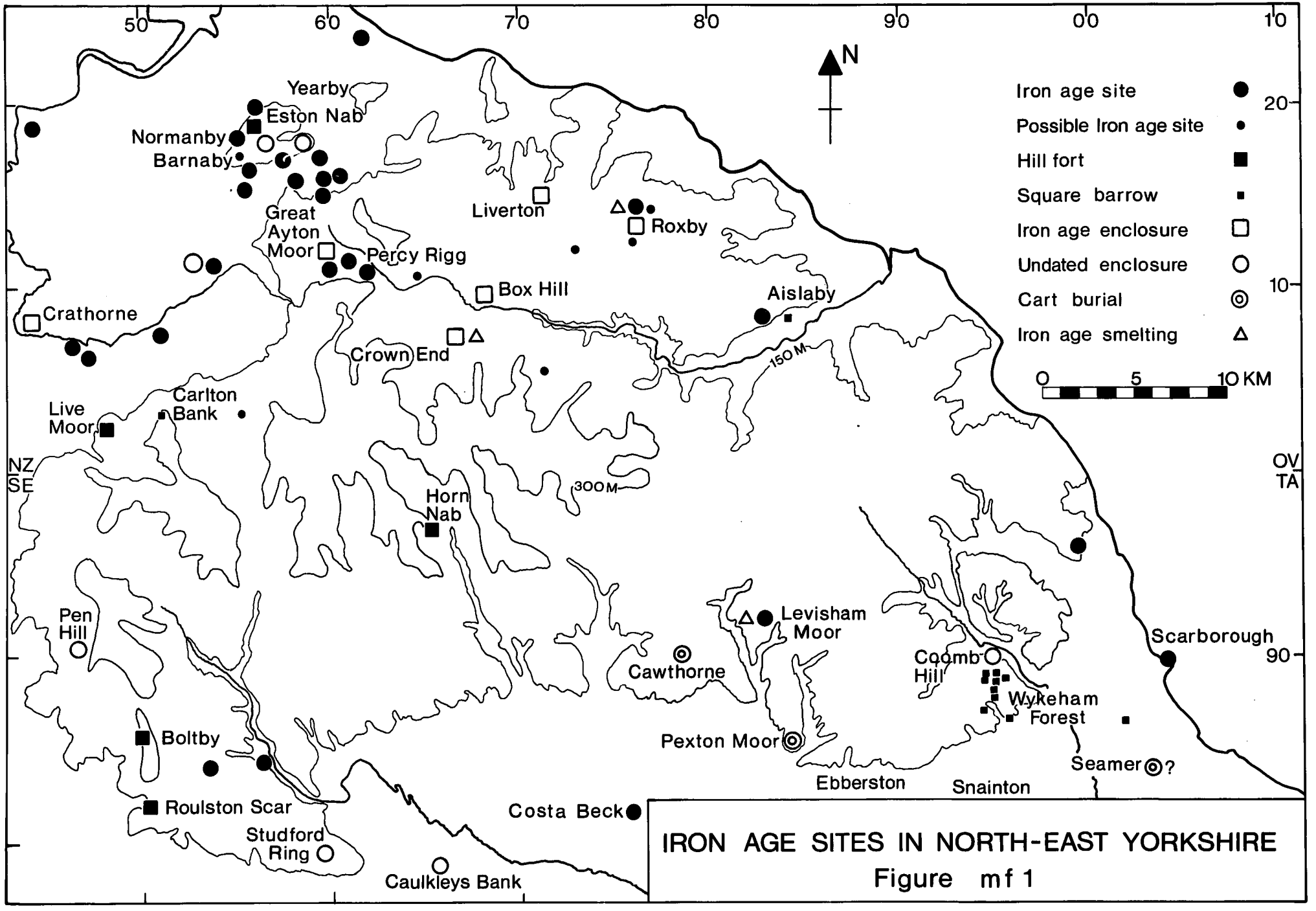
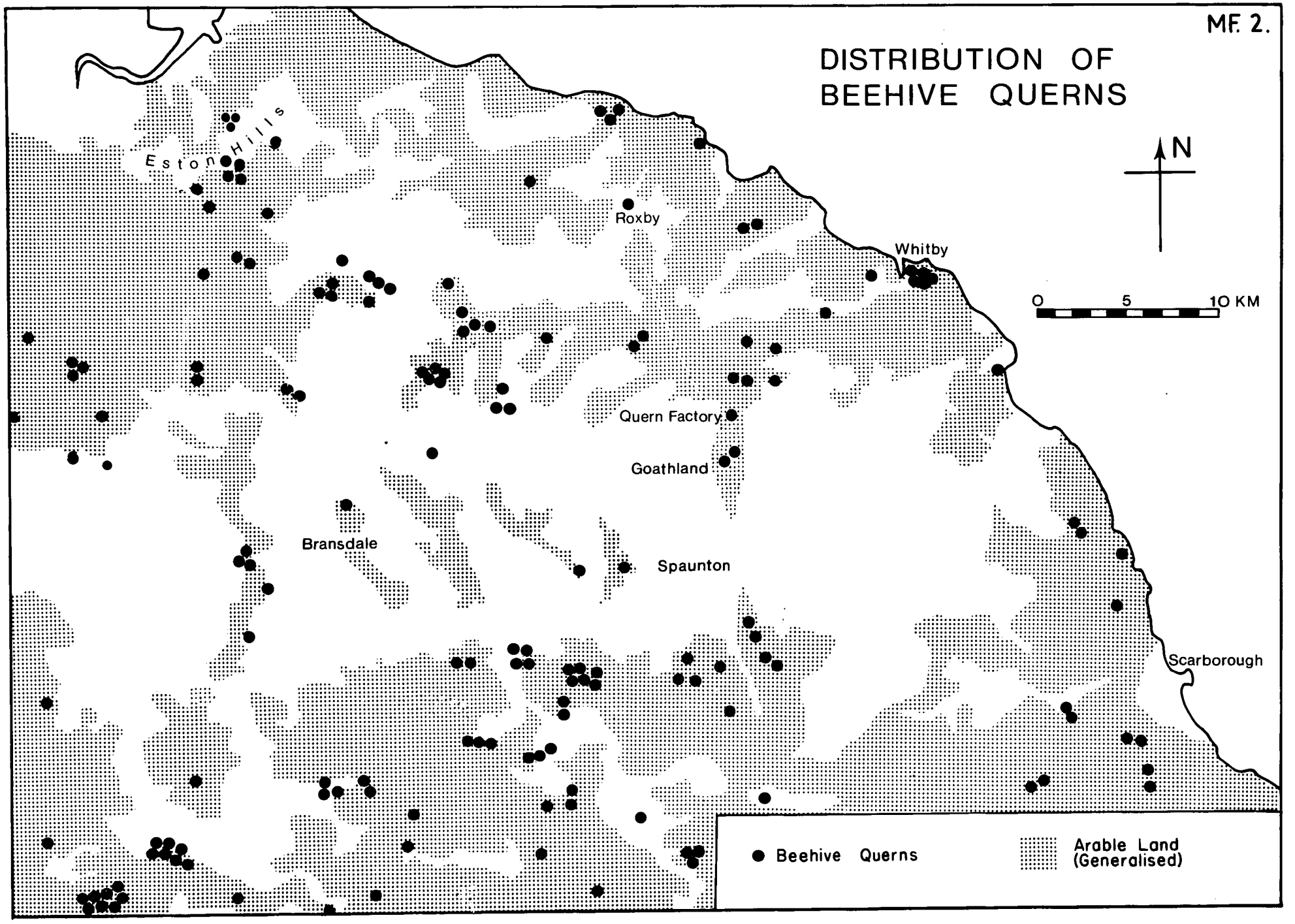
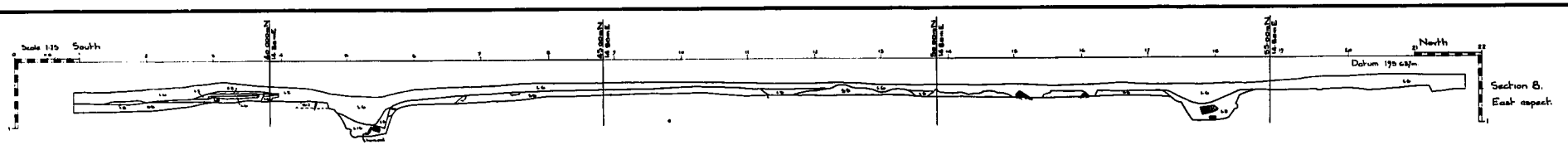
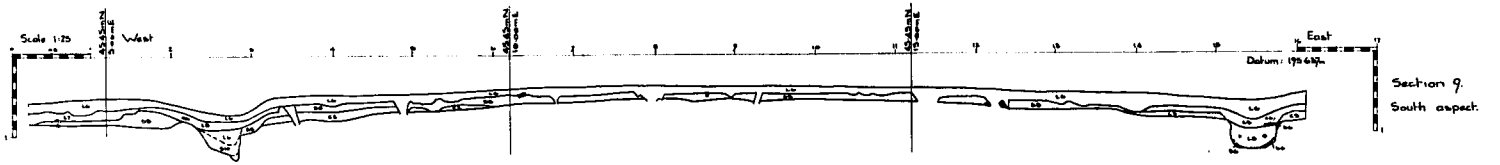


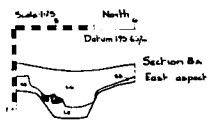
IRON AGE SITES IN NORTH-EAST YORKSHIRE

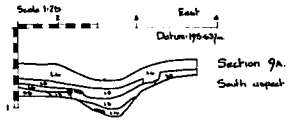
Figure mf 1

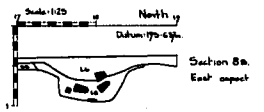

MF. 2.
DISTRIBUTION OF BEEHIVE QUERNS
N
0 5 10 KM
Eston Hills
Roxby
Whitby
Quern Factory
Goathland
Bransdale
Spaunton
Scarborough
Beehive Querns
Arable Land (Generalised)

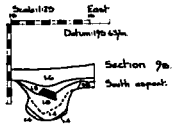




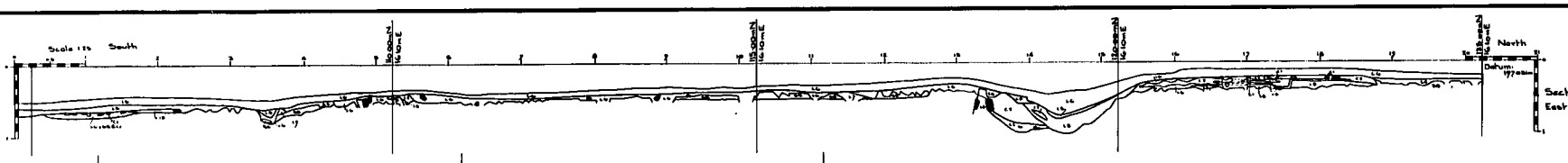


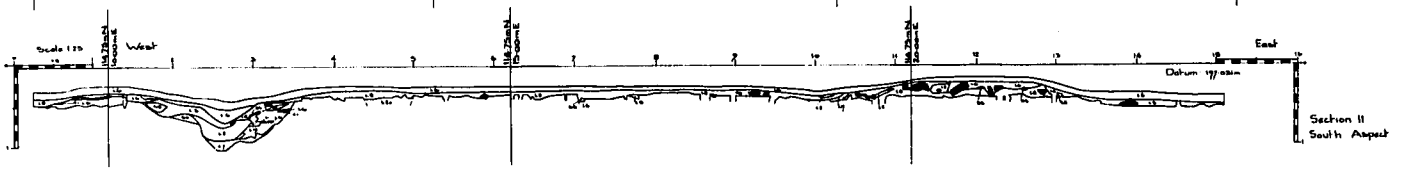




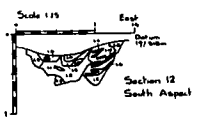


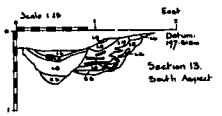
ROXBY: House site no. 2.
Ditch & site sections.

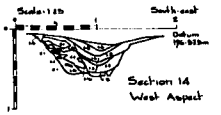


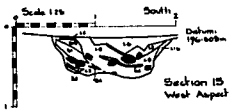


ROXBY: House site no. 1.
Ditch & site sections.



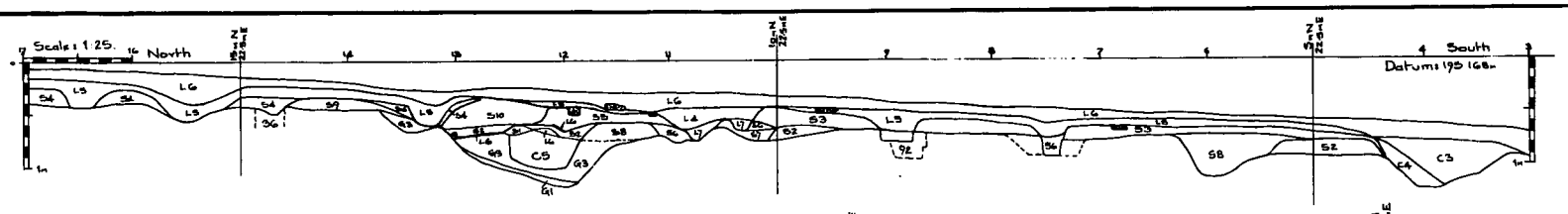




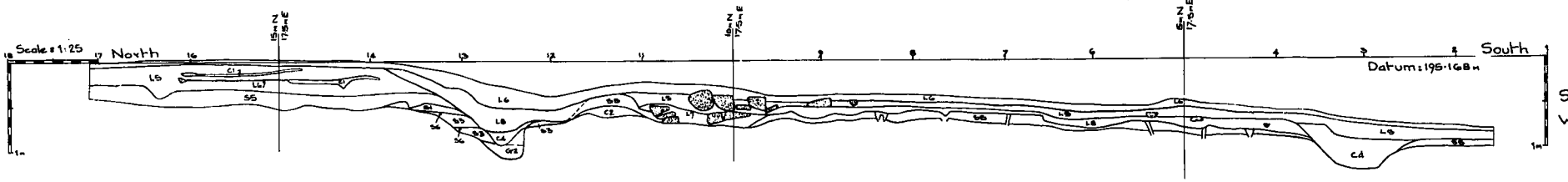


Section 16. External mound section.

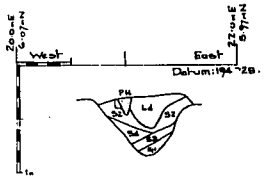
MF4.



Section 1
West aspect.



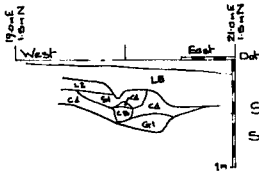
Section 2
West aspect.



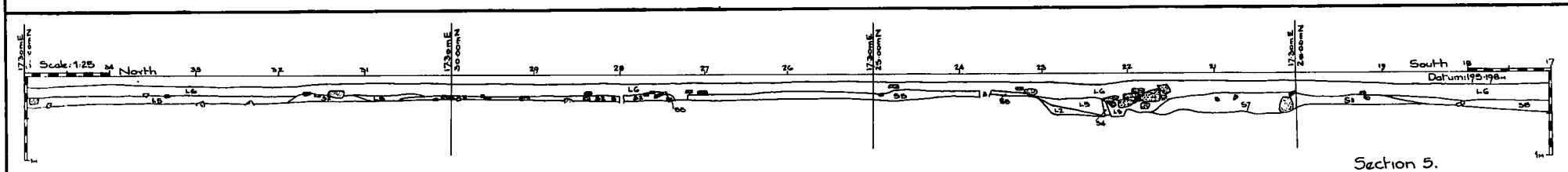
Section 3.
South aspect.

ROXBY - House site no.4.

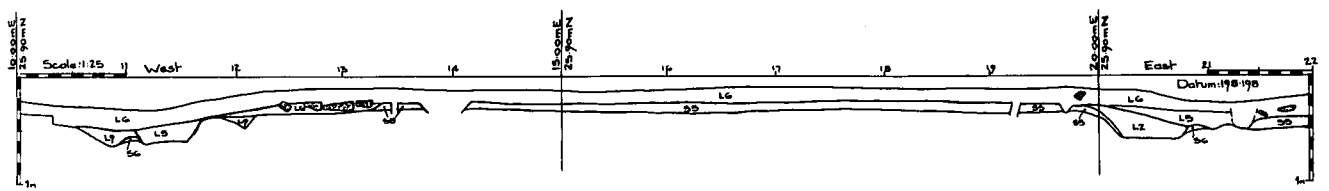
DITCH & SITE SECTIONS.



Section 4.
South aspect.



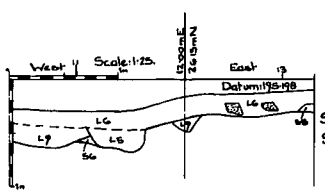
Section 5.
West aspect



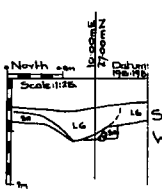
Section 6.
South aspect.

ROXBY-House site no.3.

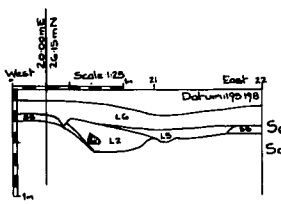
DITCH & SITE SECTIONS.



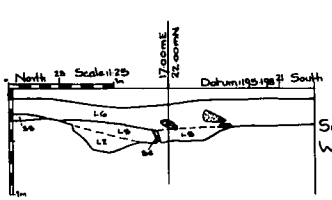
Section 6A
South aspect.



Section 7.
West aspect.



Section 6B.
South aspect.



Section 5A
West aspect.

MF 5 TABLE 1. Dimensions of post-holes of House 1

Average post diameter cms.

Depth of post-hole below natural clay level cms.	0-5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-45	46-50	> 50
0-5				20A 22							
6-10		46	18 39 43 47 59 61 66	19 25A 65	20C 41						
11-15		1 62C	10 25B 26 49 63B	55 63A		45					
16-20		40B	11 58	2 23 12(I) 12(II)	36 37B 40A 44B 57A	16(II)					
21-25		47	13 14	3A 27 28 33A 44A 50 62B	48 51	37A					
26-30		52		24 33B 42	3B 9	34					
31-35					29	4 54					
36-40					16						
41-50				4(II)	57B						

57(II) has post diameter 15 cms.

MF5

MF 6 TABLE 2. Dimensions of post-holes of House 2

Average post diameter cms.

Depth of post-hole below natural clay level cms.	0-5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-45	46-50	>50
0-5		40	23		2 24						
6-10			11		31 33 49 54B	54A			27		
11-15		28 36	48	9 43	1 45 52	16 34B	44B				
16-20		43	12 13 35	14	61	56B	47 57 (53)				(56A) (48 x 68)
21-25		7 37	10	18 58B	8 17 59	19	58A	25			(5) (80 x 70)
26-30			42								
31-35			19		21 46 60B	60A		26 57			
36-40											20
41-45					32 44A	30					

(Post numbers in brackets refer to hole sizes: all others are post diameters)

MF6

MF 7 TABLE 3. Dimensions of post-holes of House 3

Average post diameter cms.

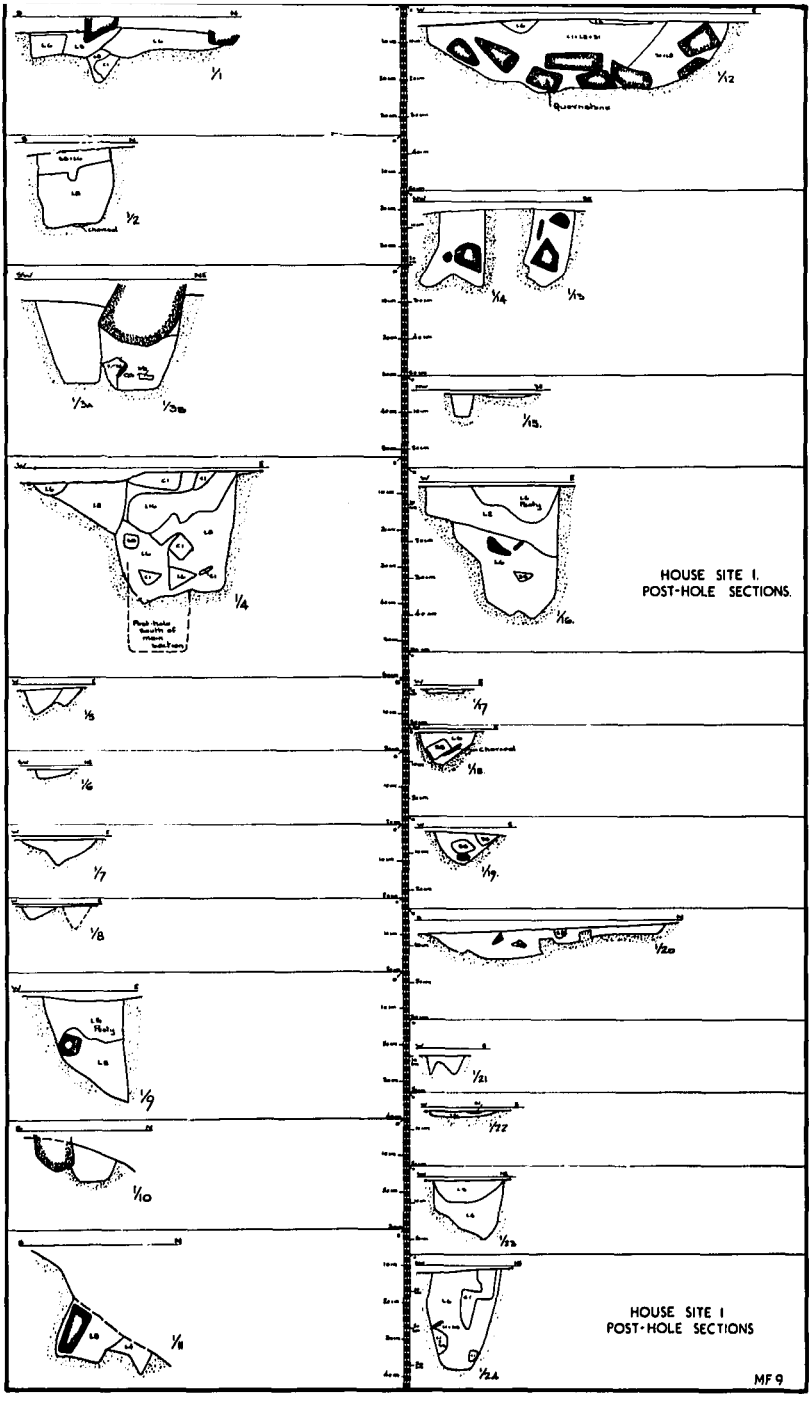
Depth of post-hole below natural clay level cms.	0-5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-45	46-50	> 50
0-5			23 37 45 51	41	21						
6-10		8	1 30 36 39	38	34	19	20 28	18 29			
11-15			7	148 31	14A	25 33					
16-20			2 9	4 6 17 52						26	
21-25				27B 49		3		12			
26-30				16							
31-35					22		27A				
36-40					11			32			
41-45				15B		15A		35			

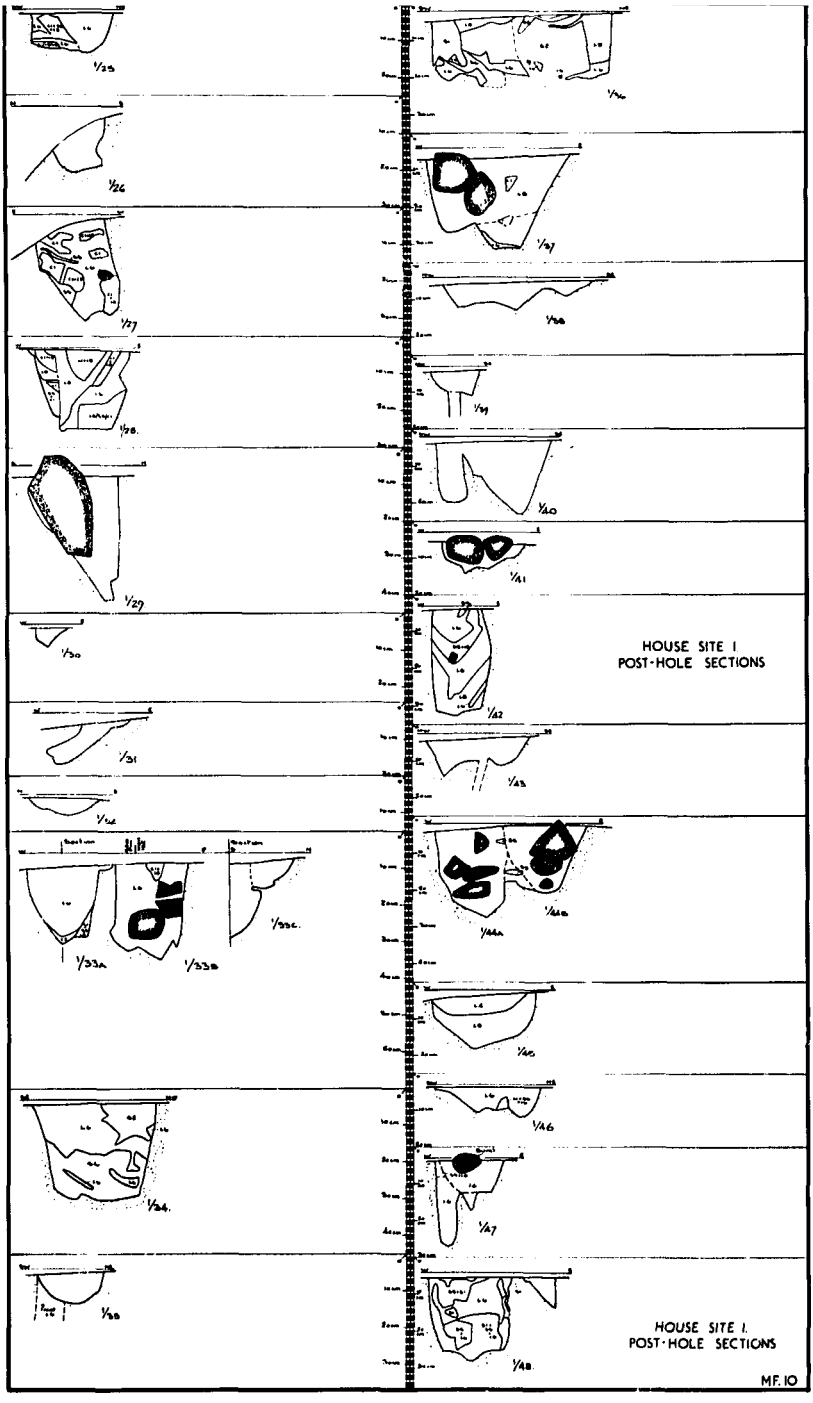
MF 8 TABLE 4. Dimensions of post holes of House 4

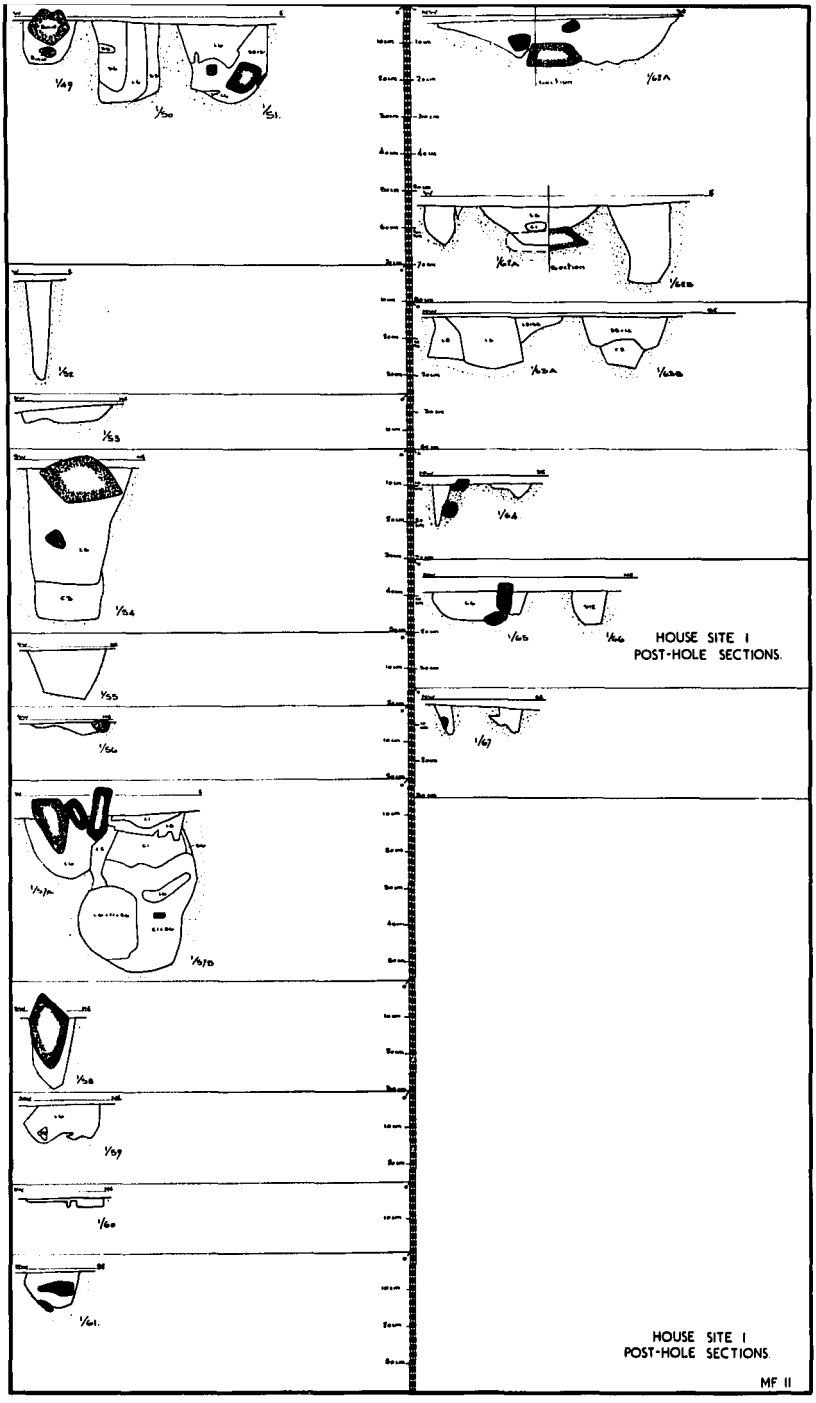
Average post diameter cms.

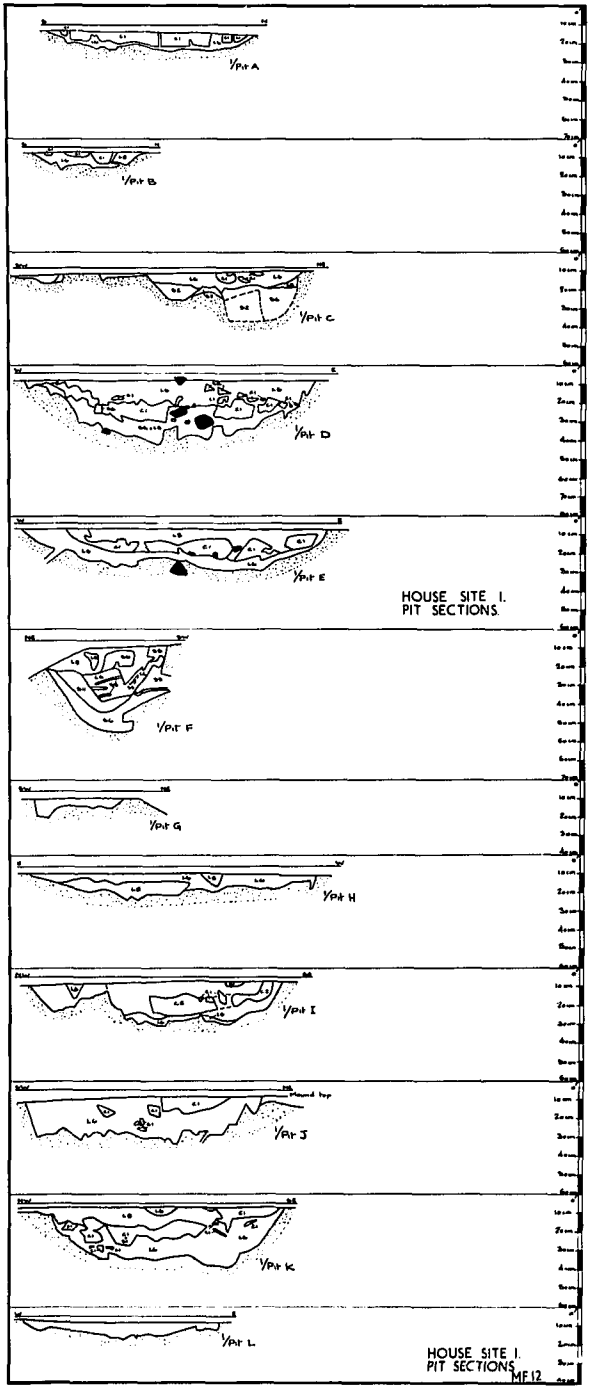
Depth of post-hole below natural clay level cms.

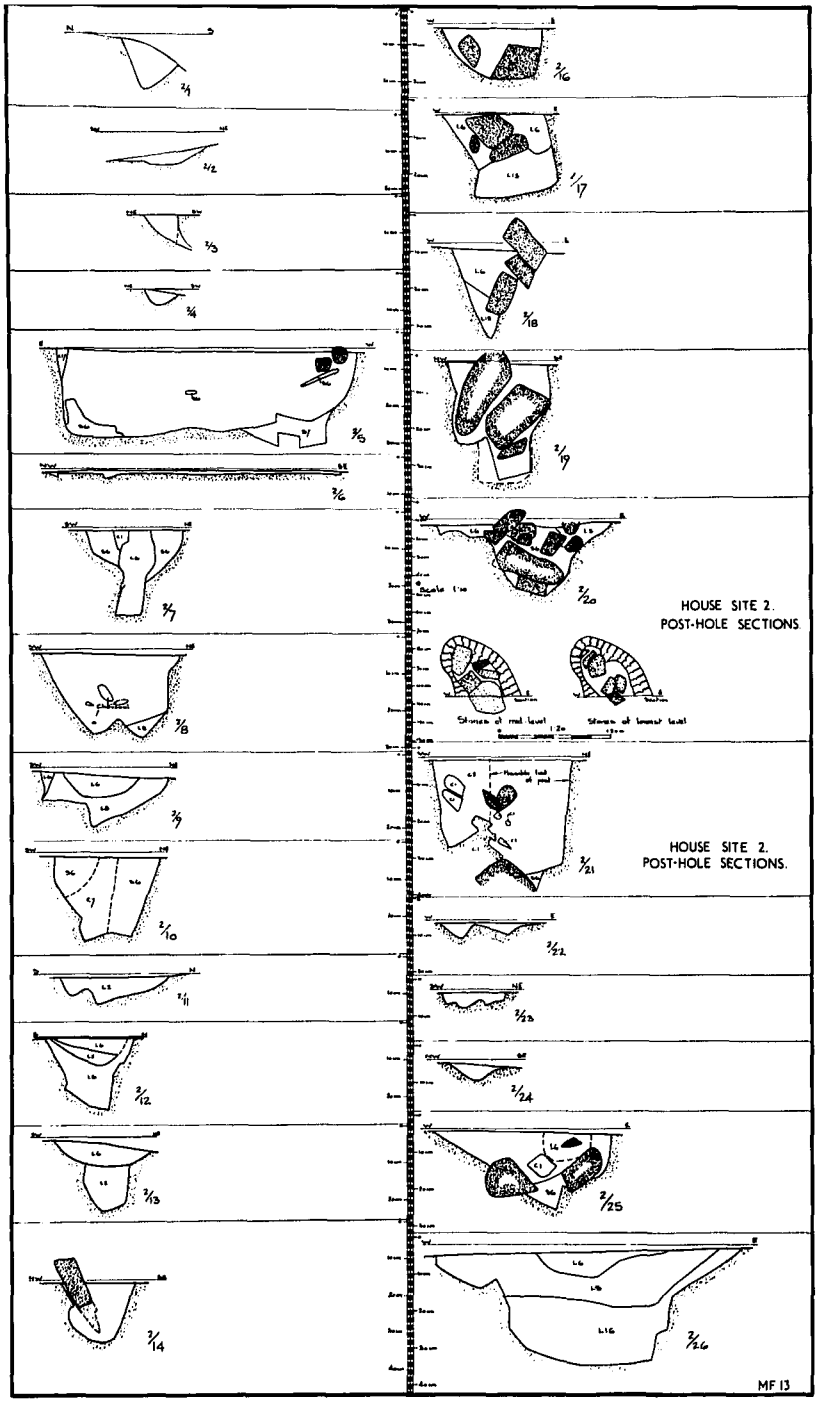
	0-5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-45	46-50	>50
0-5											
6-10		8 33	13 21 25A 30 32 53	16							
11-15		14 22 27	12 44 48A 54	52							
16-20		25B	1 3 9 26 92	15 48B	2 5 38						
21-25			74								
26-30		31	6	24							
31-35											
36-40											
41-45											

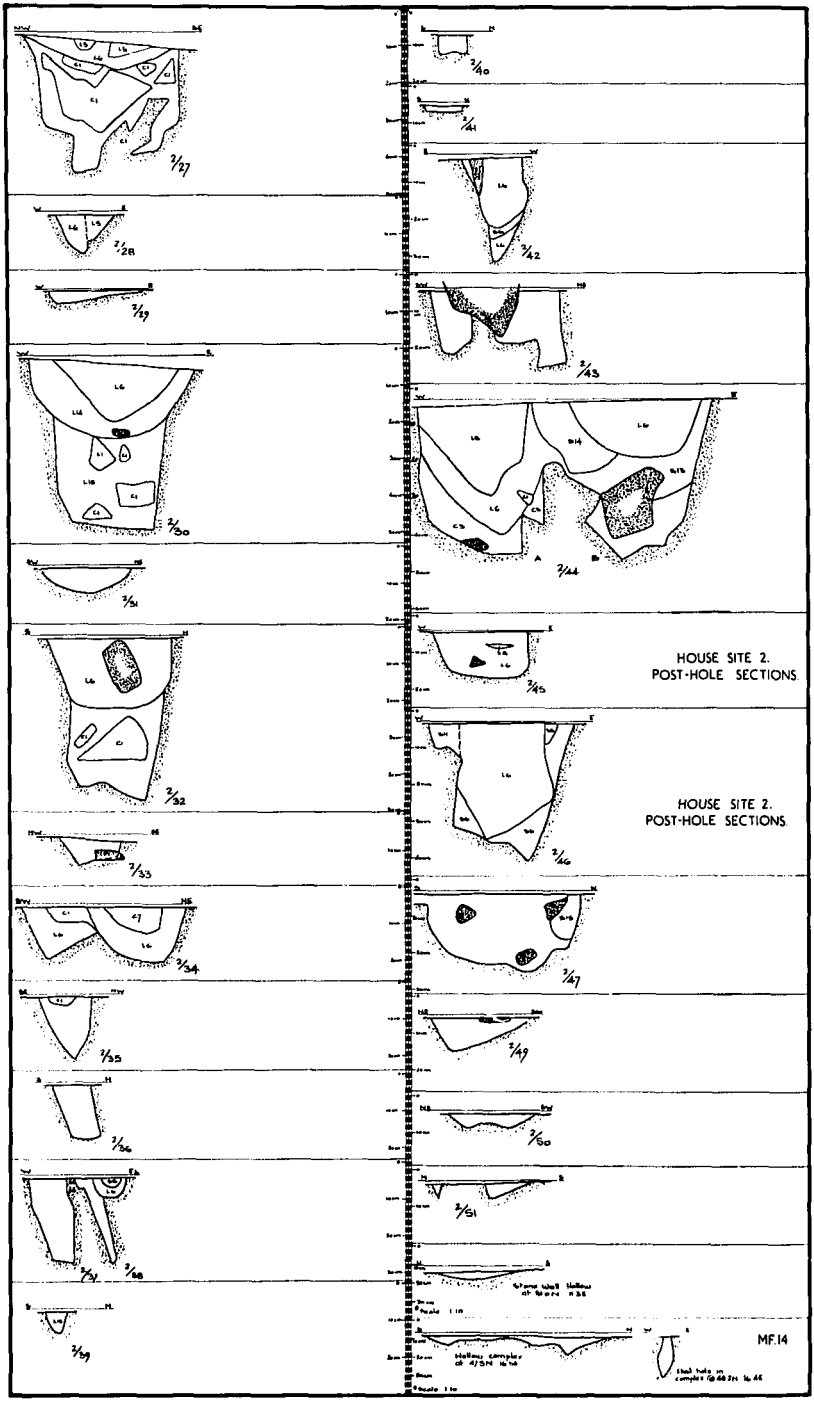

1/1
1/2
1/3a
1/3b
1/4
1/5
1/6
1/7
1/8
1/9
1/10
1/11
Post-hole south of main building
1/12
Quernstone
1/14
1/15
1/16
1/17
1/18
1/19
1/20
1/21
1/22
1/23
1/24
HOUSE SITE I.
POST-HOLE SECTIONS.
HOUSE SITE I
POST-HOLE SECTIONS
MF 9

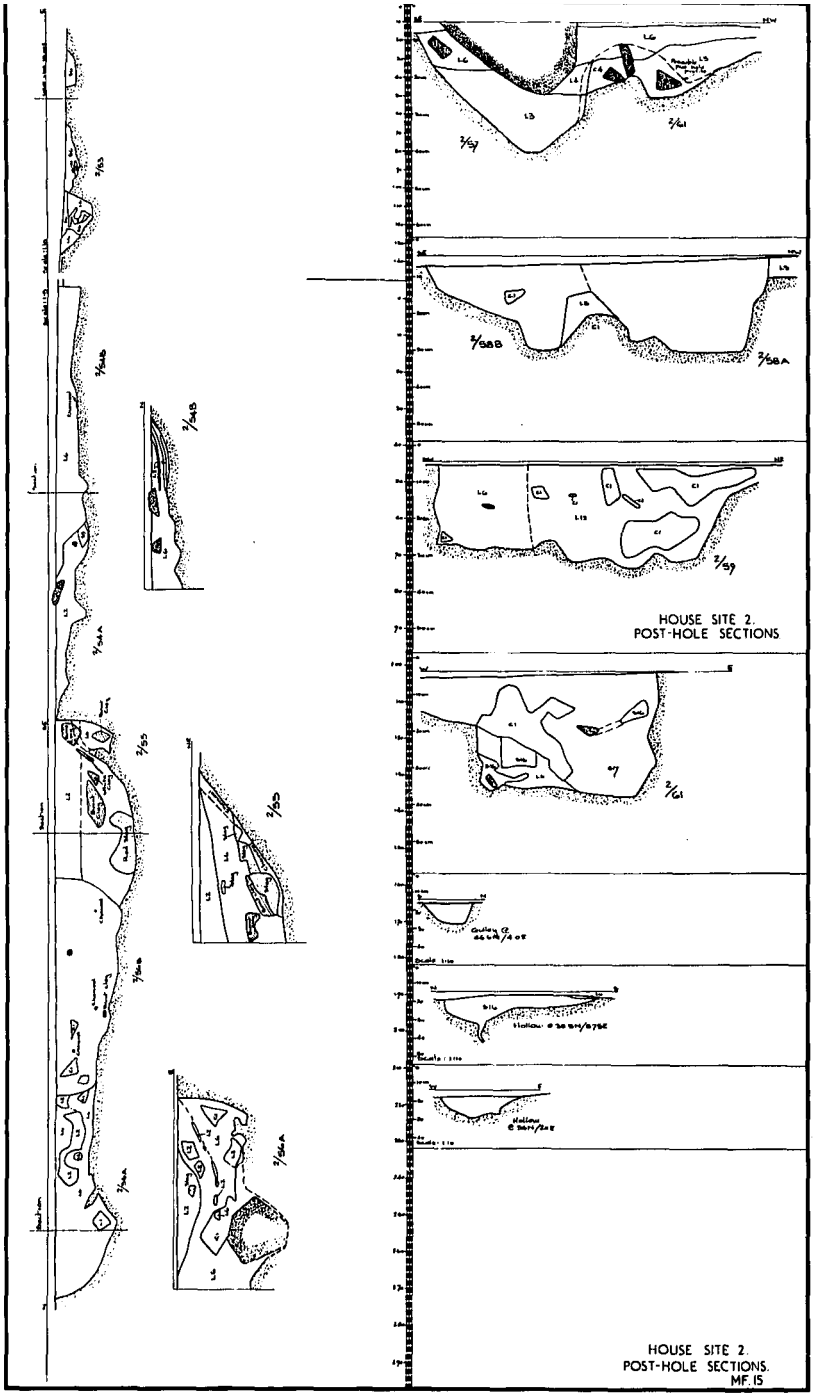

1/25
1/26
1/27
1/28.
1/29
1/30
1/31
1/32
1/33A
1/33B
1/33C.
1/34.
1/35
1/36
1/37
1/38
1/39
1/40
1/41
1/42
1/43
1/44A
1/44B
1/45
1/46
1/47
1/48.
HOUSE SITE I
POST-HOLE SECTIONS
HOUSE SITE I.
POST-HOLE SECTIONS
MF. 10


1/49
1/50
1/51.
1/52
1/53
1/54
1/55
1/56
1/57
1/58
1/59
1/60
1/61.
1/62A
1/62B
1/63A
1/63B
1/64
1/65
1/66
1/67
HOUSE SITE I
POST-HOLE SECTIONS.
HOUSE SITE I
POST-HOLE SECTIONS.
MF II


Pit A
Pit B
Pit C
Pit D
Pit E
HOUSE SITE I.
PIT SECTIONS.
Pit F
Pit G
Pit H
Pit I
Pit J
Pit K
Pit L
HOUSE SITE I.
PIT SECTIONS
MF.12

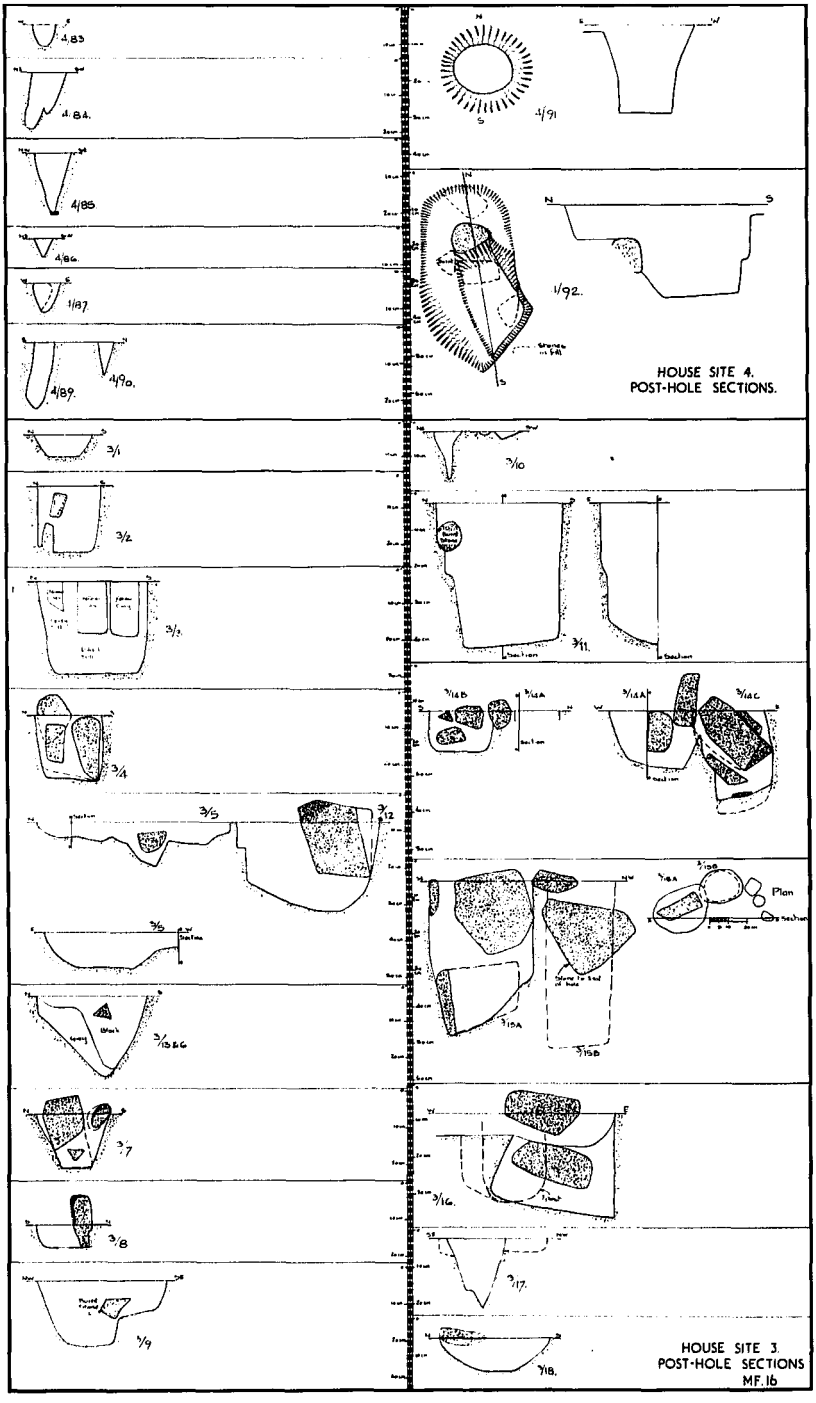

2/1
2/2
2/3
2/4
2/5
2/6
2/7
2/8
2/9
2/10
2/11
2/12
2/13
2/14
2/16
2/17
2/18
2/19
2/20
HOUSE SITE 2.
POST-HOLE SECTIONS
Stones at mid level
Stones at lowest level
2/21
HOUSE SITE 2.
POST-HOLE SECTIONS.
2/22
2/23
2/24
2/25
2/26
MF 13


HOUSE SITE 2.
POST-HOLE SECTIONS.
HOUSE SITE 2.
POST-HOLE SECTIONS.
MF.14



HOUSE SITE 2.
POST-HOLE SECTIONS

HOUSE SITE 2.
POST-HOLE SECTIONS.
MF.15


4/83
4/84.
4/85
4/86.
4/87
4/89.
4/90.
4/91
4/92.
HOUSE SITE 4.
POST-HOLE SECTIONS.
3/1
3/2
3/3
3/4
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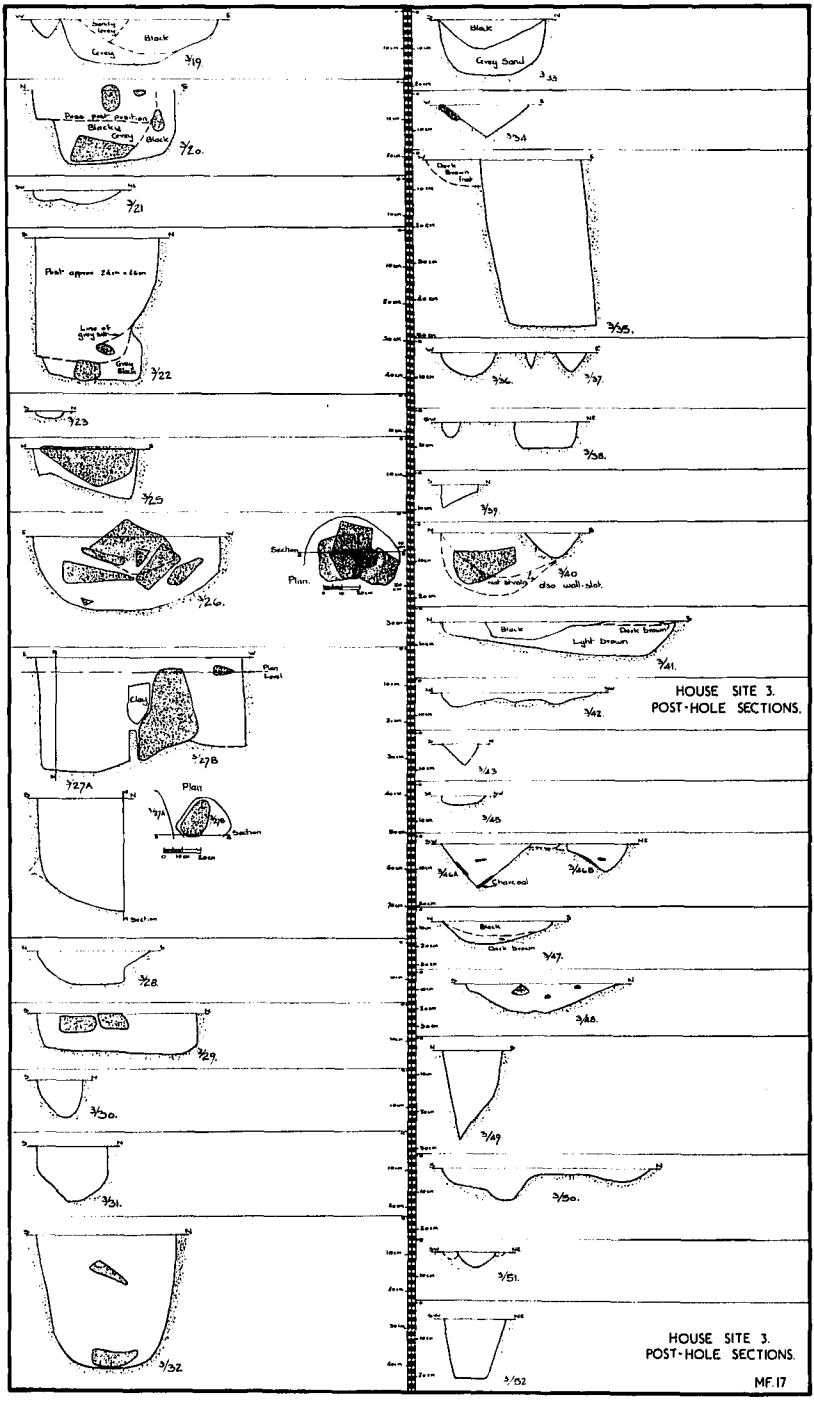
3/6
3/7
3/8
3/9
3/10
3/11.
3/12
3/15A
3/15B
3/15C
3/16.
3/17.
3/18.
Plan
HOUSE SITE 3.
POST-HOLE SECTIONS
MF.16


3/19
3/20.
3/21
3/22
3/23
3/25
3/26.
Section
Plan.
3/27A
3/27B
Plan
3/28.
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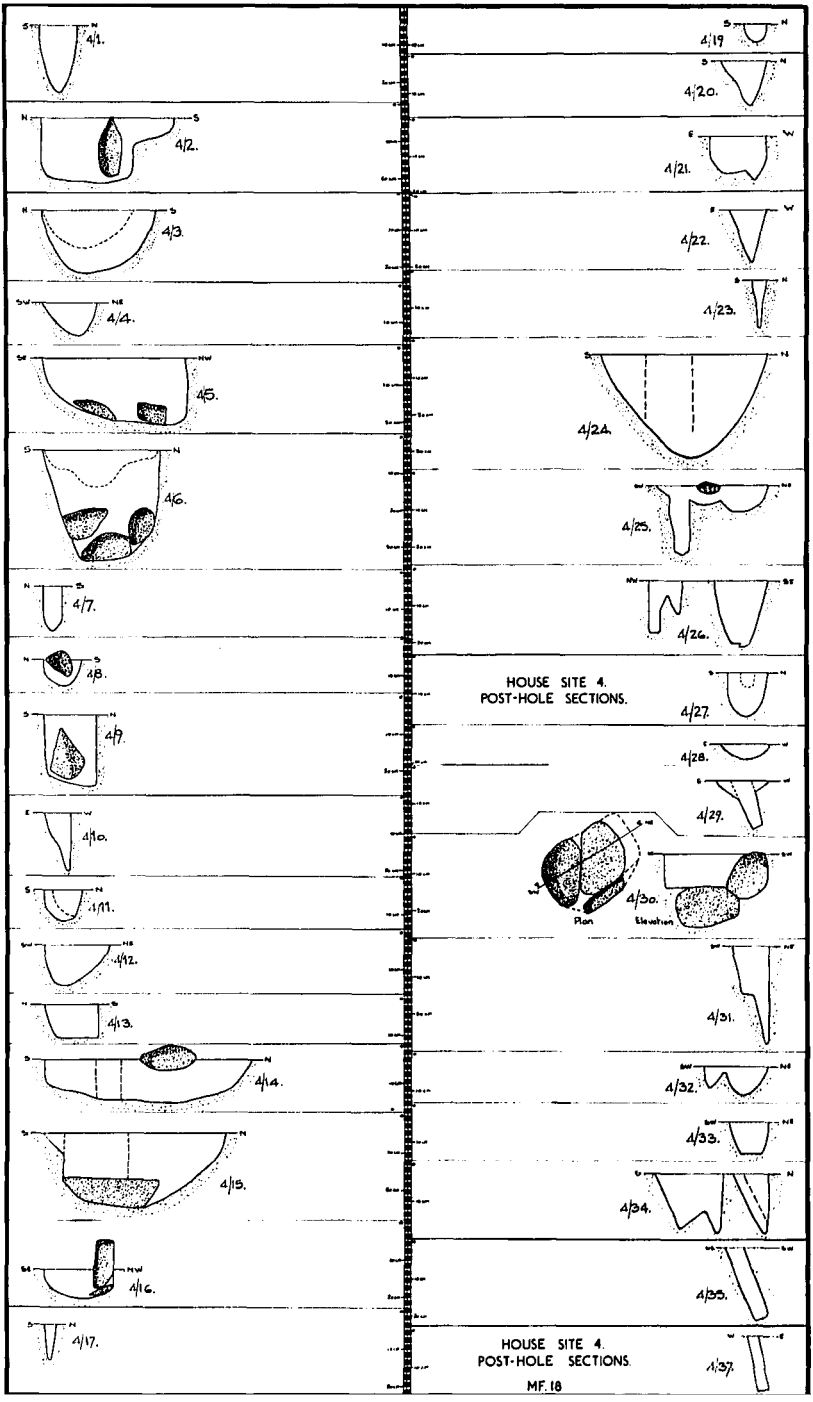
3/30.
3/31.
3/32
3/33
3/34
3/35.
3/36.
3/37.
3/38.
3/39.
3/40
dso wall-slot.
3/41.
3/42.
3/43
3/45
3/46A
3/46B
Charcoal
3/47.
3/48.
3/49
3/50.
3/51.
3/52
HOUSE SITE 3.
POST-HOLE SECTIONS.
HOUSE SITE 3.
POST-HOLE SECTIONS.
MF.17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4/2.
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4/12.
4/13.
4/14.
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Plan
Elevation
4/31.
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HOUSE SITE 4.
POST-HOLE SECTIONS.
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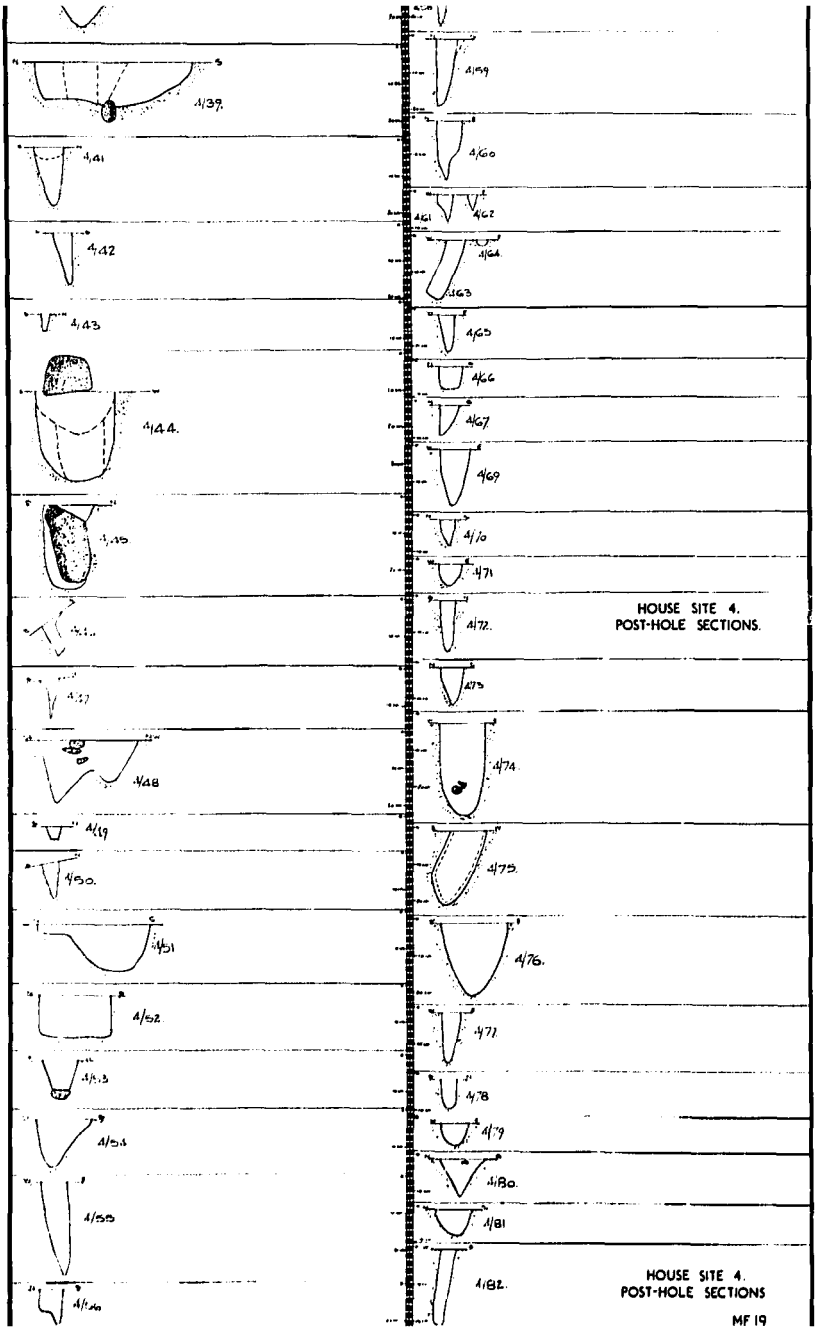
MF. 18



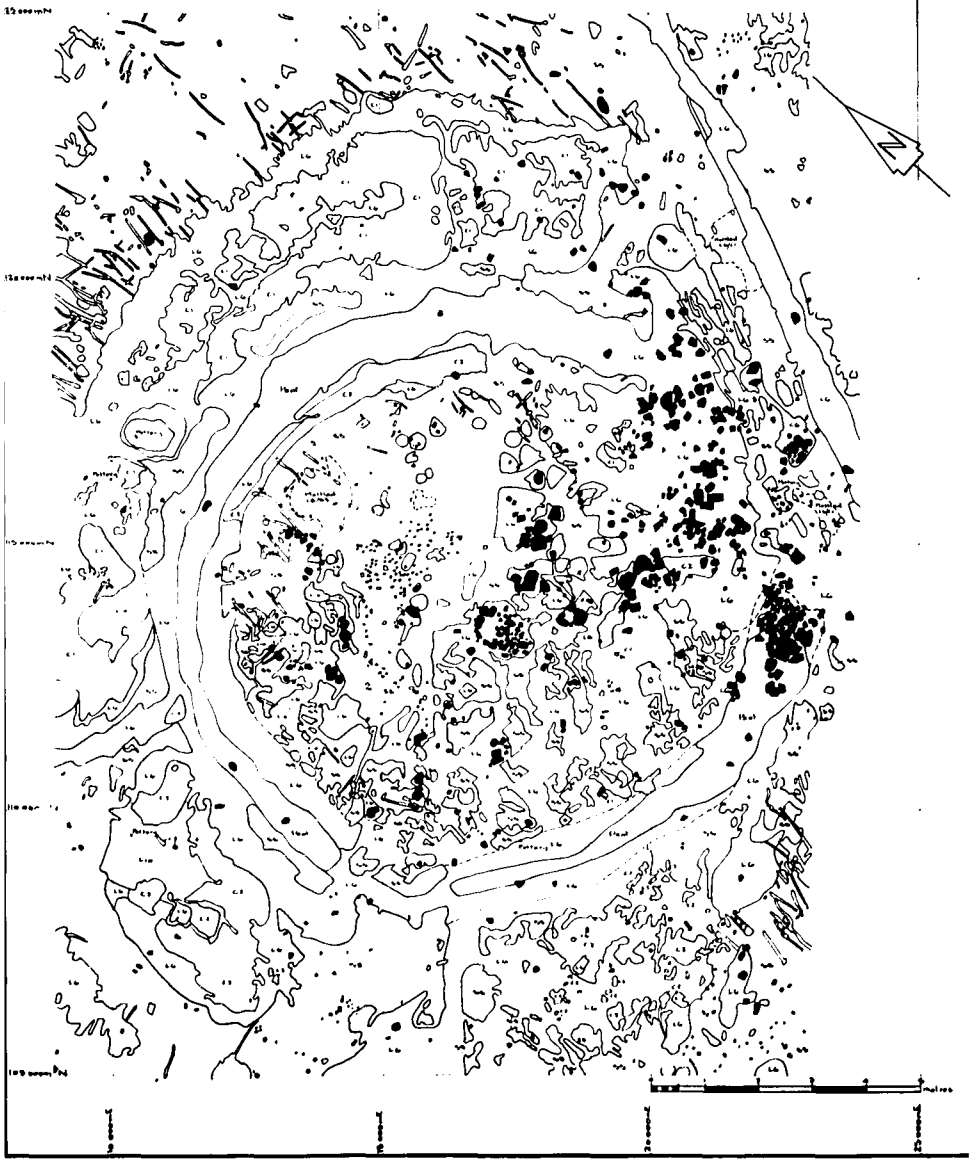
HOUSE SITE 4.
POST-HOLE SECTIONS.

HOUSE SITE 4.
POST-HOLE SECTIONS

MF 19

ROXBY : House site no.1. Features in sub-L6 level.

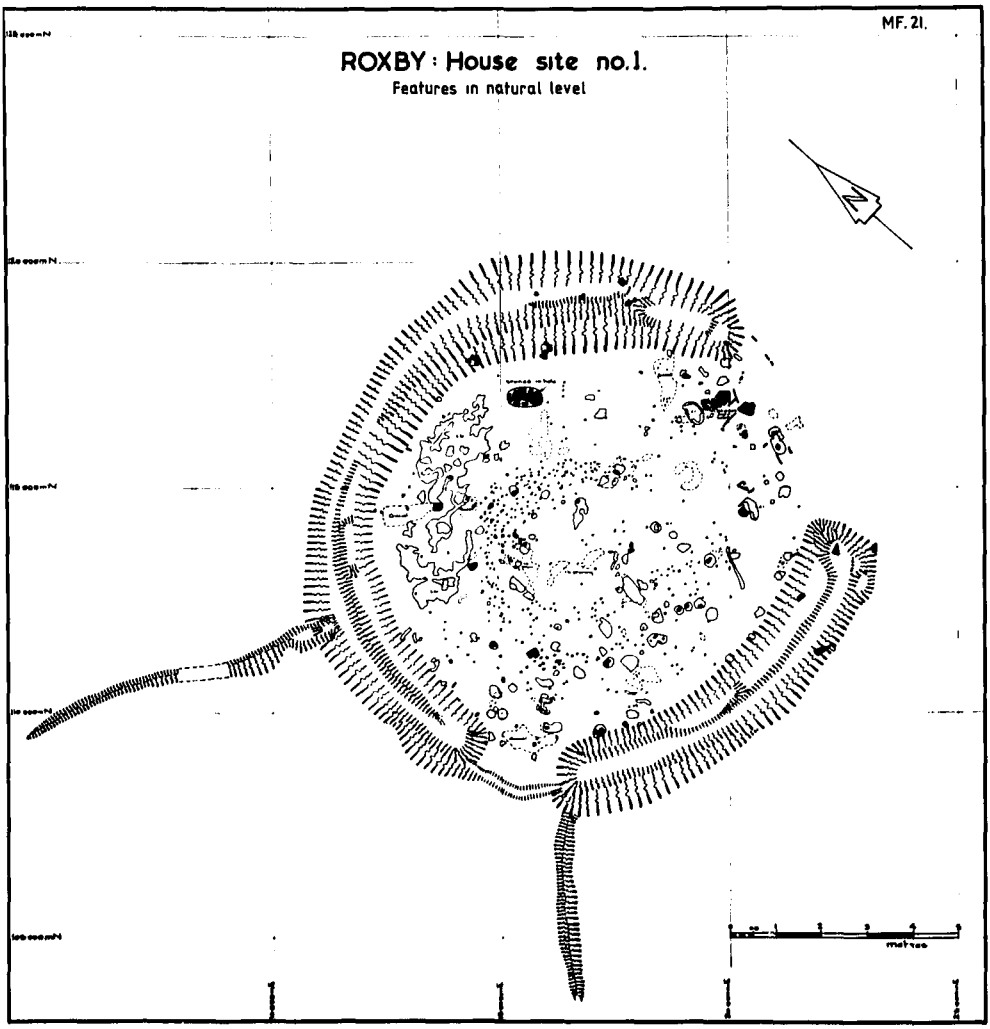
MF. 20.
AFTER DETURFING



MF. 21.

ROXBY : House site no.1.

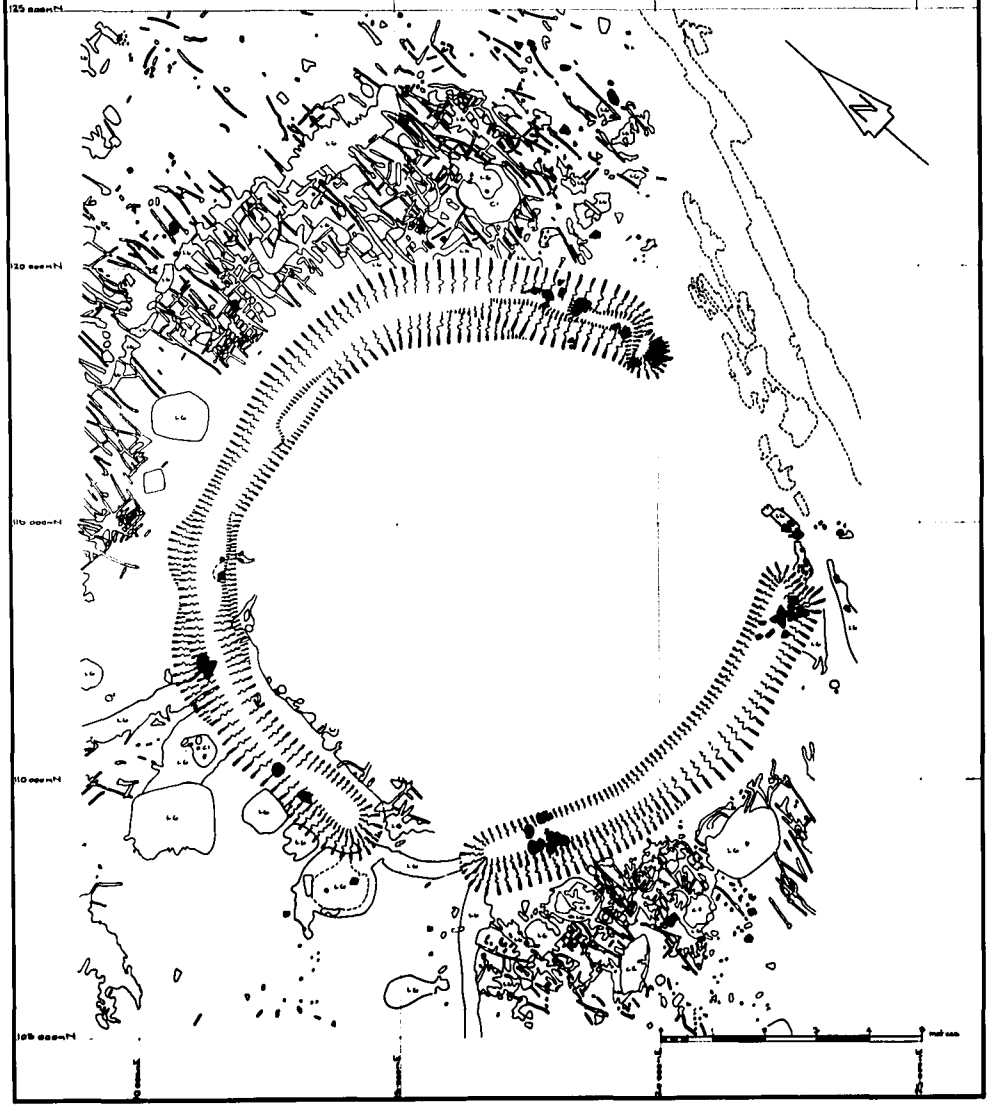
Features in natural level



MF. 22.

ROXBY: House site no.1.

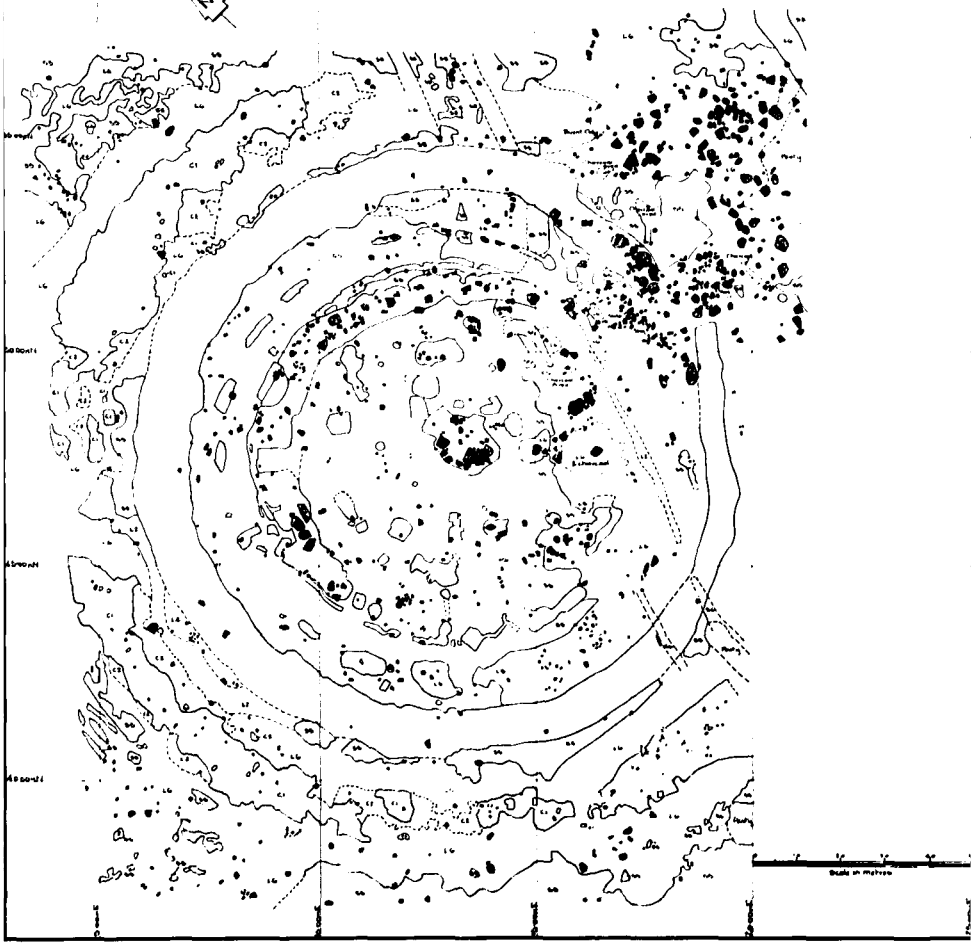
External features in natural & later ditch

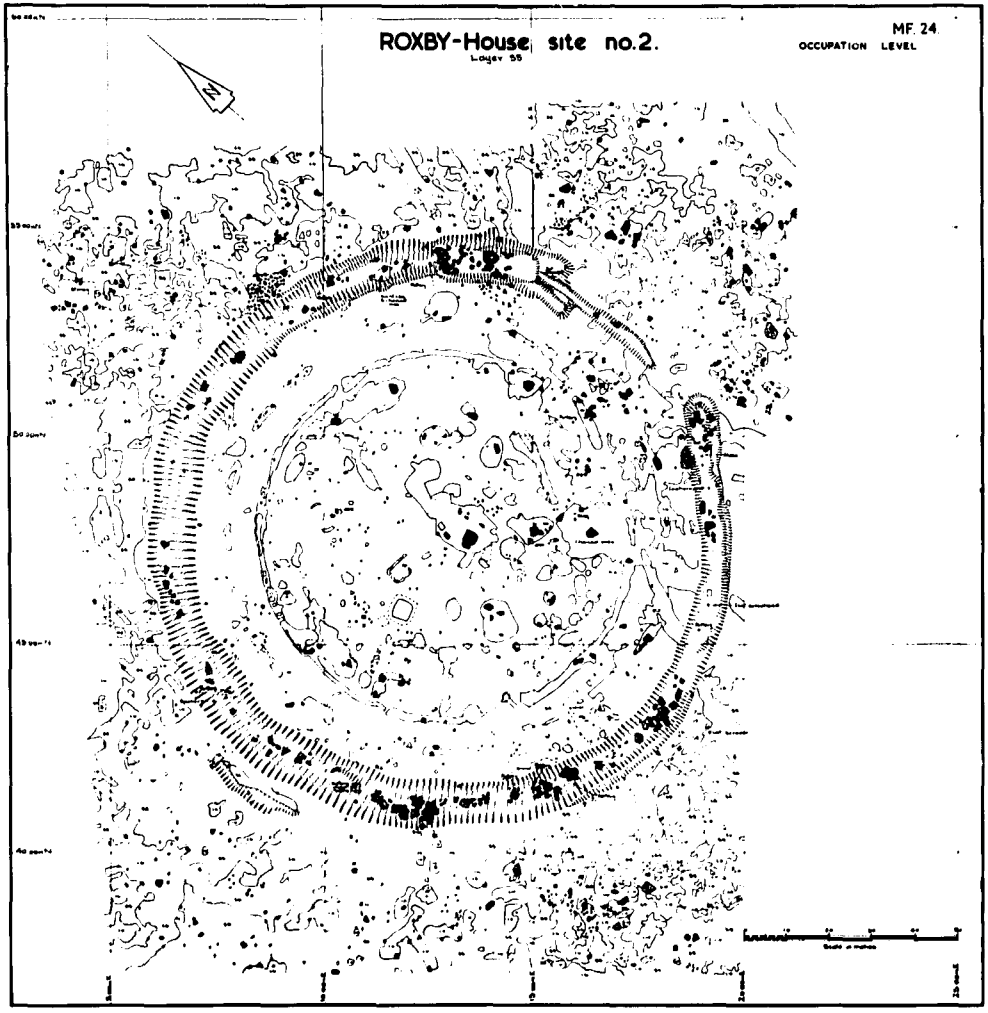


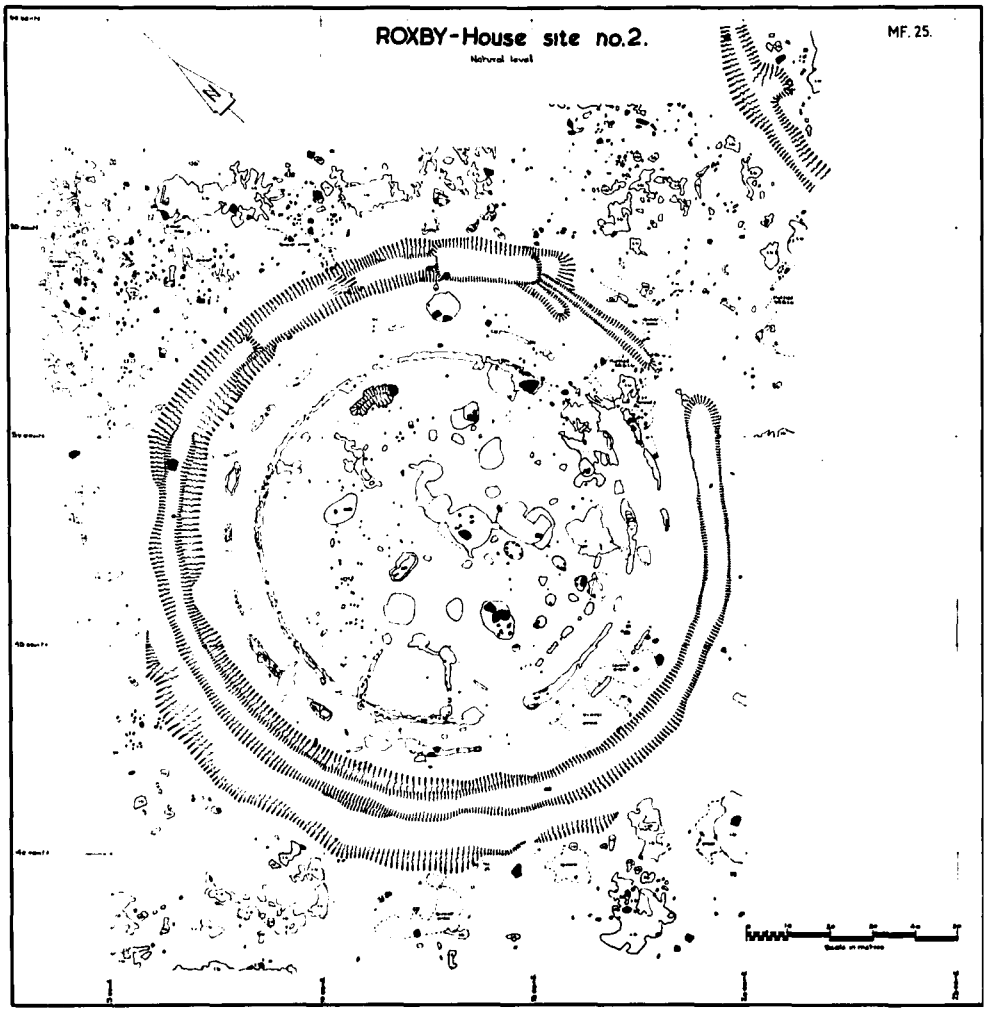
MF. 23.

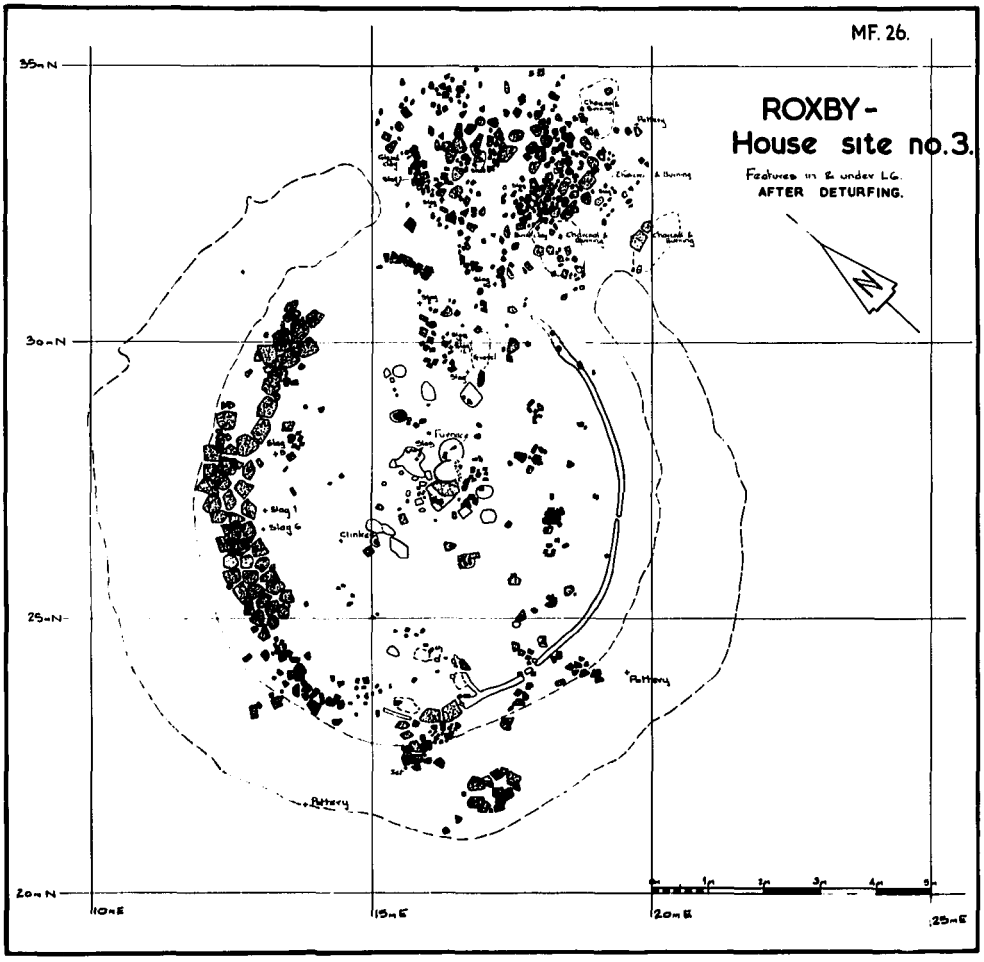
ROXBY - House site no.2.

Layer sub. Lg.
AFTER DETURFING.



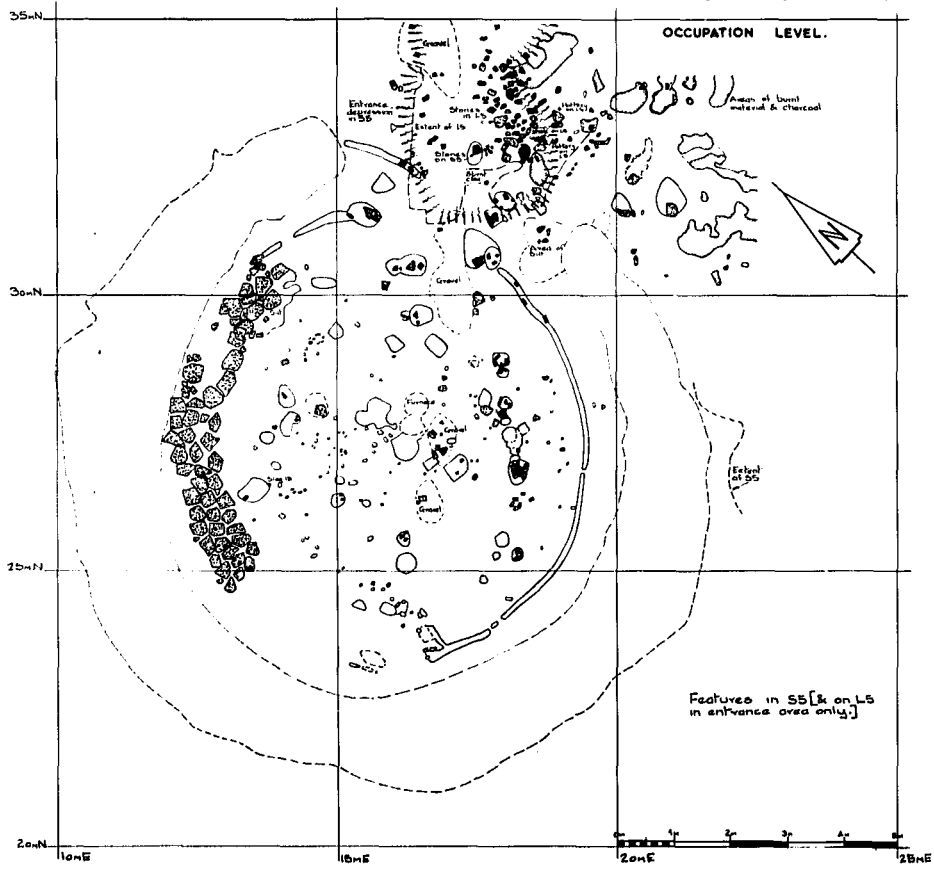

ROXBY-House site no.2.
Layer 55
MF. 24
OCCUPATION LEVEL

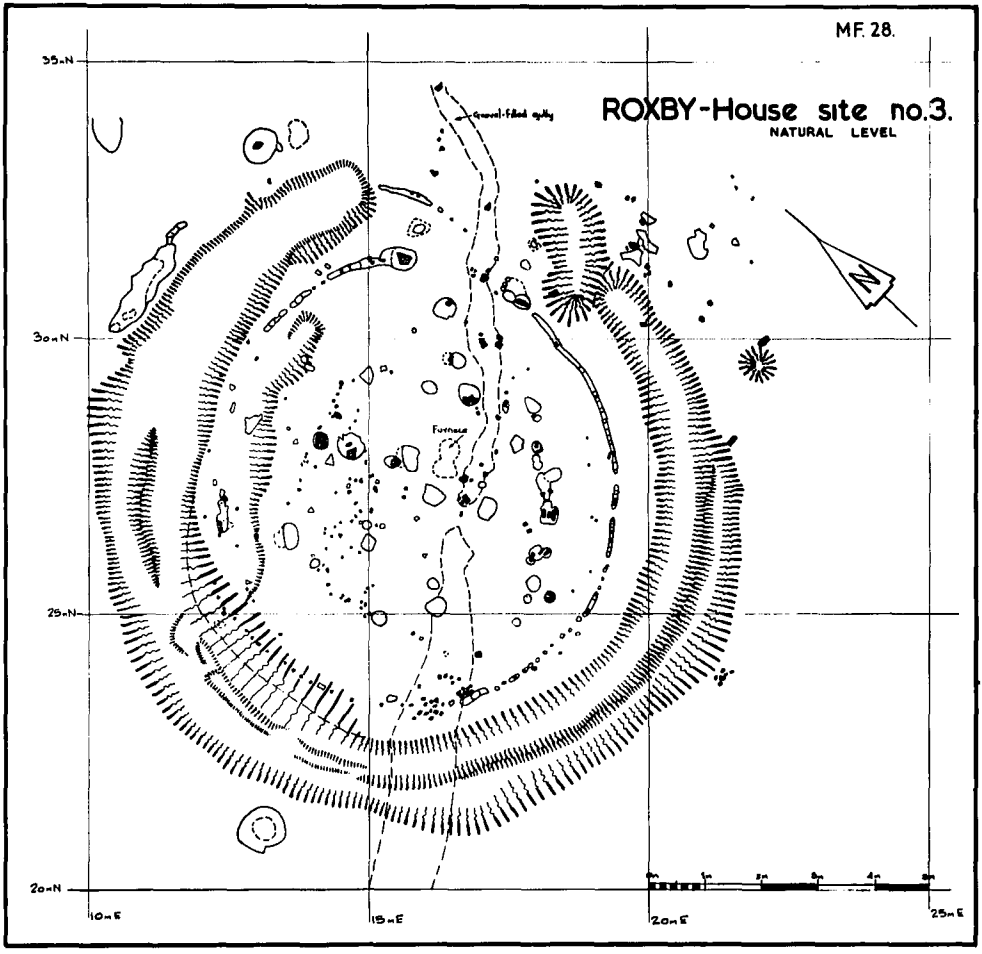

ROXBY-House site no.2.
Natural level
MF. 25.

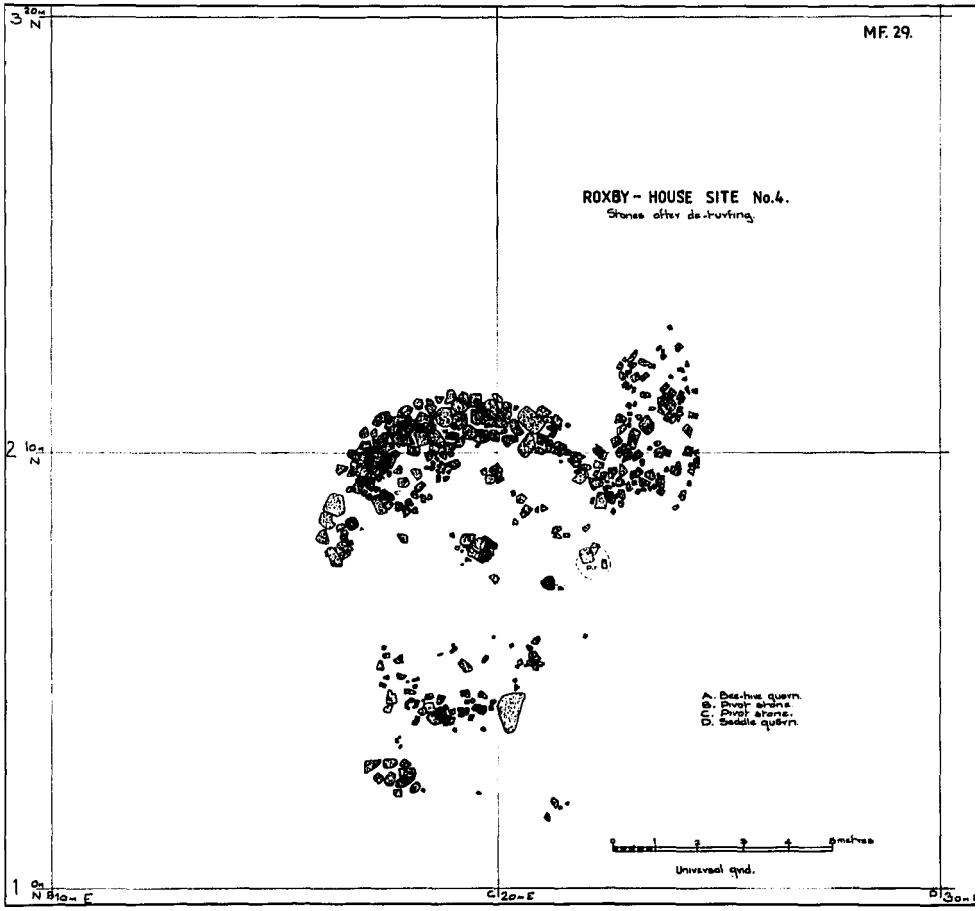

MF. 26.
ROXBY -
House site no.3.
Features in & under L.G.
AFTER DETURFING.
N
35m N
30m N
25m N
20m N
10m E
15m E
20m E
25m E
Furnace
Slag
Slag
Clinker
Pottery
Pottery
Pottery

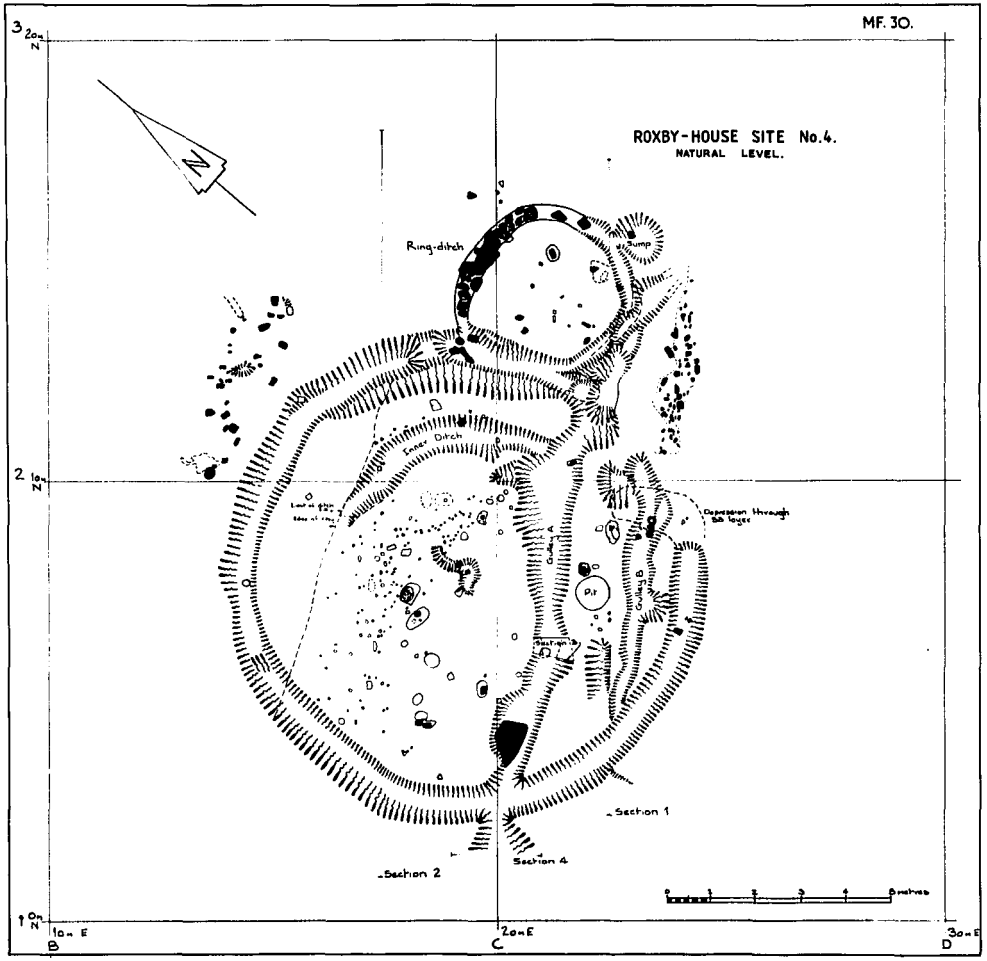
MF. 27.

ROXBY - House site no.3.




MF. 28.
ROXBY-House site no.3.
NATURAL LEVEL
Gravel-filled gully
Furnace
N
35mN
30mN
25mN
20mN
10mE
15mE
20mE
25mE


MF. 29.
ROXBY - HOUSE SITE No.4.
Stones after de-turfing.
A. Bee-hive quern.
B. Pivot stone.
C. Pivot stone.
D. Saddle quern.
0 1 2 3 4 5 metres
Universal grid.
3
2
1
20m N
10m N
0m N
B 10m E
C 20m E
D 30m E


MF. 30.
ROXBY-HOUSE SITE No.4.
NATURAL LEVEL.
N
Ring-ditch
Sump
Outer Ditch
Depression through bb layer
Gully A
Gully B
Pit
Section 1
Section 2
Section 3
Section 4
0 1 2 3 4 5 metres
3 20m N
2 10m N
1 0m N
10m E
20m E
30m E
B
C
D

GRAVEL (G)

1. Red sand and gravel.
1A. Red sand and gravel with clay inclusions.
2. Yellow sand and gravel.
3. Yellow sand and gravel with grey sand interlaced.

SAND (S)

1. Yellow and pure (usually compact).
2. Yellow with grey interlaced.
3. Yellow and grey mixed in equi-volume.
4. Reddish sand with grey interlaced.
5. Light (almost white) brown sand, with yellow clay, sandstone fragments and pebbles.
6. Grey sand (reasonably pure).
7. Grey sand and inclusions (pebbles, sandstone, etc.)
8. Grey stoney sand.
9. Very light yellow (almost white) sand with some pebbles and sandstones.
10. Black varying to light brown with inclusions, of pebbles, sandstones, yellow clay.
11. Brown sand with small gravel.
12. As S5 with interlacing black sand.
13. Mottled brown and yellow sand.
14. Mottled brown sand with yellow sand and clay inclusions.
15. Mottled yellow and black sand.
16. White sand and grey sand.
17. Mottled grey, white, some black sand.

CLAY (C)

1. Yellow, stiff (usually natural or sub-natural).
2. Yellow interlaced with black silt.
3. Grey (pure).
4. Grey with yellow specks in sand.
5. Yellow, stiff with sand inclusions.
6. Brown, stiff.
7. Yellow mottled with light grey clay.

SILT (L)

1. Medium to dark grey or brown (fine).
2. Light grey or brown (pure).
3. Black with stones.
4. Light grey or brown - stoney.
5. Dark brown (fairly pure and fine).
6. Black (fairly pure and fine).
7. Dark grey, stoney and black interlacing.
8. Dark grey (fairly pure and fine).
9. Dark brown, stoney.
10. Very black with possible charcoal or clinker.
11. Dark grey and mottled white.
12. Fine light grey and motled white.
13. Fine light grey and motled yellow.
14. Mottled grey and brown.
15. Mottled black and grey.
16. Grey with patchey yellow and clay.
17. Mottled black and brown.
18. Mottled brown and yellow.
19. Mottled black, dark grey, and yellow.
20. Mottled black, brown, and S5.

Notes on the metallurgical operations

1. Examination of slags (G. McDonnell, Dept. of Metallurgy, University of Aston, Birmingham.)

Two typical smelting slags were sectioned for mineralogical and chemical analysis, one a lava-like flow of slag containing charcoal impressions, the other a plano-convex cake often called a "furnace bottom".

Under the reflected light microscope, both specimens showed an unusual microstructure comprising more than 30% of rounded iron oxide grains in a massive silicate matrix, with less than 5% of glass. Both contained fine vesicles. It is a structure more often found in a smithing rather than a smelting slag.

Chemical analyses were obtained using a scanning electron microscope with an attached energy dispersive analysis system, enabling both bulk and phase analyses to be made. The results, given as percentage oxides, are shown in Table A. Both bulk analyses show excess free iron oxide and the analysis of the iron oxide phase shows it to be wustite (FeO), although other dendrites may be higher oxides of iron. The low alkali content confirms the low content of glass, and the silicate is confirmed to be fayalite ($2FeO.\ SiO_2$). The glass could only be analysed in the first sample, and this analysis fell far short of 100%, as commonly occurs with this method of analysis on glasses.

The bulk and silicate phase analyses of the Roxby slags are compared with those of slags from Levisham Moor, an iron-working site contemporary with Roxby, some 24 kms. south.

The most significant difference (Table B) is the higher manganese content of the Levisham slag, indicating that Levisham had used bog iron ore, whereas Roxby had used the local seam. The mineralogical texture of the Levisham slag is the same as those from Roxby.

The total evidence shows an inefficient process, with the slag containing much iron oxide. The mineralogical texture indicates a low level of technology, a low operating temperature, poor reducing conditions and a relatively slow cooling rate of the slag. These comments apply both to the Roxby and the Levisham operations. They are identical to conclusions reached in earlier work when the Levisham slags were compared with slags from a putative iron age site at Crown End, Westerdale, also in North East Yorkshire (Harbord, N.H. and Spratt, D.A., J. of Hist. Metallurgy Soc. 1975, 9, 1, 32-3).

2. Structure of the furnace

We have interpreted the smelting furnace of House 3 as a bowl furnace, probably with a clay dome. This seems to accord with the primitive state of technology revealed by the slags. As with nearly all such furnaces, however, there is an element of conjecture in reconstruction of the superstructure, as it was not in place during the excavation. Research is in progress on this subject over a wide geographical area, and the Roxby data will form part of this survey by G. McDonnell.

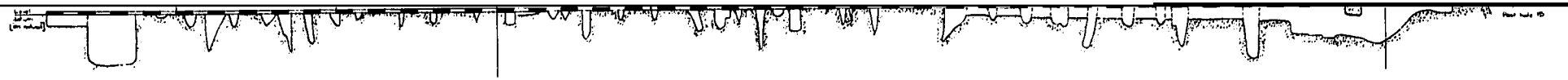
We thank Mr McDonnell for his help and interest in the Roxby metallurgy.

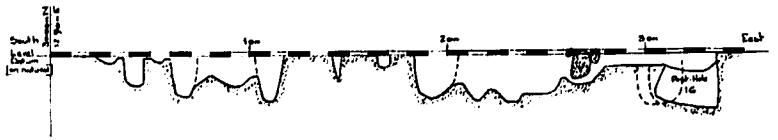
Table A. Roxby Slag Analyses (% oxide)

	Na	Mg	Al	Si	P	K	Ca	Mn	Fe	Total
Roxby I										
Bulk	0.7	0.2	4.0	21.5	0.5	0.2	0.2	0.2	71.8	99.3
Silicate	0.6	0.2	0.0	28.8	1.0	0.1	0.1	0.1	68.6	99.5
Iron Oxide	0.6	0.0	0.9	0.8	0.0	0.0	0.1	0.0	99.9	102.3
Glass	0.6	0.0	3.9	55.5	1.0	0.9	0.5	0.0	13.1	75.5
Roxby II										
Bulk	0.3	0.0	1.9	8.6	0.0	0.2	0.1	0.1	85.6	96.8
Silicate	0.5	0.3	0.2	28.6	0.7	0.0	0.4	0.3	69.1	100.1
Iron Oxide	0.0	0.1	1.0	0.8	0.0	0.0	0.1	0.0	97.8	99.8
Glass	No Analysis									

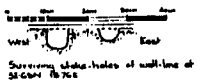
Table B. Comparison of Roxby and Levisham Slags (% oxide)

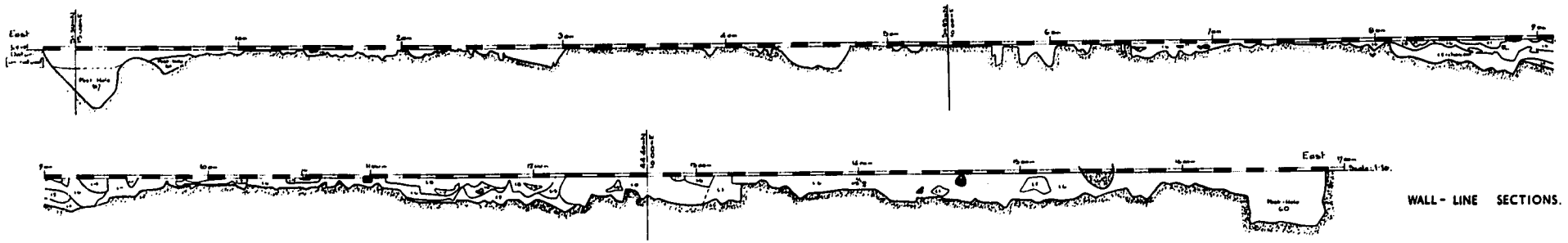
	Na	Mg	Al	Si	P	K	Ca	Mn	Fe	Total
Bulk Analyses										
Roxby	0.7	0.2	4.0	21.5	0.5	0.2	0.2	0.2	71.8	99.3
Levisham	0.0	0.6	1.7	19.4	0.3	0.4	1.2	7.4	62.8	93.8
Silicate Analyses										
Roxby	0.6	0.2	0.0	28.8	1.0	0.1	0.1	0.1	68.6	99.5
Levisham	0.0	0.4	0.3	27.7	0.1	0.0	0.9	11.3	53.6	94.3





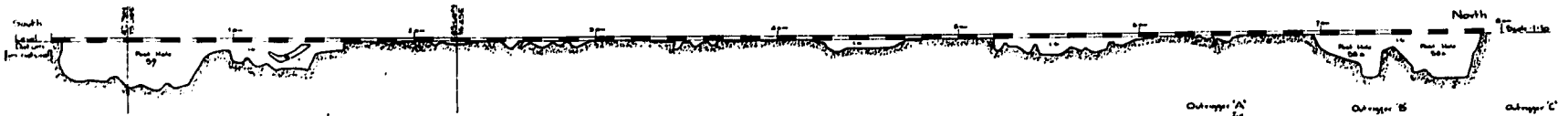
ROXBY-House site no.3.
WALL-STAKES LINES SECTIONS.





WALL-LINE SECTIONS.

ROXBY-House site no.2.



All sections drawn as viewed from outside the huts.

ROOM WALL-LINES SECTIONS