

national museums of scotland

saqqara project report

1993

National Museums of Scotland
Chambers Street Edinburgh EH1 1JF

NATIONAL MUSEUMS OF SCOTLAND

SAQQARA PROJECT 1993

Ian Mathieson, Louise Maguire, Harry Smith, Ana Tavares

An interim report on the work carried out during the 1993 season covering the testing of resistivity results by *sondage* trenches over selected anomalies and carrying out further resistivity profiles over areas of particular interest, topographic survey and research into previous records at the Saqqara Necropolis of Memphis, Egypt

Project Directors
Ian J Mathieson
Prof Harry S Smith

National Museums of Scotland
Chambers Street Edinburgh EH1 1JF

THE NATIONAL MUSEUMS OF SCOTLAND

PRELIMINARY REPORT OF THE SAQQARA SURVEY PROJECT, 1993

By IAN MATHIESON, LOUISE MAGUIRE, HARRY SMITH and ANA TAVARES

The findings of this project will enable the National Museums of Scotland to produce an up-to-date archaeological and sub-surface geophysical map of the area known as the Abusir West-Saqqara Wadi. The work combines

- remote sensing investigation
- field inspection
- archival research into previous excavations and surveys
- selected excavation of anomalies that demand more detailed examination.

The National Museums of Scotland acknowledge with gratitude the help and co-operation of the Egyptian Antiquities Organisation with whose permission the Museum's work is carried out; especially the Officers at Abassiya, Chairman Prof Dr Abdul Halim Nureddin, Dr Ali Hassan, the members of the Committee and the Secretariat, Mr Ahmed M. Moussa and Mme Samia; at Giza Mr Ahmed M Moussa; at Saqqara the Director of Antiquities Mr Yehia Eid and the EAO representative Mr Said Farag, all of whom have been most willing to give assistance at all times.

Financial assistance from the British Academy, the National Museums of Scotland, the Wainwright Fund and map reproduction by Survey and Development Services, Bo'ness, West Lothian are gratefully acknowledged.

The 1993 field season opened on the 3rd of October and continued to the 6th of December, the staff being co-directors Ian Mathieson (geo-archaeological surveys) and Prof. Harry Smith (Egyptological adviser), Ana Tavares (archaeologist and project research), Dr Louise Maguire (ceramicist). David Jeffreys (archaeological adviser) was consulted prior to the field season.

During the 1990 season resistivity work was completed along the length of the concession area and four of the proposed cross-sections covering the large enclosure known as the Gisir-el-Mudir were surveyed. In 1991 the complete concession area was field-walked and all visible surface indications of structures and old excavations were located for inclusion on the base maps. Work was completed in 1992 on the observation of the resistivity data covering the Southern two-thirds of the original concession area, from the Northern access road to the Serapeum to the Southern limit of the concession which lies some 100m South of the Southern boundary of the Gisir-el-Mudir (the Great Enclosure). (See Map Sheet Layout diagram)

FIELDWORK

Methodology

Sub-surface remote sensing for archaeological purposes can be carried out by:

- resistivity,
- proton-magnetometry
- sonic profiling,
- ground penetrating radar
- thermal imaging

For large-scale exploration the method of resistivity survey by traverse profiles gives the fastest results and enables the area to be divided into a grid pattern for closer examination of any anomalies touched during the traverses. The techniques of resistivity survey, proton magnetometry, field inspection and archival research are fully described in the Reports of 1990, 1991 and 1992/3.

Gisr-el-Mudir (Great Enclosure) (Map Sheet 1)

At the time of building the Gisr-el-Mudir would have been a massive construction project and even today still looks very impressive despite extensive use as a quarry. To put the size in context the GM is approximately twice the area of the Zoser enclosure and four times the area of the Sekhemkhet complex to name the closest neighbours. By the end of the 1992 season the resistivity cross-sections across the monument in an East-West direction had been completed and the anomaly indicated in the 1990 survey which was located at the South West end of the assumed South Wall had been investigated.

It was decided in 1993 to test the results of the resistivity data by *sondage* trenches over the previously discovered anomalies. This would allow for a calibration of the recorded data against the actual material seen in the *sondage* trench. Four areas on the main anomaly were chosen by study of the resistivity profiles and local topography. These areas were designated Anomaly A7a, b, c and d, as shown on Fig.1. The profile of area A7a showed an increase in resistance suggesting a change from normal sand cover over bedrock to a sudden rise to a less conductive material. This was followed by a low level of resistance for some five to eight metres then another sudden rise which then fell gradually to the normal desert level after a further 10-15 metres. Fig.2 shows the profile of the A7a area. Three *sondage* trenches were marked for excavation, A7a(1) which covers the first rise, A7a(2) is approximately at the centre of the low resistance area and A7a(3) over the second area of high resistance.

In trench A7a(1) a sequence of fine aeolian sand deposits was found to cover a gritty and compact layer of coarse red sand and gravel. This crust had a pronounced slope down to the South and sealed deposits varying from very fine white sand to dark red and black coarse sand with occasional fragments of mudbrick. These, in turn, covered a series of disarticulated coarse sand conglomerate boulders lying East-West across the trench. A few deposits of sand and local *gebel* fragments separated the boulders from the bedrock which in this area shows a distinctive cap of hard red coarse conglomerate above the friable yellow local limestone, the complete series forming a natural ridge. This topographic feature runs East-West forming the Southern boundary of the Gisr el Mudir and continuing under the Sekhemkhet complex and into the area of the 2nd Dynasty royal galleries East of the Unas pyramid. The South face of the ridge had been deliberately cut in an irregular manner (Fig.4 -1&2), and the 'boulders' obtained in the process heaped along the top of the ridge in order to accentuate the feature rather in the manner of a Roman ditch and mound. It was this very non-conductive material which had given the high resistance values found as the profile crossed the mound forming what was assumed to be the South-West corner of the monument.(Figs. 3 & 4)

A similar use of this distinctive sand-conglomerate material (i.e. cutting and shaping and utilising it for building purposes) can be seen in the presumed superstructures of the Ninetjer tomb.(see P. Munro (1993), 47-58.especially pl.1) The close relationship between topographic features and man-made monuments, evident at the Gisr el Mudir seems to be a characteristic of Early Dynastic monuments at Saqqara.

Trench A7a(2) confirmed the low results in the centre of the anomaly; the sondage revealed a series of sand deposits and an auger hole in the centre found the natural bedrock at 4.55 metres from the surface at a level of 54.14 metres, which agrees with the bedrock elevation value for A7d. (Fig. 5)

Trench A7a(3) again provided excellent confirmation of resistivity results. In the southern half of the trench the compact cap of coarse red sand was exposed above a series of sand deposits which sealed a sizeable construction consisting of large (60cms x 40cms x 40cms) sand-conglomerate boulders laid in random order. There was a pronounced slope to the North and the construction extended beyond the limits of the sondage. A level of 55.21metres was reached but bedrock level could not be established and it was not feasible to sink an auger hole through the boulders. (Figs. 6 & 7)

Both sondages A7a 1 & 3 contained small grey silt bricks associated with the disarticulated boulders and fragments of these bricks were found throughout the sand deposits sealing the construction.

Trench A7b, some 25metres to the North-West, located the hard crust and some *tafl* boulders but added no further information. (Fig.8)

The sondages undertaken show that the mound forming the South-West corner of the Gisir el Mudir appears to have an outer support ridge to the South with an infill of sand and desert surface material scraped from the area of sondage A7d. This leads to a second retaining ridge to the North, which was formed using a much greater accumulation of boulders due to the slope formed by the natural erosion of the Northern face of the outcropping of the bedrock. The resistivity profiles in this area show that this construction follows the curve of the mound towards the visible Southern ends of the West wall. Work completed proves that the mound is a man-made construction of an early date but as yet gives no clue as to its function or the reason for its location. The builders of the Gisir el Mudir appear to have extended this mound and, utilising the natural bedrock ridge, formed the Southern boundary of the monument by scraping sand and debris from the South side of the area and piling it on to the ridge. To investigate the low readings found to the south of the ridge, trench A7d was opened and this confirmed that the area was scraped down to the bedrock. There were some man-made shallow pits which were apparently located in an area of gypsum deposits, a few sherds were found in the pits. Some of the pits are circular in shape and could have been made for storage as this seems to be a work area with a large accumulation of limestone chippings in the surface material.(Fig.9)

In the 1992/3 Report, it was predicted on the basis of the resistivity profiles (1992/3 Report figs 1-3, pp 7,8) that

the builder used as many of the natural features of the site as he could. By locating the Southern limit of the structure against a natural ridge running East-West, bounded by small outcrops of local limestone at each end, the East and West walls were locked into the ridge and the South wall was formed by "bulldozing" or scraping the natural desert surface of gravel, flint nodules and sand to the south of the ridge up and onto the crest to form the existing wall-like feature which can be clearly seen today.

This prediction was substantially confirmed by tests. A natural ridge of hard sandstone conglomerate had been used as the foundation of the wall, and had been cut back to form a vertical face on the South Side. Material had then been scraped, as envisaged, from both North and South and from within the ridge to form outer 'faces' or bulwarks: the area between them was filled with softer material. The reason why previous investigators, using conventional survey and excavation methods, had failed to locate the South wall of the structure was that the builders had utilised and enhanced a natural feature which had, of course, suffered subsequent denudation.

On the North side of the ridge a fall in resistivity led to the investigation of an area where traces of mud-brick can be seen on the surface. Trench A7c (area 15m x 20m) revealed a feature consisting of one course of mudbricks laid directly on the desert surface which in this area is a stratum of coarse reddish coloured *breccia*-type material forming a slightly concave East-West basin. The feature was fully exposed showing a *pavé* one brick thick roughly laid with headers (North-South) and occasional lines of stretchers. The latter still formed a well preserved edge at the South-West corner but the feature is severely eroded in the North-North-West to a trace of brick dust or to less than half a brick in thickness. The bricks are small (26cms x 12cms x 8cms), light grey in colour and of a fine silt with some sand and no obvious inclusions. This is unlike settlement bricks which show a high percentage of pottery and organic material used as temper. The size and composition suggests that these are archaic bricks especially fabricated for funerary monuments. (Figs. 10 & 11)

The brick feature was overlaid by a layer of dark grey brickdust in a distinctive matrix of orange sand and fine white gypsum, which consists of decomposed local limestone similar to the type of material excavated from the circular pits in sondage A7d. This deposit sealed the full extent of the brick feature which was completely exposed, but due to erosion and probable robbing the original shape is unknown. On the East the natural surface of the desert has been cut down and prepared with the brickwork running up to the cut and then continuing at a higher level, though still only one brick thick. The difference of level was disguised by a single half row of stretchers forming the only area where two brick courses appear to have been laid. The bricks in this area are fragile and eroded with no trace of the coarse sand mortar present elsewhere. (Fig. 12)

The central and Southern part of the feature was covered with a thin, hard, compacted mortar with irregularly spaced ridges 20cms to 60cms apart, 3cms high by 10cms thick which wander across the surface in an East - West direction. As it seems clear that the feature did not support a building, (there are no traces of walls or edges) it may be that this is an aid to construction and that the ridges and the mortar covering are explained by the movement of heavy objects across the surface. The extreme hardness of the mortar and ridges could be the result of the compacting of liquid mud poured in front of sledges or some other form of locomotion. (Fig.11) Examples of Egyptian mud-slipways (see, Vercoutter, (1970), figs.11-20) and mudbrick building ramps do not seem directly comparable, though recent work at Giza and experimental archaeology may shed light on this feature. These aspects will be dealt with more fully in future publications as this is the first construction found within the walls of the Gisir el Mudir.

No artefacts were found in trenches A7a 1-3 and A7c. Sondages A7b and A8WW produced one faience tube bead, a small fragment of worked limestone and a pottery scraper (recut body sherd). All trenches proved to have very few ceramic finds, the identifiable, diagnostic sherds were Archaic in origin. (We would like to thank J D Bourriau and her ceramic team for their kind help and advice during this season).

Trench A8WW

Some 200m to the North of the South-West corner (resistivity cross-section GM90-XS3) there was a rise in resistivity values as the profile approached the assumed position for the East face of the West wall of the monument. This suggested that the wall comprised East and West faces of masonry the intervening space filled with a conductive material. (Fig.13) (The presence of the West wall was previously known from photographs of unpublished work by 'Abdel Salam Hussein for the Egyptian Antiquities Service in 1947 but its character, construction and dimensions were unknown.) Trench A8WW was opened to explore this area. Again the excavation confirmed the data recorded and an impressive section of Wall was exposed standing to a height of 3.2 metres (twelve courses of limestone masonry) (Figs.14, 15, & 16). There was a specially prepared hard packed sand deposit which formed a level 1.5metre deep buttress against the East face of the wall and it appeared to continue to the North and South of the trench. The top five centimetres of this fill was compacted and had numerous mud-brick and limestone fragments embedded in such a fashion as to lead to the conclusion that in addition to buttressing the lower courses this had formed a pavement or inner platform to the East face of the wall. There was no apparent foundation trench, the base course being laid on the level desert surface. This level pavement extended out from the wall for a distance of 25m to where it merged with the natural desert surface. (see diagram Fig.17). The fill had also protected a much harder, grey-coloured plaster which had been used to face and protect the bedding mortar between the stone blocks of the wall face, this mortar was thick and composed of fine sand and mud. (Fig.18)

The roughly dressed facing blocks which slope back at approximately seven degrees towards the centre of the wall are supported from behind by further undressed blocks set in fine sand forming a buttress to the facing and sloping towards the centre of the wall. (diagram Fig.17) If it is assumed that the West face is constructed in a similar manner then the builders have produced a pylon-shaped construction with masonry walls 15 metres apart, buttressed on the inside by further masonry and the central V filled with a prepared material made from mud, limestone fragments, sand and flint nodules. (For similar type of construction see D. Arnold, 149, Fig.4.78). Once again the resistivity results were confirmed as this material is low in resistance and shows clearly on the profiles (diagram Fig.19). These features, together with the failure to trim away soft 'tafl' layers in the limestone and the irregular laying of the blocks (so that the masonry joint on one course was not centred between an upper and lower course block), probably contributed to the collapse shown at the southern end of the exposed wall. All these features plus the absence of a foundation trench indicate that the Gisir el Mudir Enclosure belongs to an earlier type of construction than the Zoser and Sekhemkhet pyramid enclosures and suggest a Second Dynasty rather than a Third Dynasty date.

During his 1947 excavation 'Abdel Salam Hussein found a few inscriptions on masonry blocks. These were photographed but remain unpublished. The material is presently held in the EAO photographic archive at Saqqara. The 1993 exposure of the wall produced two groups of inscriptions:

1. Two 'Masons' marks, these are single large hieroglyphic signs in red ink. A "wꜣs" or "wꜣsr" sceptre mark and a "njwt" (Gardiner F12; 048, respectively) can be easily identified.
 2. Graffiti - group of signs, in black and at small scale, which cannot be easily read.
- Both groups were found on the lower courses of the masonry wall. (Figs.20 & 21).

A further 95 resistivity profiles were observed in the Gisir el Mudir area;

- In the South West at the position where limestone outcrops and dressed limestone blocks were observed in 1991 (MT2) a 25metre grid (GL1-GL12) over an area of approximately 150m by 150m was surveyed as shown on Map Sheet 1 and Figs. 25 & 26. Several anomalies indicate further exploration is necessary.
- Two profiles were run North-South and East - West over the large mound which juts out from the South ridge near the centre of the monument. No structures were found in this area. (Map Sheet 1, GMC3 27, & 28)
- Two profiles were observed at the position of the main De Morgan excavation near the foot of the large mound but no structure was indicated. (Map Sheet 1, GMPRTGD 29 & 30)
- Three resistivity cross-sections were observed across the North Wall. The central profile crosses an area where the North wall appears to be 17m wide compared to the 15m of the West and East walls. There is also a stepped-back section with possible structures at each end within this central area where the profiles show very high readings. There is a probability that this may be a gate structure similar to the Abydos funerary monuments but in a different position because this construction is in stone. (Map Sheet 1, GMNW93 24, 25 & 26)

Ceramics

In addition to the pottery sherds recovered from the *sondage* trenches a statistical pottery surface collection on a gridded format was undertaken. Originally a 10m square in the South-East corner of each 100m grid area was considered statistically correct but so few sherds were recovered that this sample area was increased to a 25m square. Analysis of this showed three components: Coptic sherds, imported wares of the 6th - 4th Century BC and sherds of Archaic/Old Kingdom wares of the 2nd and 3rd Dynasties as well as a large proportion (39%) of unidentified material. The sherdage was often abraded, baked and discoloured from surface exposure and was therefore, unidentifiable. The Coptic wares are ubiquitous in Saqqara surface collections: the 6th - 4th Century material may derive from plundered graves within the enclosure.

The Archaic material, of the same character as the few sherds found within the test trenches, is more than likely contemporary with the monument, and supports the dating suggested for the construction described above. (Figs. 22, 23, 23a & b, 24 & 24a)

Ptah-hotep Area (Map Sheet 2)

This area comprises a large mastaba field of the Old Kingdom, the most famous tomb being that of Ptah-hotep, lying West of the Zoser enclosure. Within it, lines of mounds define the South and West sides of a rectangular enclosure (described in the Reports of 1990, 1991 and 1992/3, pages 7-8 as the L-shaped structure). Further resistivity cross-sections have been recorded this season consisting of a grid at 50m centres containing 131 profiles with the following results:

- i) The readings suggest that these mounds forming the L-shape consist of surface material scraped up from the desert and are unlikely to conceal any built structure, though they may well have been intended as preliminary outlines for one.
- ii) High readings at the North end show the presence of one or more very large mud-brick structures, but these may not necessarily be connected to or contemporary with the L-shaped structure.

iii) Surface observation suggests that the East and most of the North walls of the presumed rectangle were dispersed or removed when tombs were constructed in the area, which may indicate a pre-5th Dynasty date for the L-shaped structure. There are tombs within the rectangle but there are no clear indications that they are contemporary with the construction.

The Serapeum and Sacred Animal Necropolis (Map Sheets 2 & 3)

The Serapeum area is described in the 1992/3 Report (pp. 4-7) when resistivity and magnetometer coverage was accomplished. This season, with renewed permission, the area on the Eastern side of the Serapeum-Abusir valley was examined. The remaining 7 resistivity cross-sections from the 1991 season were observed in a South-East direction from the central traverse of the Abusir Wadi to the excavations of the Animal Galleries; 58 profiles were recorded. (Map Sheet 3). The resistivity survey was of value in charting, in certain localities, the depth of the original desert surface and the contour of the valley, though large areas of disturbance preclude the building up of more than a partial picture. Two major areas of anomalous readings were discovered. (Map Sheet 3). One was North of the Serapeum on cross-section 18 and comprised an area of 20 metres by 30 metres; the low current and very high readings suggest that some structure with a very solid and compact fill is present. This could be a filled platform, a stone or brick settlement filled with occupation debris and sand, a tomb superstructure and shaft with fill or even the entrance to a catacomb. Indeed, the shape of the feature tends to favour one of the last two interpretations. The National Museums of Scotland would propose to include testing of this feature in next season's programme. A second, less extensive and pronounced but similar anomaly was found on cross-section 23, West of the central temple precinct of the Sacred Animal Necropolis. This anomaly is of considerable interest as it might indicate an extension of the housing known to exist in this area from EES excavations in 1964-76, or the entrance to a catacomb.

Conclusion

This work is important in two distinct ways:

i) The success in predicting results at Gisir el Mudir shows that resistivity survey methods have now been sufficiently refined to provide reliable predictions even in the difficult conditions presented by disturbed sites and drifted sand: it is especially notable that the anomalies can be analysed not only in terms of the existence, but also of the character, of the sub-soil material, providing adequate account is taken of the features of the terrain. As resistivity survey has already been shown to provide controlled and valid results in the very difficult conditions of sites in the alluvium (Memphis) and on the desert edge (Amarna), it must now be considered a technique of general application which should be widely used in pre-excavation and topographical survey.

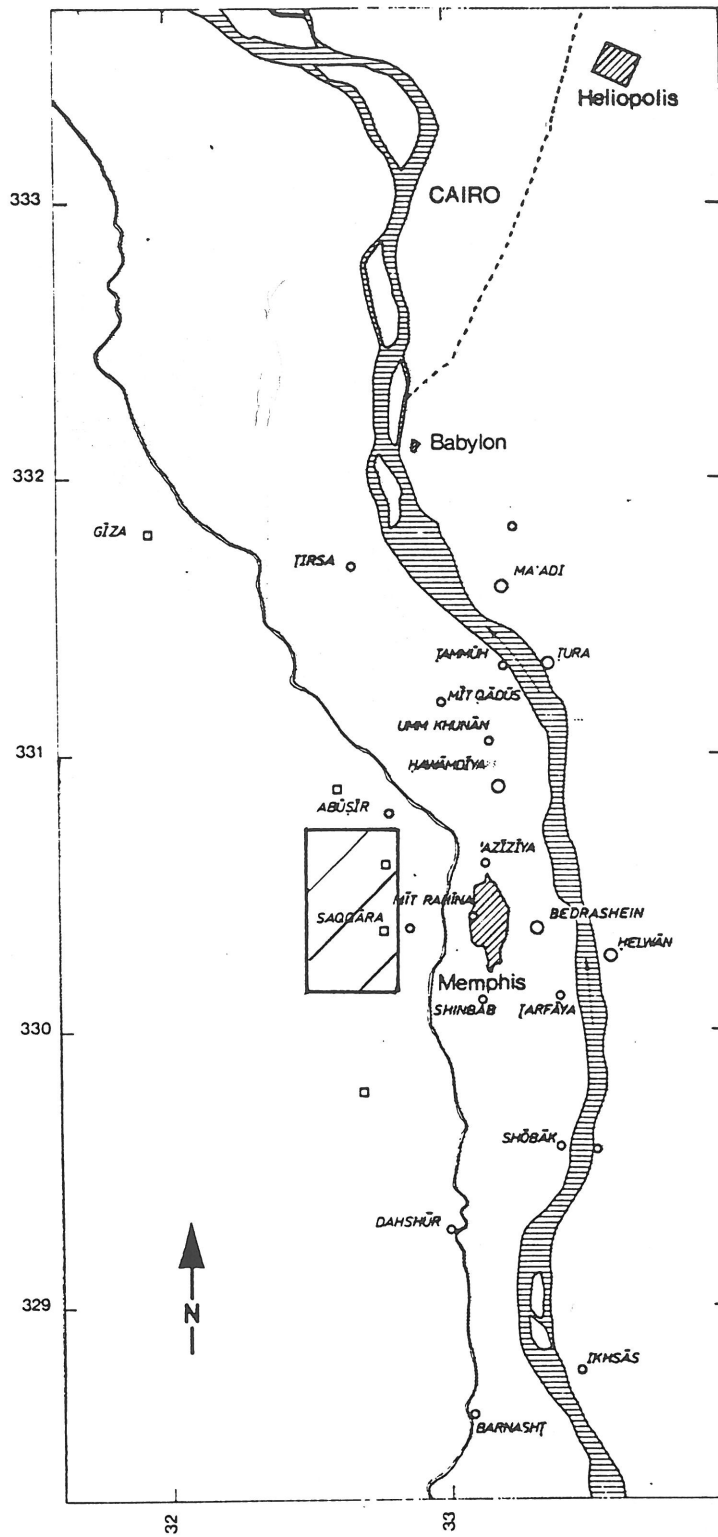
ii) The Gisir el Mudir has been shown with a considerable degree of probability to be the earliest large-scale stone building in Egypt, and is therefore of intrinsic historical and architectural interest. The facts (now almost certain) that no pyramid or subterranean burial chamber was ever commenced shows that it was of a character different from that of the Sekhemkhet and Zoser complexes of the early 3rd Dynasty and may indeed be an intermediate phase between the Abydos mud-brick funerary monuments and the pyramid complexes. This emphasises the desirability of testing further resistivity anomalies and investigating further the character and purpose of the building. For this purpose the National Museums of Scotland will propose further work at the Gisir el Mudir.

D. Arnold, Building in Egypt: pharonic stone masonry (New York, 1991).

A. H. Gardiner, Egyptian Grammar, Oxford, 1957.

P. Munro, "Report on the Work of the Joint Archaeological Mission Free University of Berlin/University of Hanover, 12th campaign, 1992" DE 26 (1993), 47-58.

J. Vercoutter, Mirgissa 1 (Paris, 1970).



SAQQARA

Location map

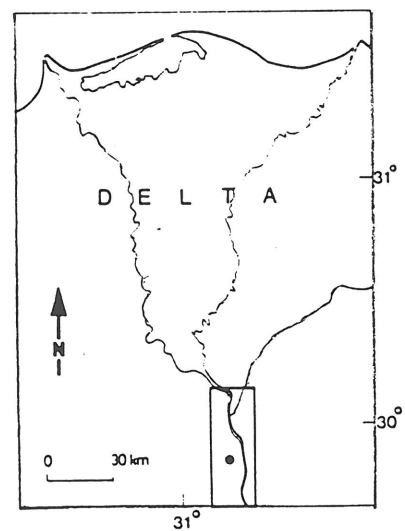
- extent of Nile flood plain
- course of Nile
- course of Bahr Libeiny
- course of Red Sea canal
- TURA modern place name
- pyramid field

Babylon ancient place name

UTM GRID INTERVALS = 10 000 m

SOURCE SOE 1930



EE'S 1983

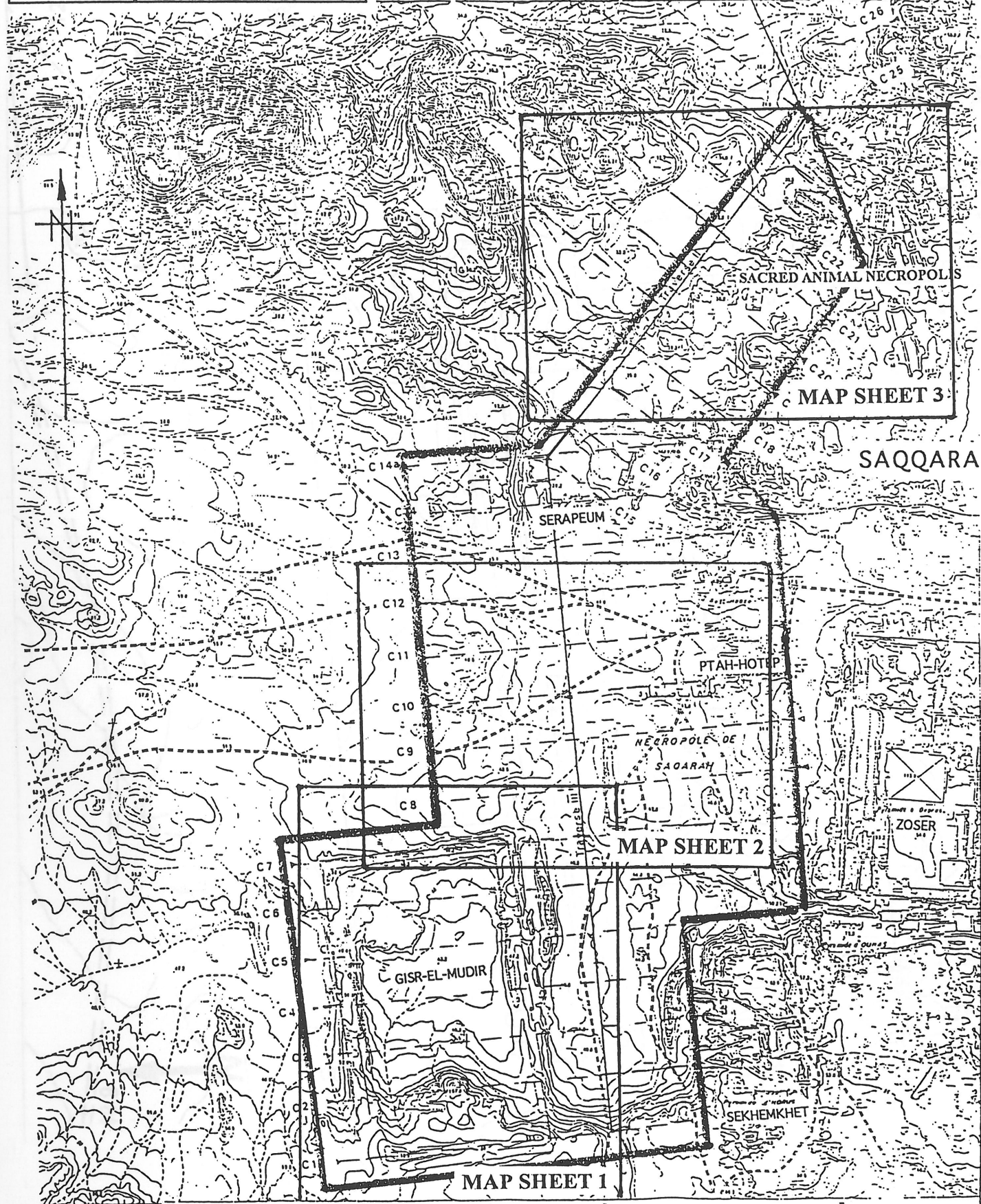


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APPROXIMATE SCALE 1:10,000

Concession Area 
Resistivity Lines 



LEGEND

Topographic

Contour

Spot Height

Triangulation Point

Building (modern)

Track

Geophysical Sensing

Resistivity Line (& direction)

High Readings

Cross-section & Profile

Anomaly

Proton-magnetometer sites

Archaeological

Maricette's numbered tombs

Surface features-surveyed & numbered
(Mathieson & Tavares)

Serapeum Enclosure
(as shown by De Morgan)

Serapeum Enclosure
(as shown by Rhone)

Early Dynastic Cemetery

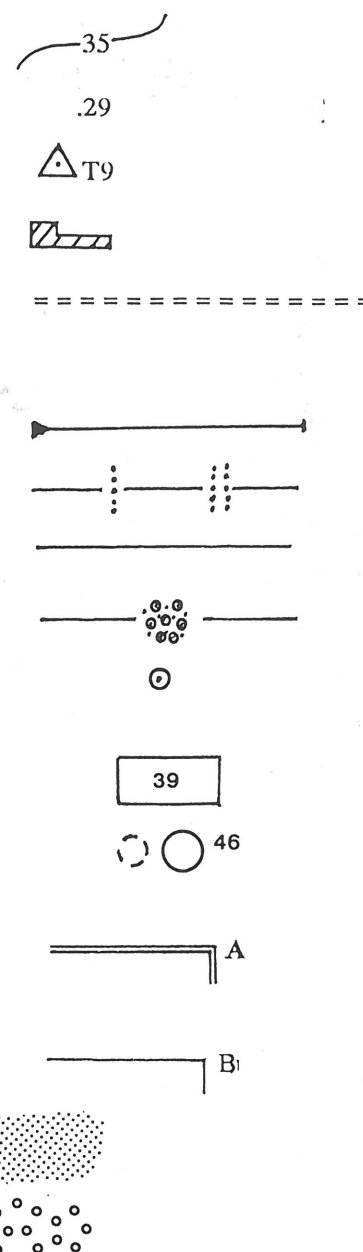
Probable shallow burials

Scale

1/2500

Elevations in metres above Mean Sea Level

Topographic information from 1978 Map Sheets
for the Ministry of Housing and Reconstruction
UTM Projection - Hayford 1909 Int.Ellipsoid









SACRED ANIMAL NECROPOLIS

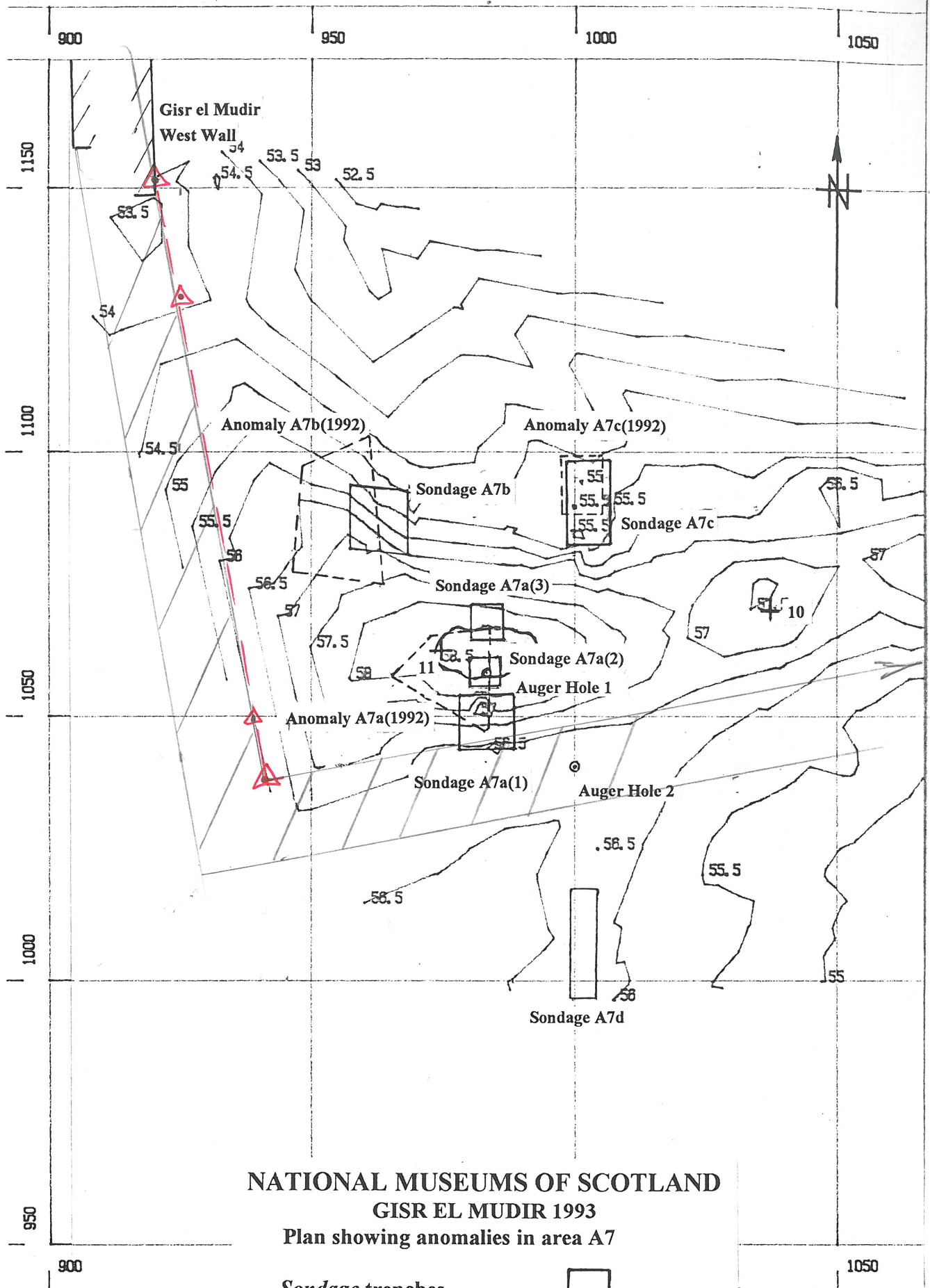


Fig.1

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Pseudo-section of profiles 93/486-488

Gisr el Mudir Anomaly A7

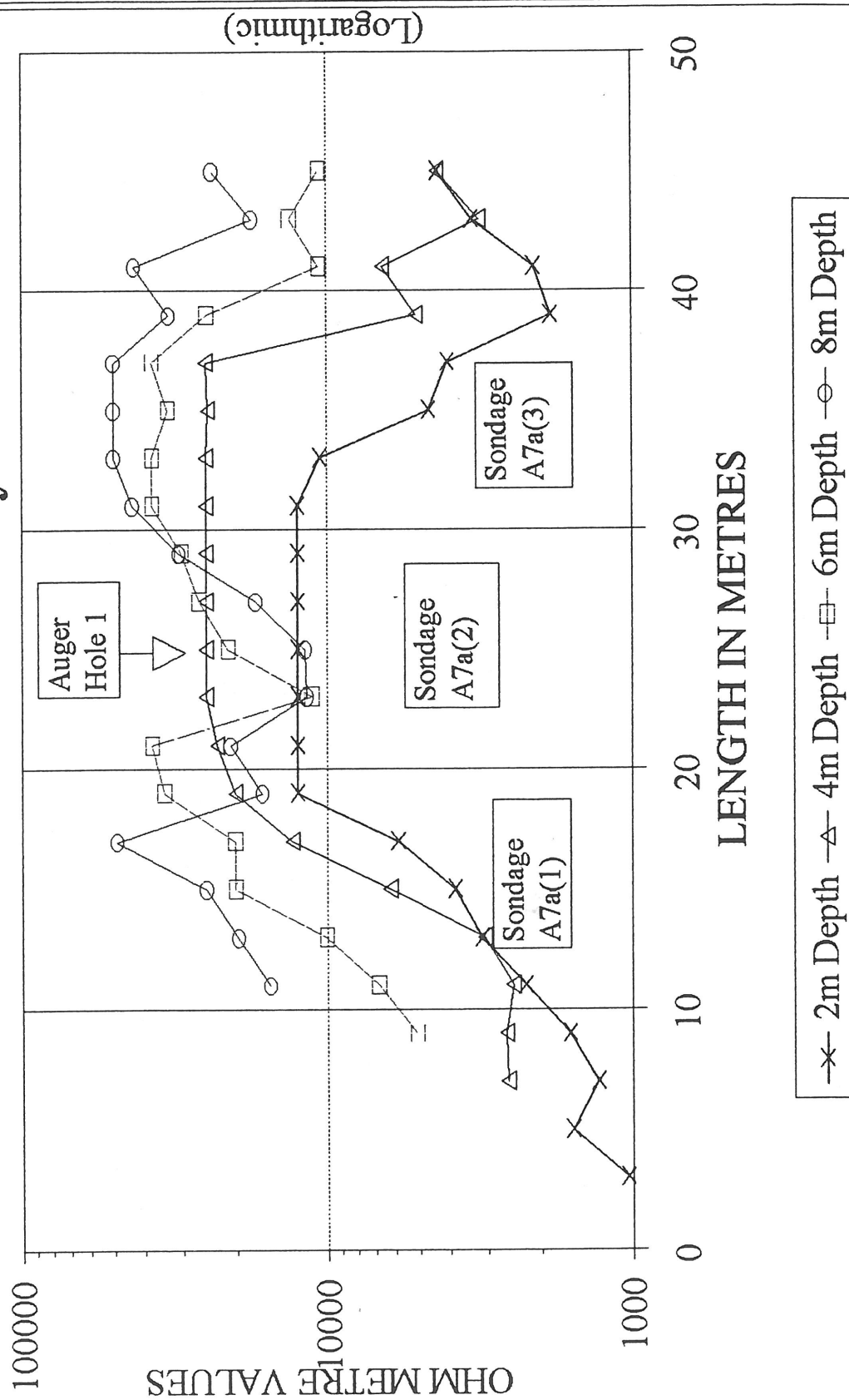
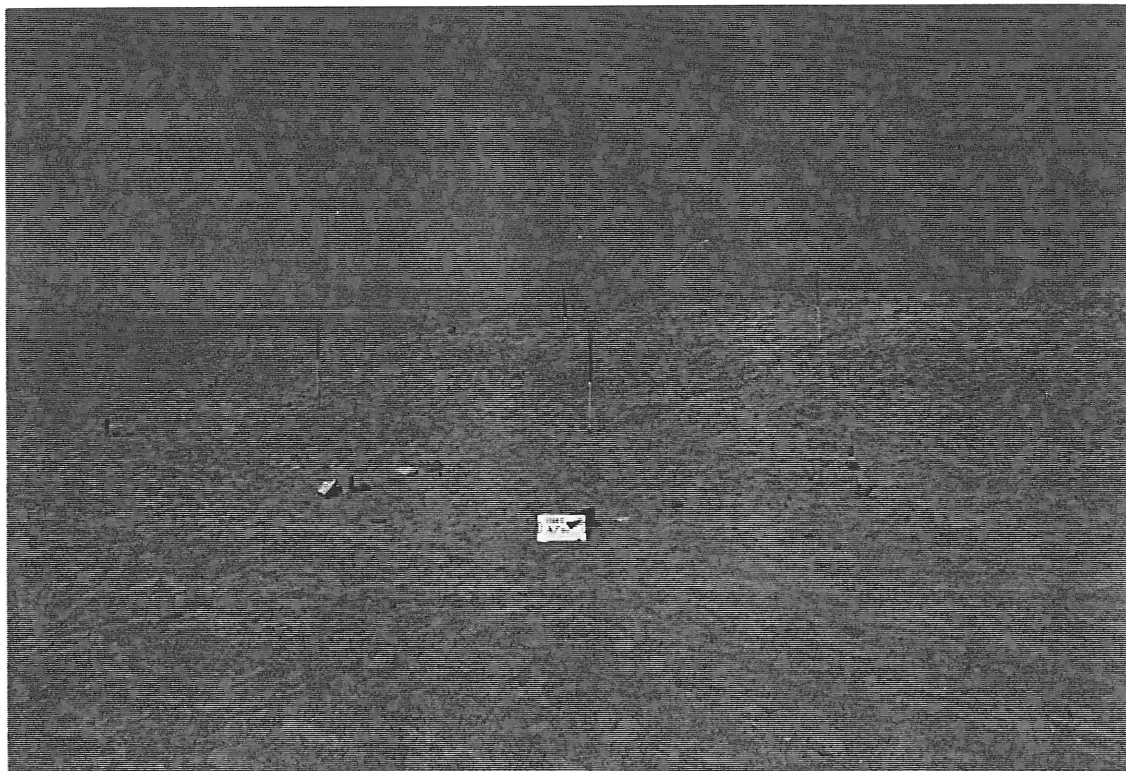
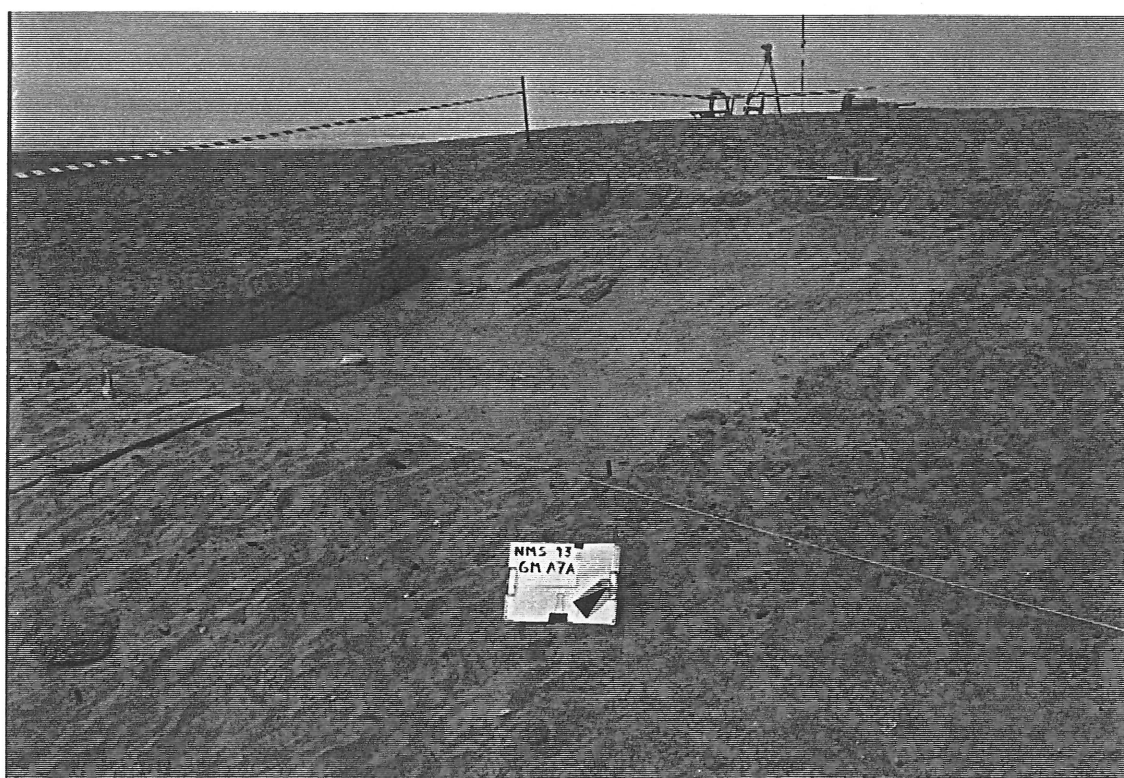


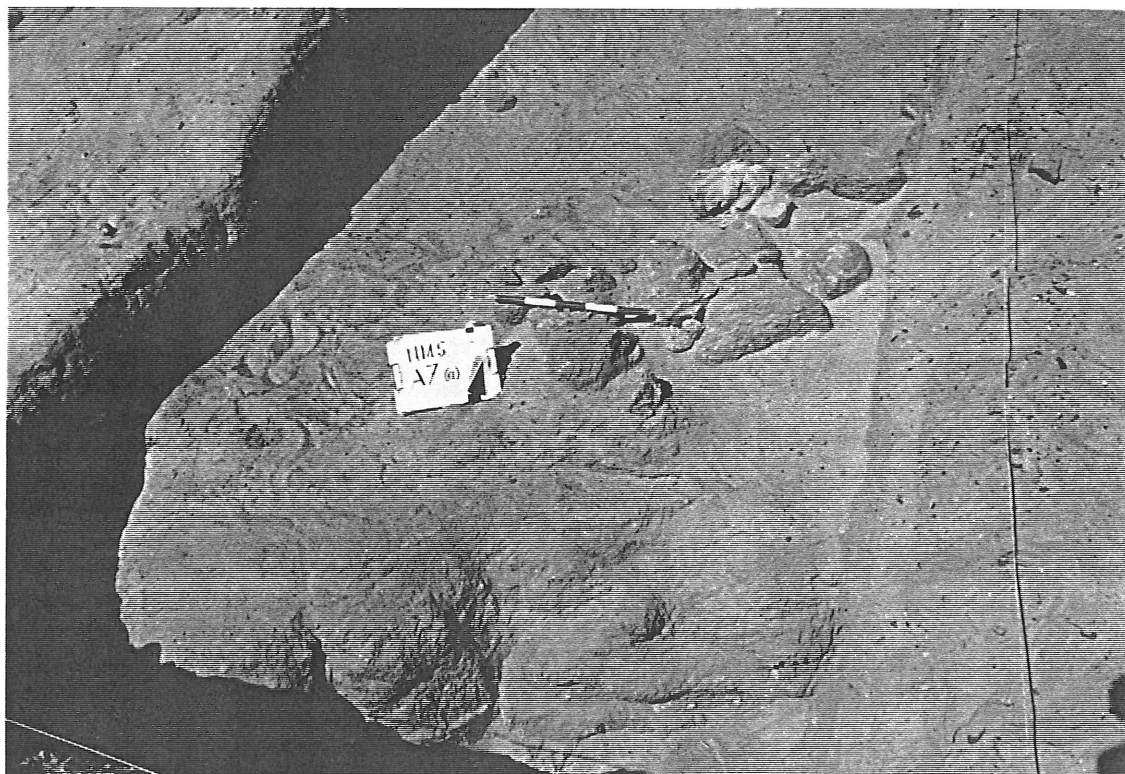
Fig.2



1. Anomaly A7 Sondage A7a1
South aspect of South "Wall" ridge looking North West

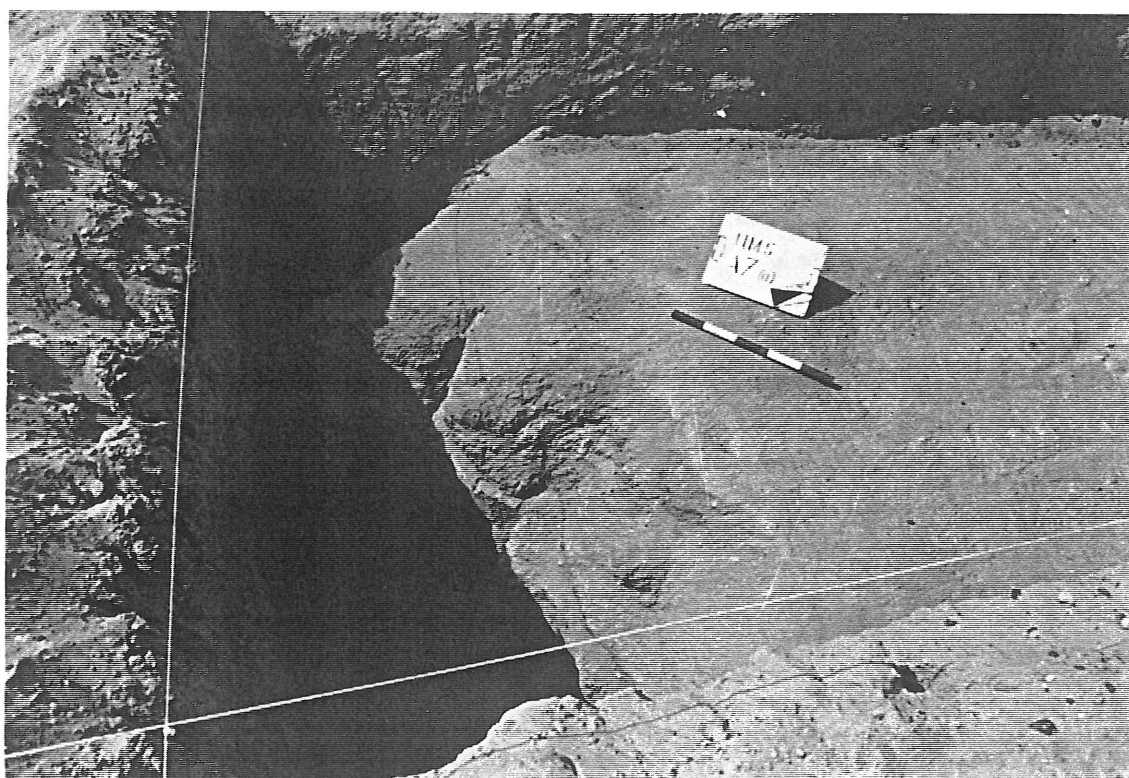


2. Anomaly A7 Sondage A7a1
South face of South "Wall" ridge showing crust of *tafl*, mud brick and debris



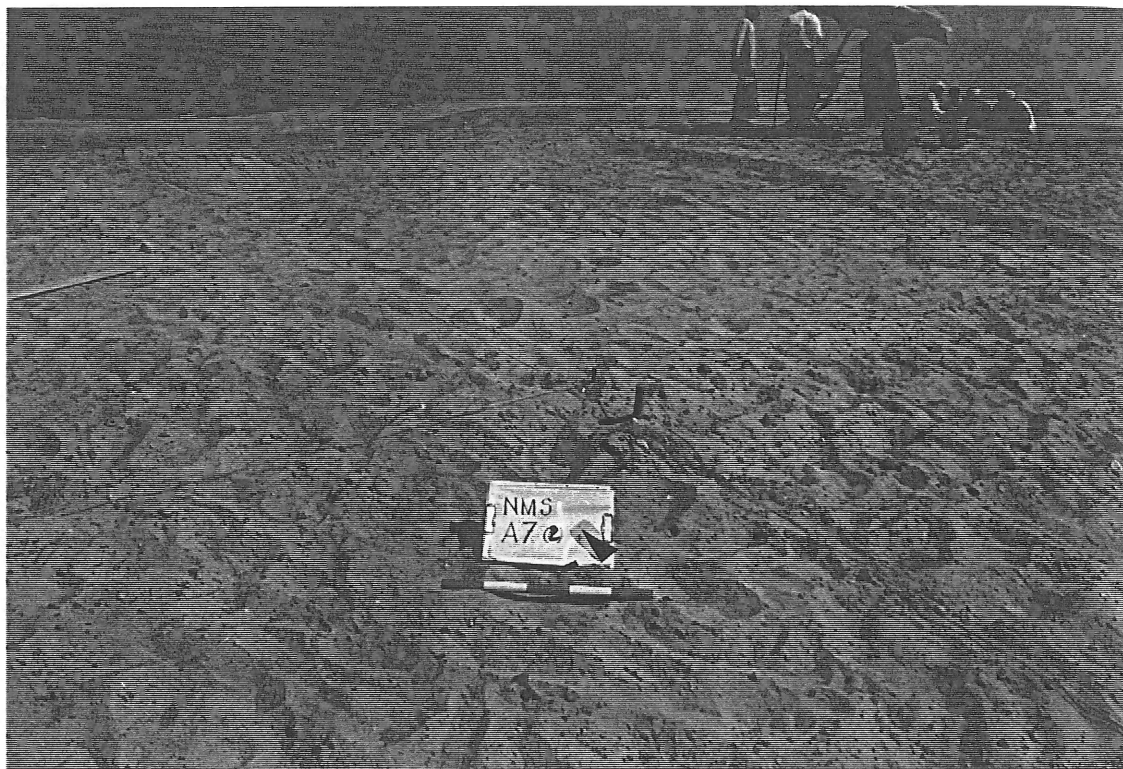
1. Anomaly A7 Sondage A7a1

South face of South "Wall" ridge showing cut in ridge base conglomerate and build up of *tafl* and conglomerate blocks on top of the base



2. Anomaly A7 Sondage A7a1

South face of South "Wall" ridge showing depth of cut and prepared base for build up of the "Wall" with *tafl* and blocks cut from the edge in the foreground



1. Anomaly A7 Sondage A7a2
Looking North East along top of ridge



2. Anomaly A7 Sondage A7a2
Centre of Anomaly A7 showing depth of the debris
and auger hole being drilled



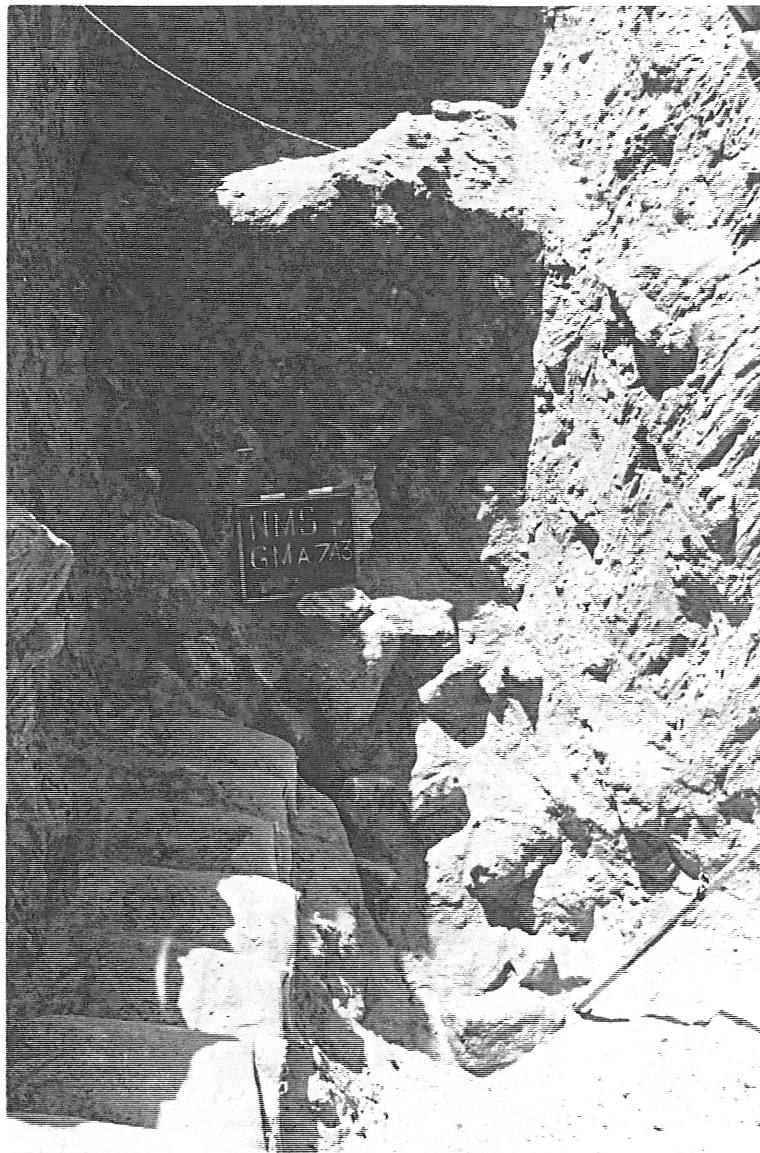
1. Anomaly A7 Sondage A7a3

North side of "Wall" ridge showing top of *tafl* and conglomerate blocks



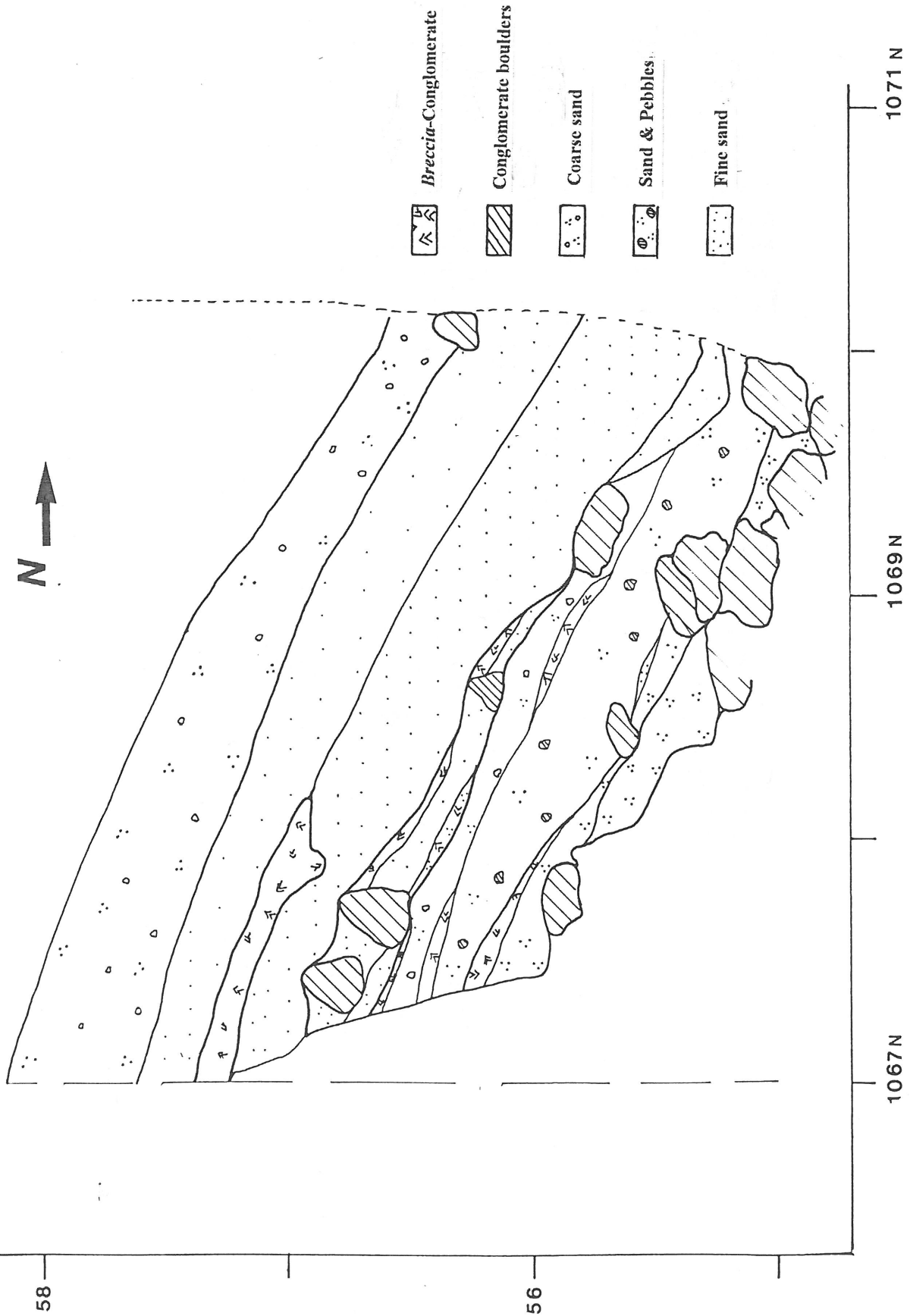
2. Anomaly A7 Sondage A7a3

North side of "Wall" ridge
showing blocks at 1.5 metres depth



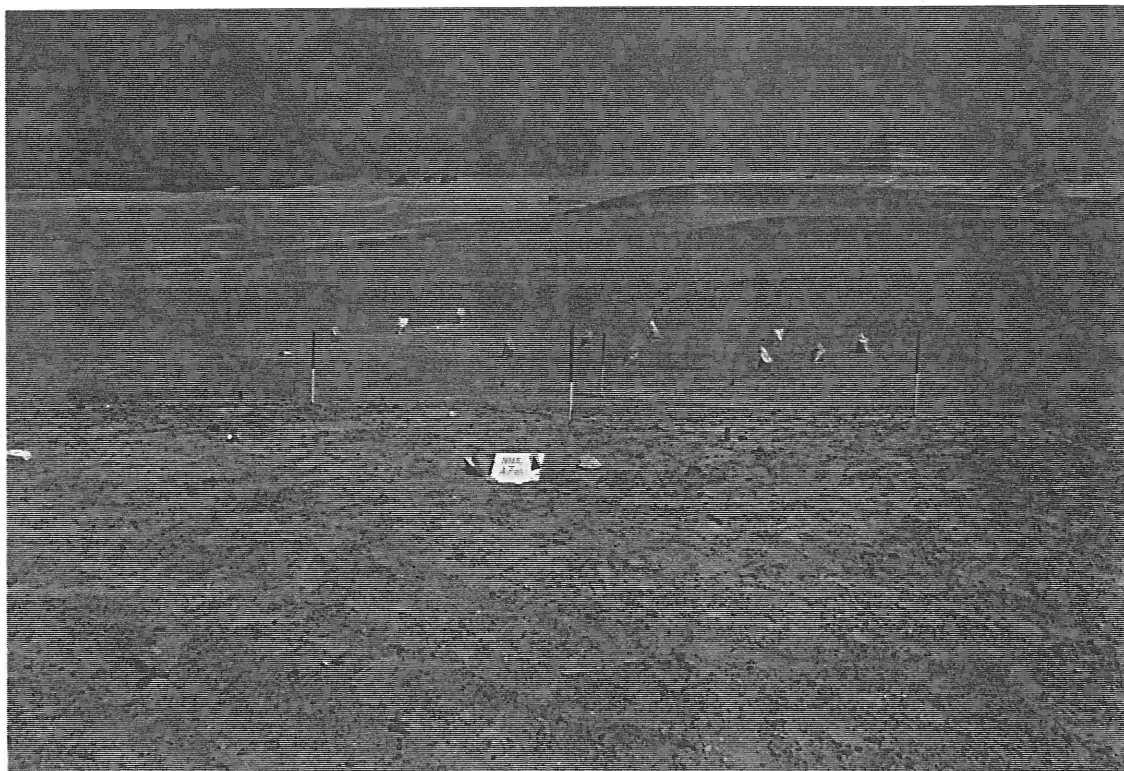
1. Anomaly A7 Sondage A7a3

North side of "Wall" ridge with blocks at 3 metres depth
Note cavity to South of survey pole



1. Anomaly A7 Sondage A7a3
West Section showing details of South "Wall" construction

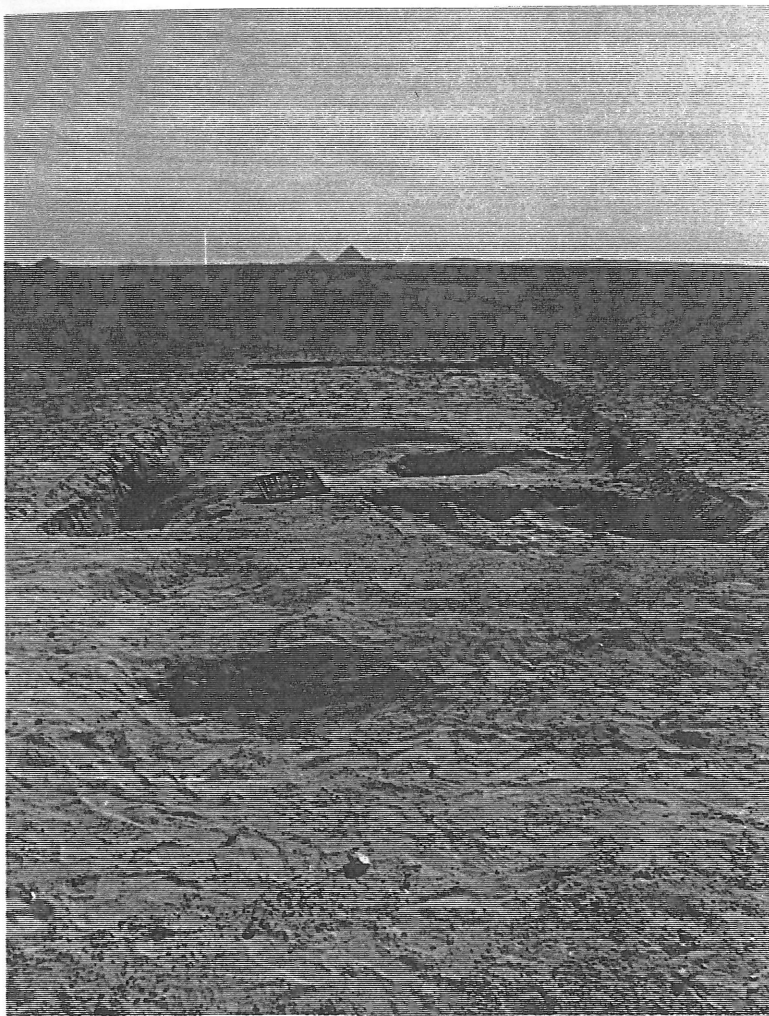
Fig.7a



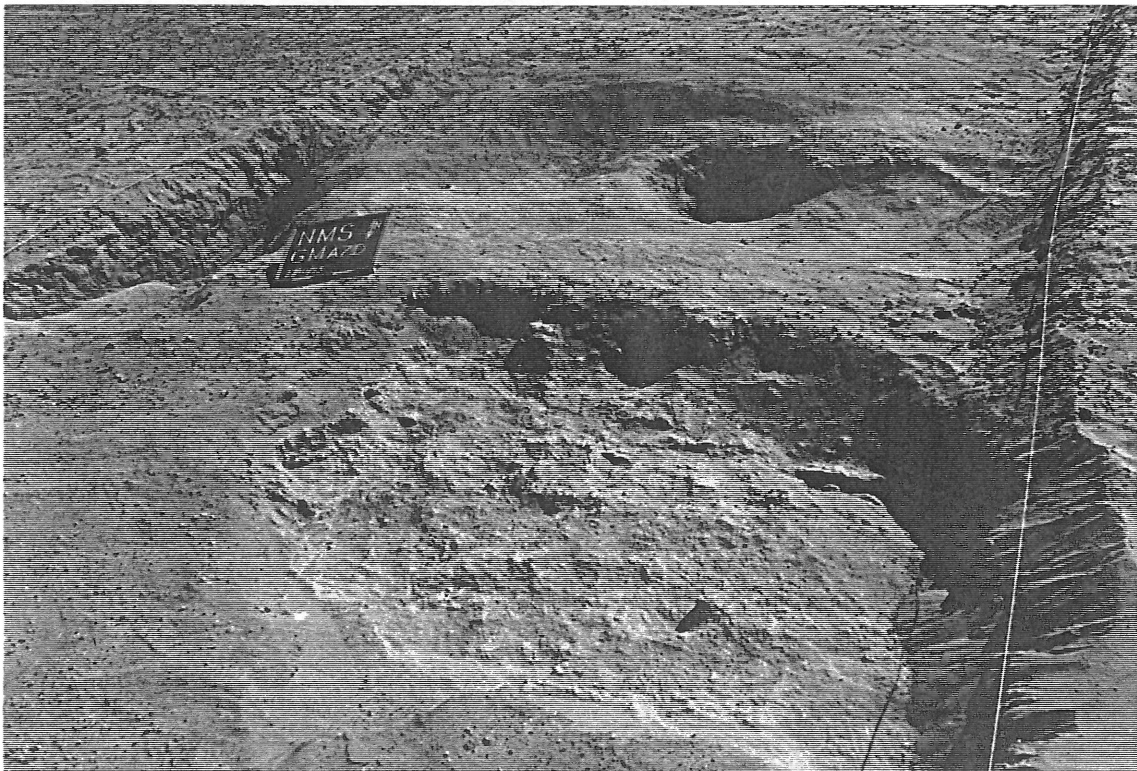
1. Anomaly A7 Sondage A7b
Looking North East down North side of South "Wall" ridge



2. Anomaly A7 Sondage A7b
Mud bricks and *tafl* boulders forming crust on top of South "Wall" ridge



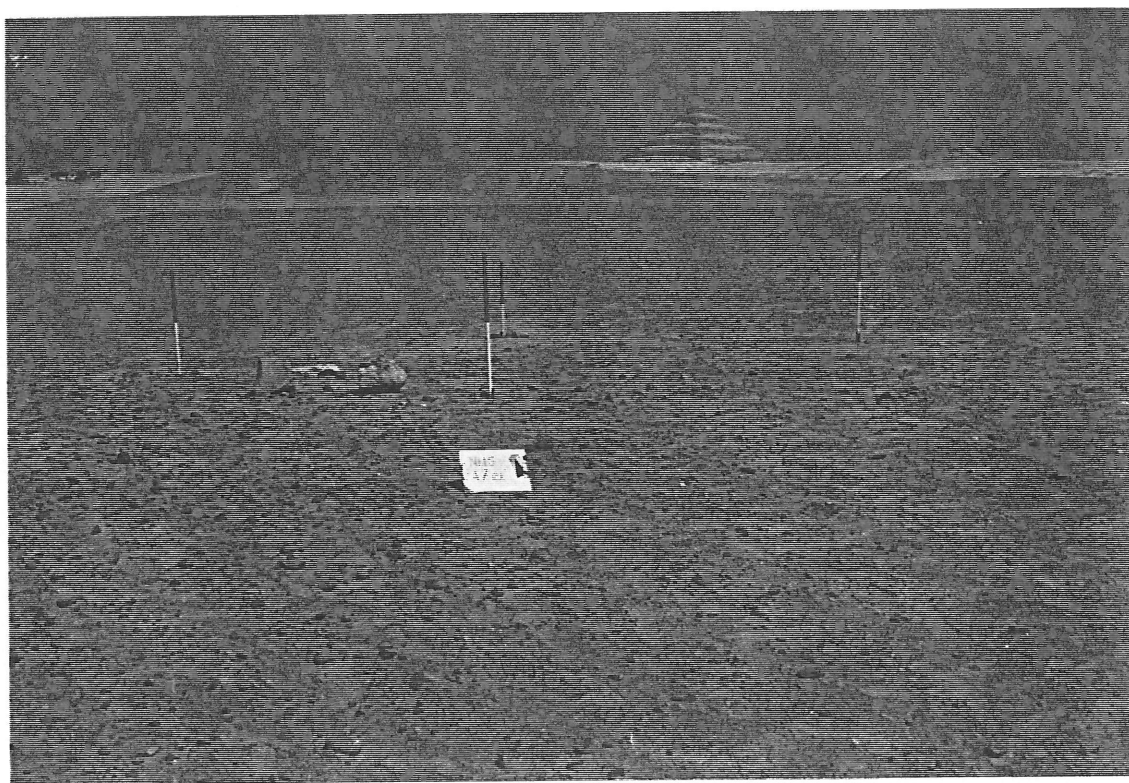
1. Anomaly A7 Sondage A7d
50 metres South of A7a on level desert
Pyramids of Dahshur in the distance



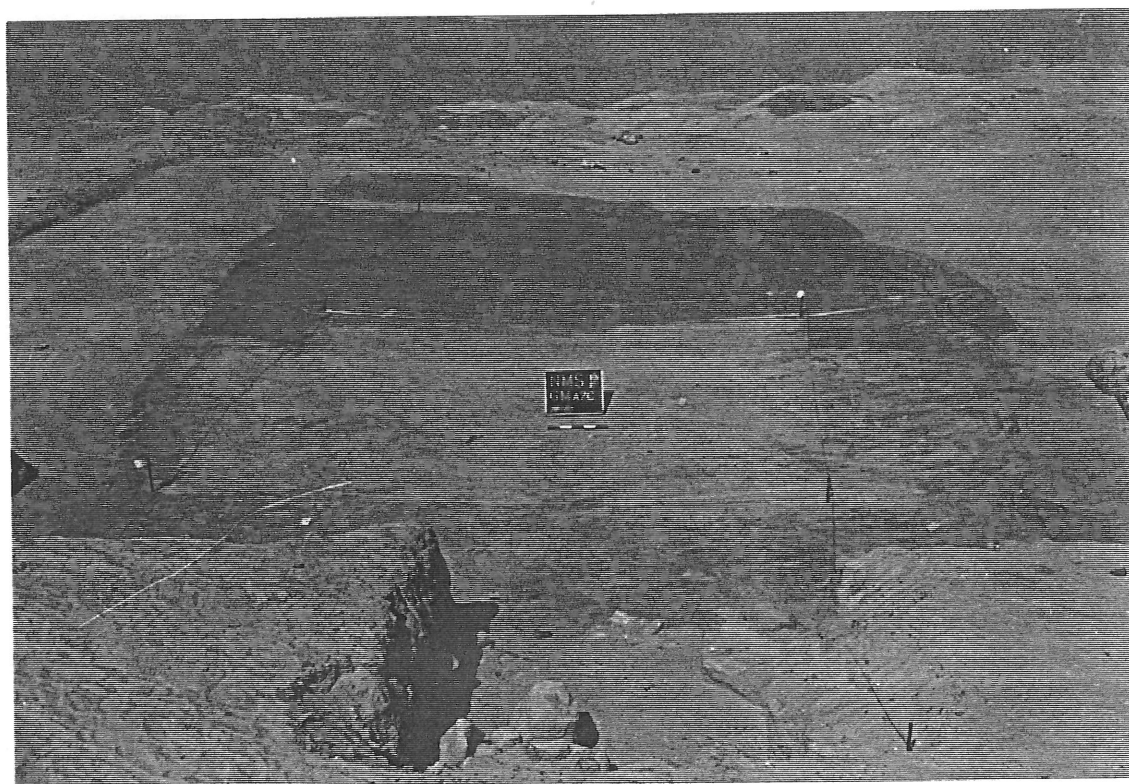
2. Anomaly A7 Sondage A7d

Showing pits dug in the bedrock

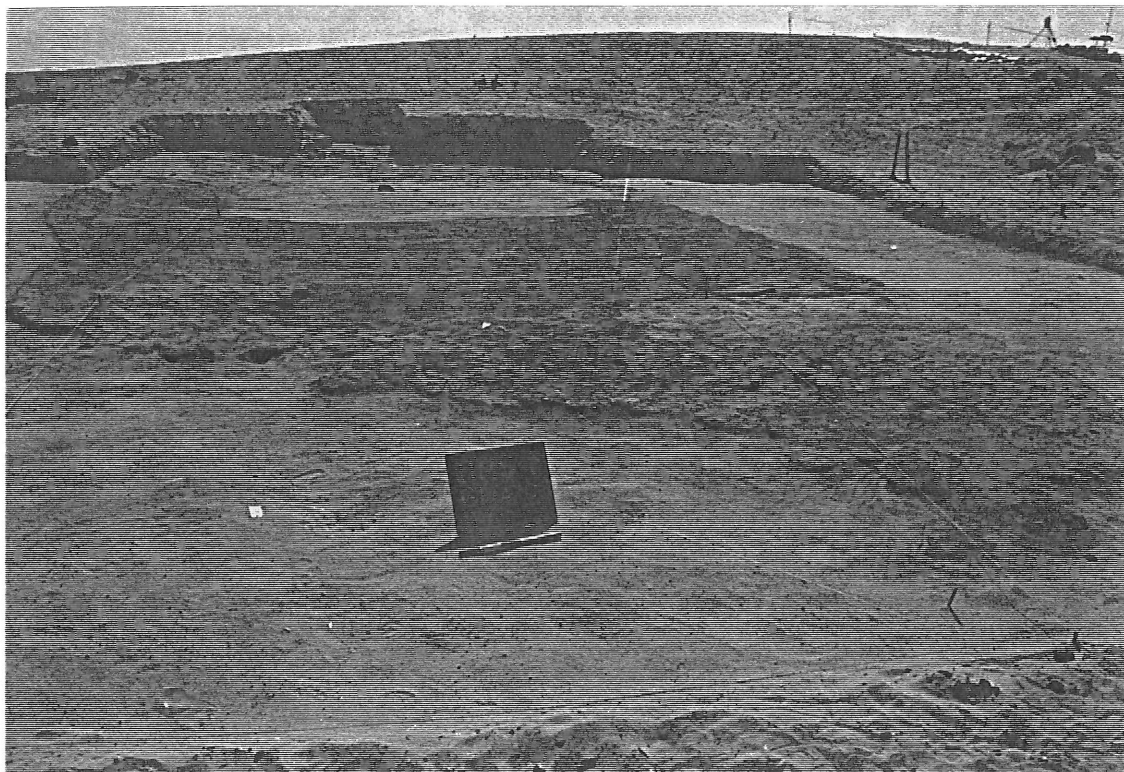
Note only 10-15cms of cover, the normal desert surface
of sand, pebbles, flint nodules had been scraped up to form the fill for the ridge



1. Anomaly A7 Sondage A7c
Looking North East along flat area to the North side
of the South "Wall" ridge



2. Anomaly A7 Sondage A7c
Mud brick pavement abutting on to the North face of the South "Wall" ridge



1. Anomaly A7 Sondage A7c

Mud brick pavement looking South at ridge

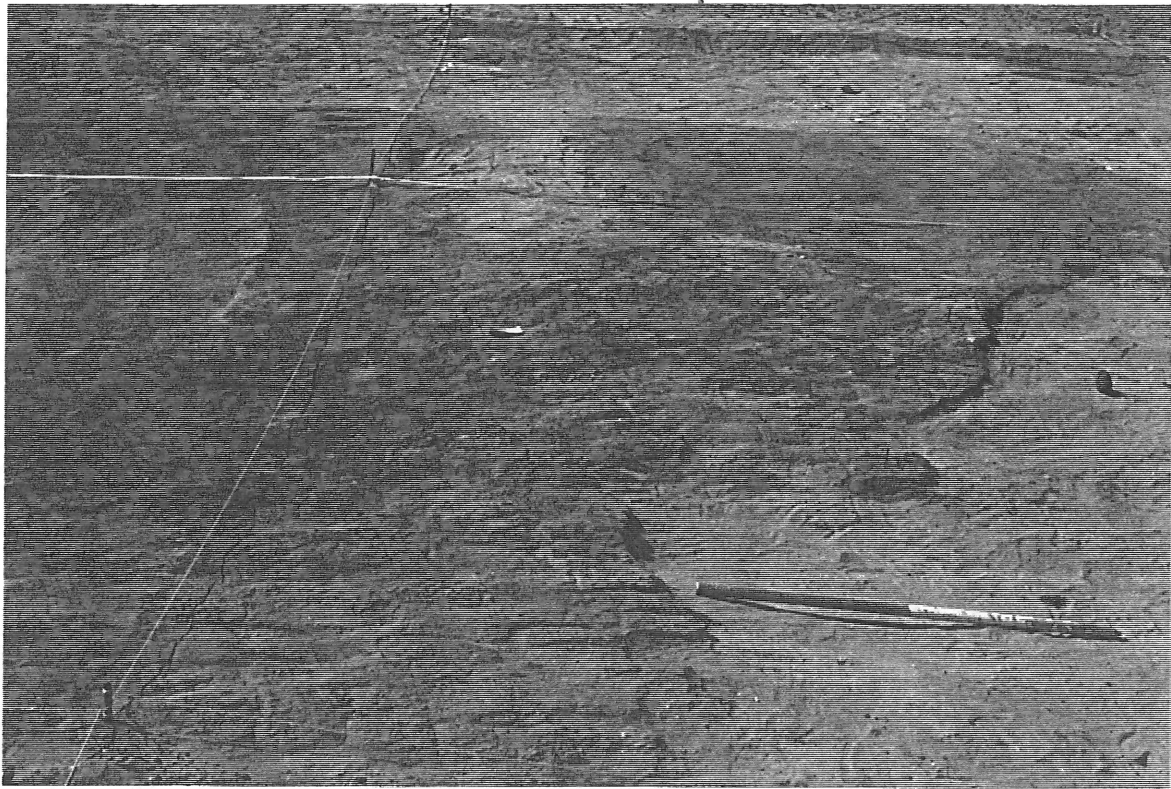
Note how single thickness of brick has been eroded in foreground



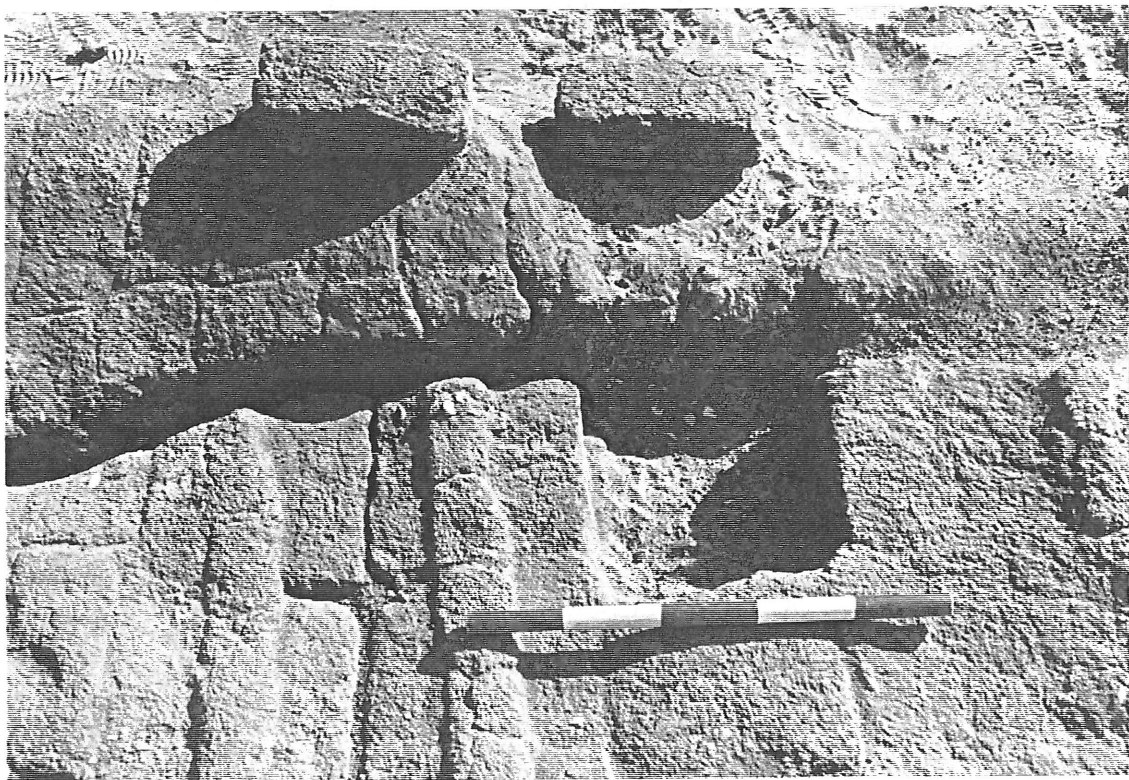
2. Anomaly A7 Sondage A7c

Mud brick pavement looking East along flat area

Note apparent 'sledge runner' marks preserved on surface of pavement



1. Anomaly A7 Sondage A7c
Mud brick pavement looking West along flat area
Showing robbed edge at the North



2. Anomaly A7 Sondage A7c
Detail of stepped brickwork on East edge of pavement
with mortar ridges

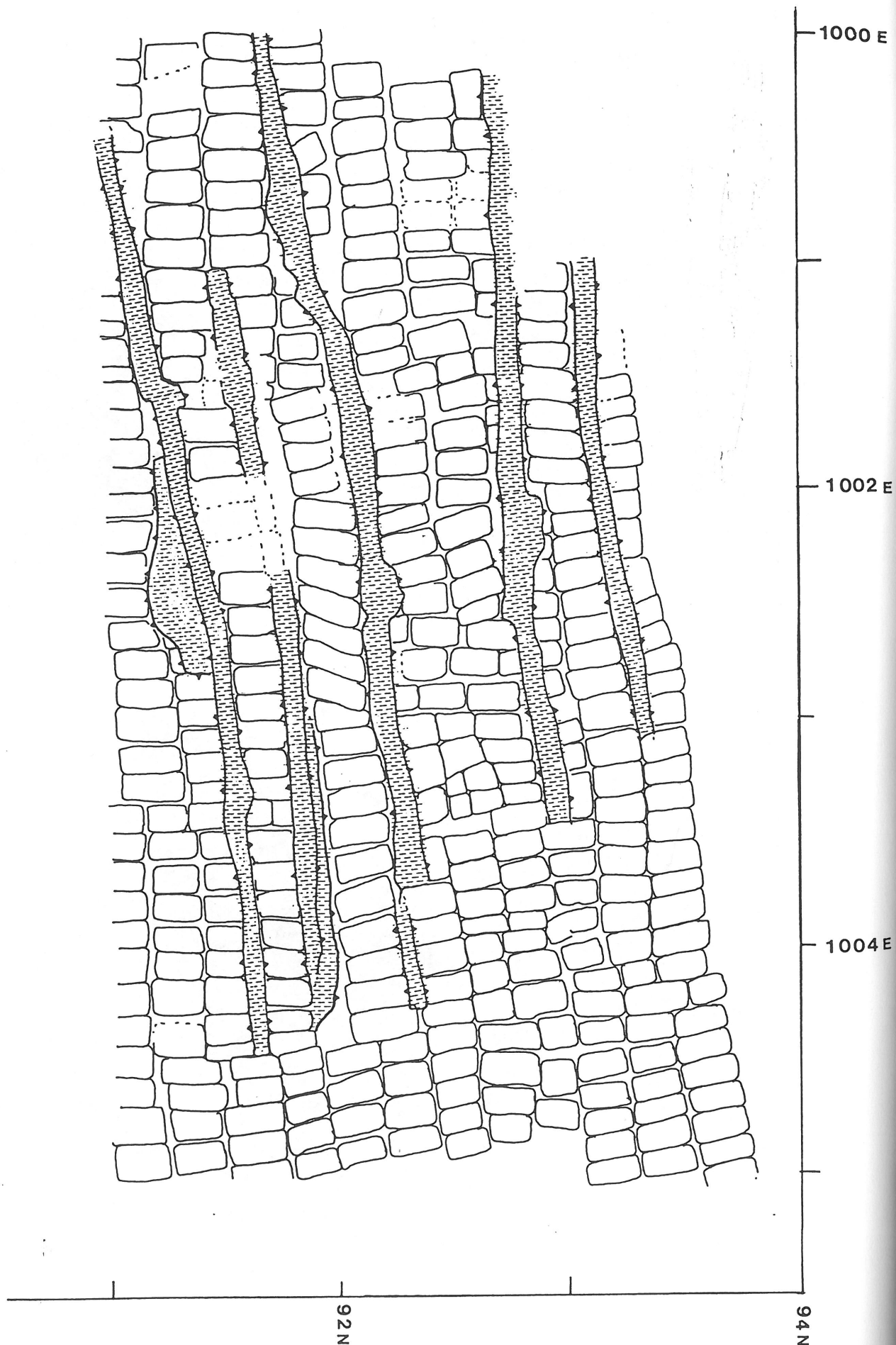


Fig.12a

1. Anomaly A7 *Sondage A7c*
Plan of feature showing brick articulation and mortar ridges

NATIONAL MUSEUMS OF SCOTLAND

Pseudo-section of profiles 90/175-206

Gisr el Mudir GM90-XS3

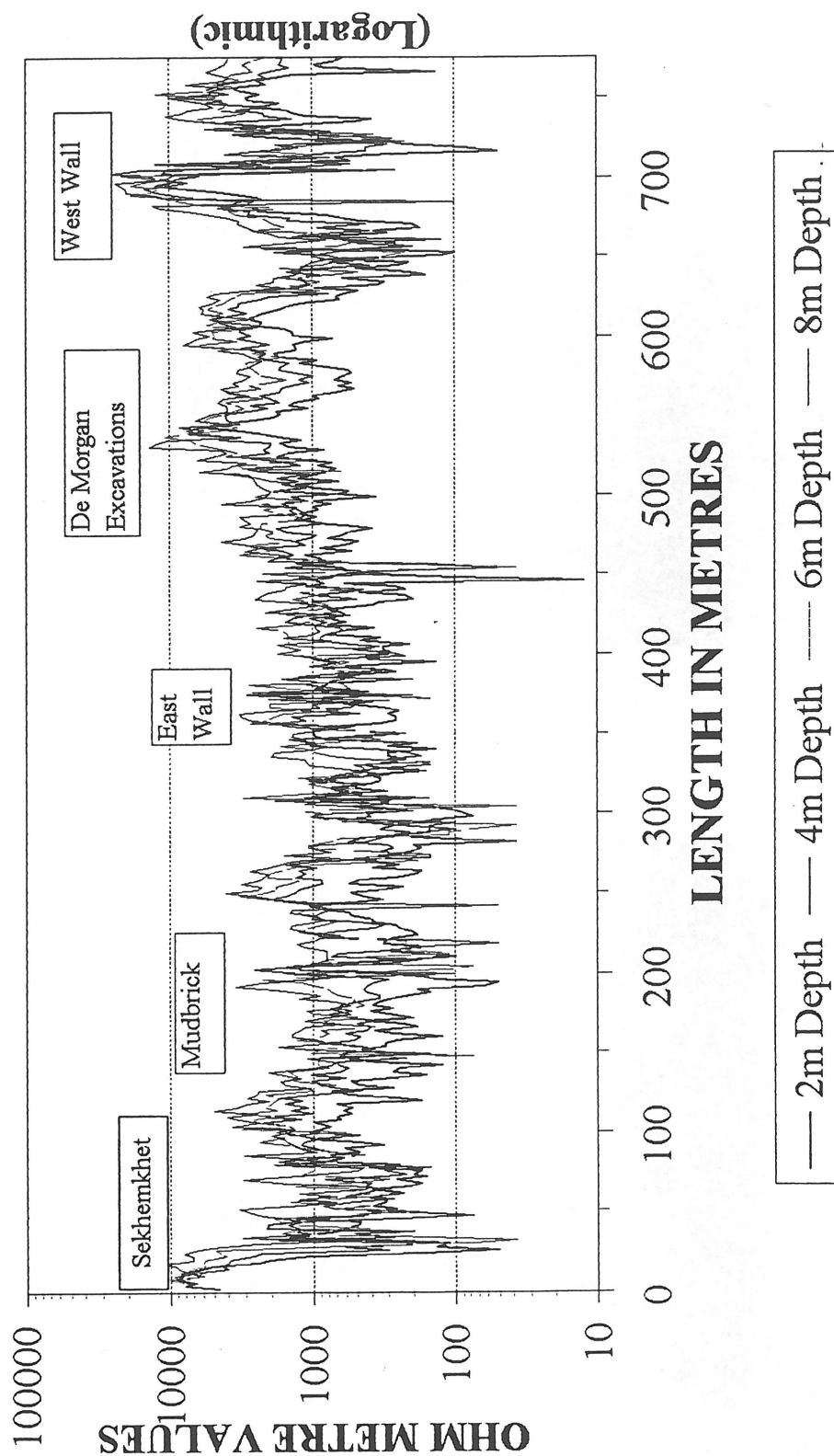
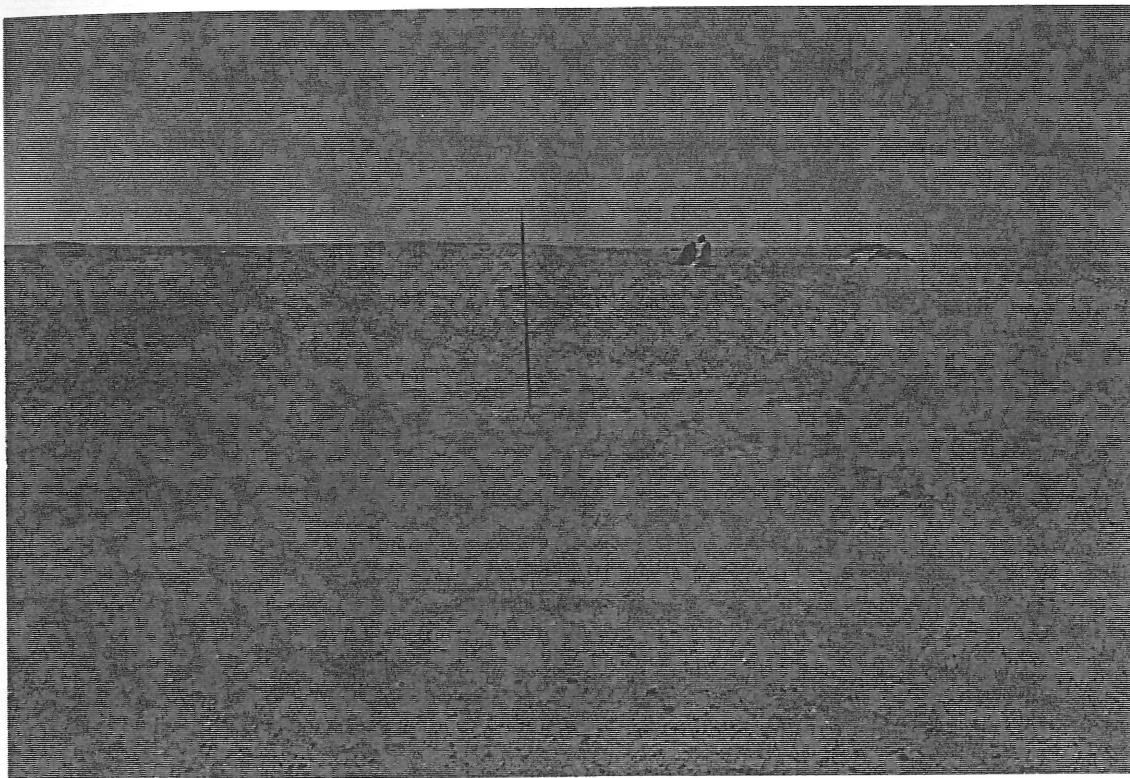


Fig.13



1. Anomaly GM90XS3-A8 *Sondage* A8WW
Looking West along the centre line of resistivity
cross-section GM90XS3

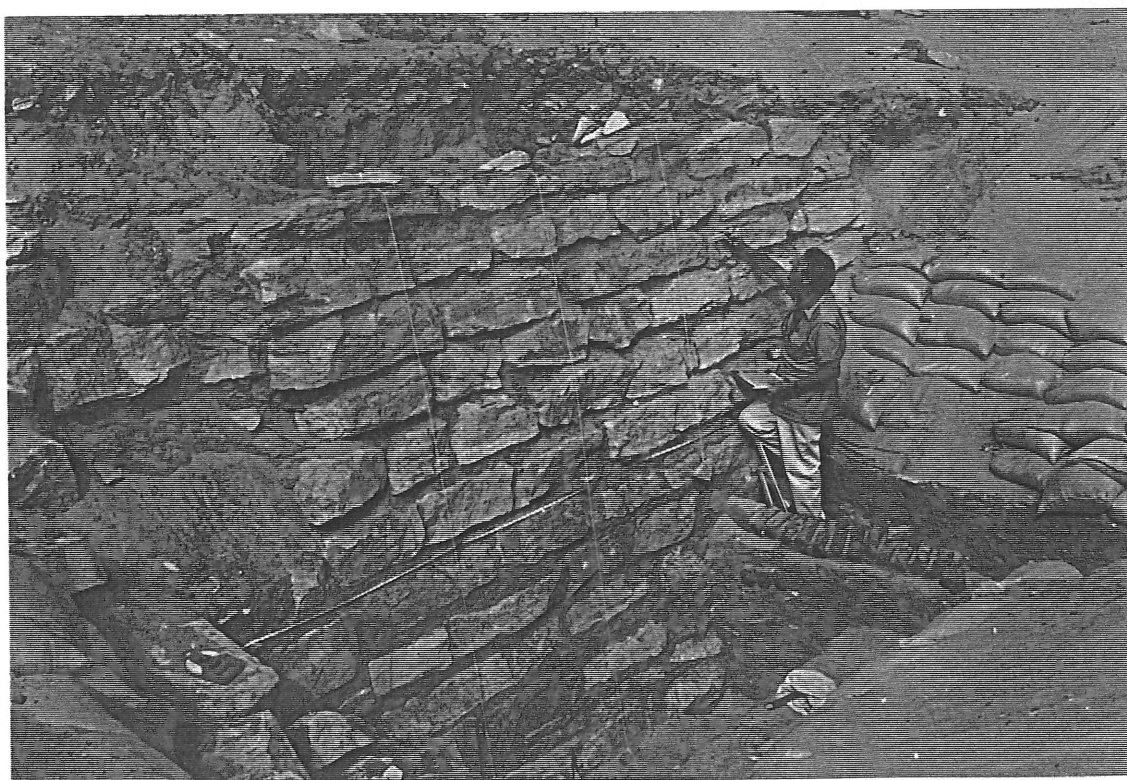


2. Anomaly GM90XS3-A8 *Sondage* A8WW
Looking North West with three courses of masonry exposed
and inner fill showing behind facing blocks



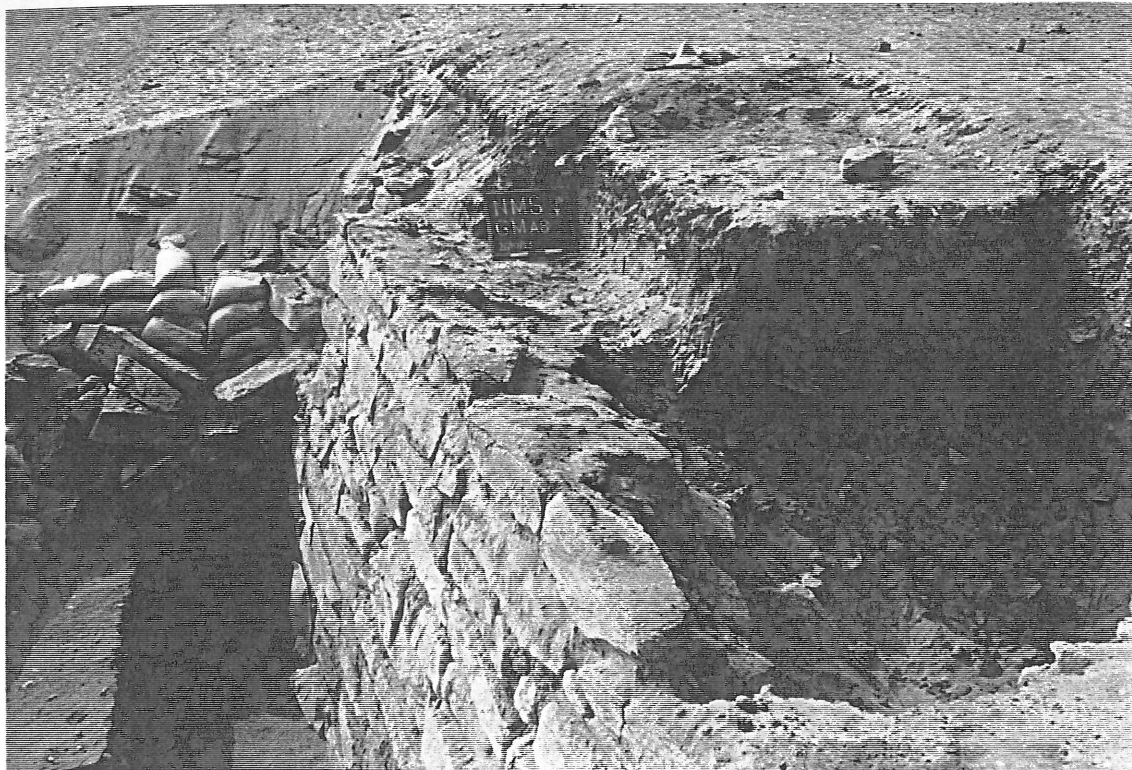
1. Anomaly GM90XS3-A8 Sondage A8WW

East face of wall with seven courses of masonry exposed and top of hard fill 3/4cms above lower edge of course



2. Anomaly GM90XS3-A8 Sondage A8WW

East face of wall with hard fill cut through to expose foundation course making 12 courses. Note mud brick found at various levels throughout the prepared hard fill which forms a buttress against the lower six courses



1. Anomaly GM90XS3-A8 Sondage A8WW

Looking South along wall with batter of 7deg inwards
of the facing blocks. Note angle of repose of the inside fill
made of prepared sand, mud brick, tafl and limestone fragments



2. Anomaly GM90XS3-A8 Sondage A8WW

East face of wall showing early building techniques with large masonry blocks
Collapse to South no doubt due to inadequate overlap of blocks on alternate courses

NATIONAL MUSEUMS OF SCOTLAND GISR EL MUDIR 1993

Diagrammatic Section of West Wall at Anomaly A8

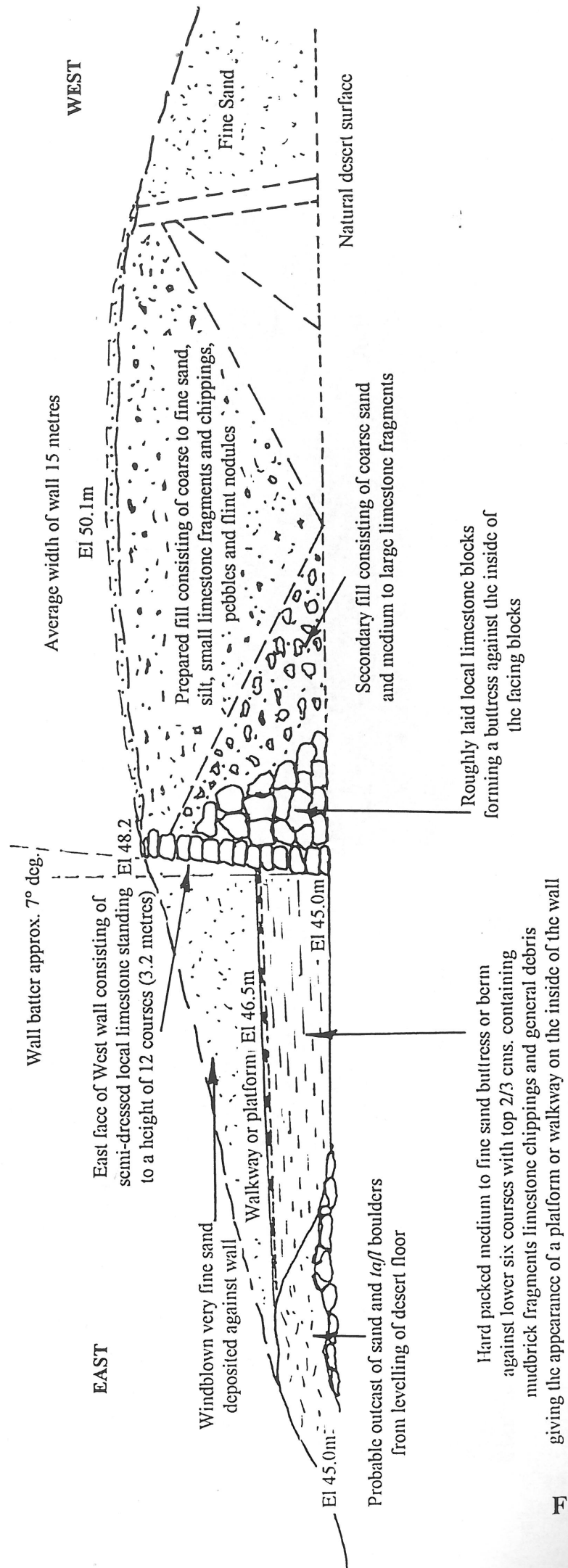
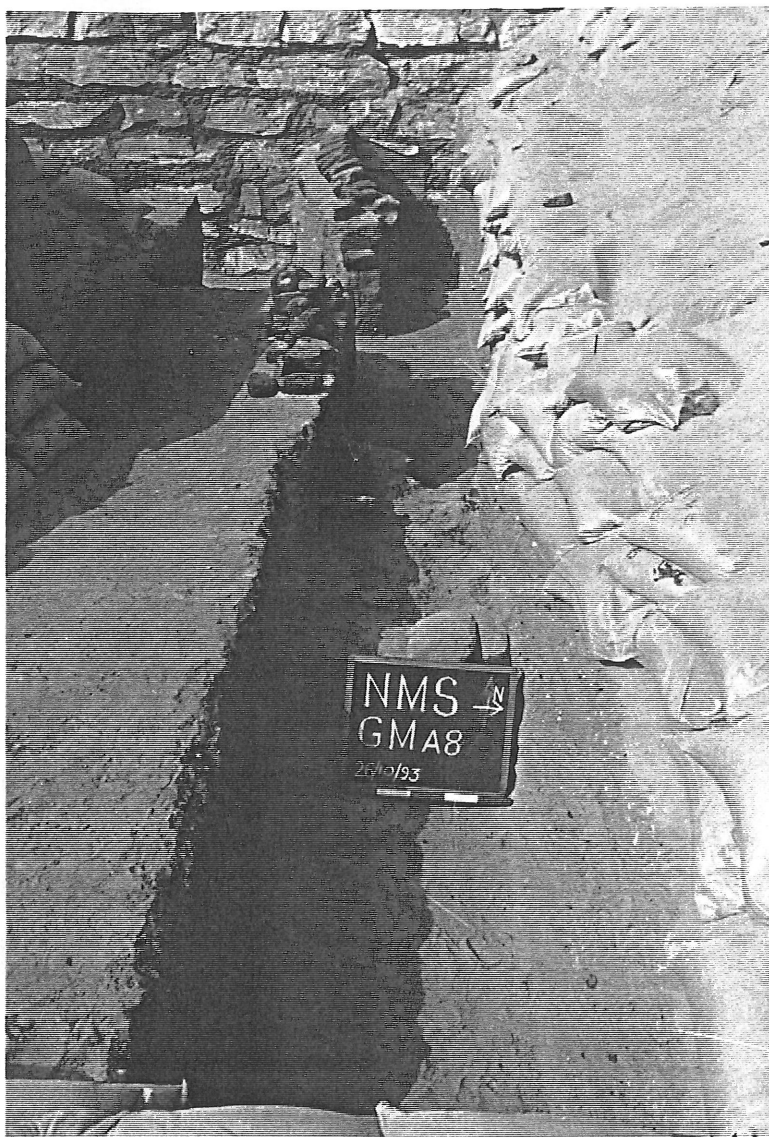


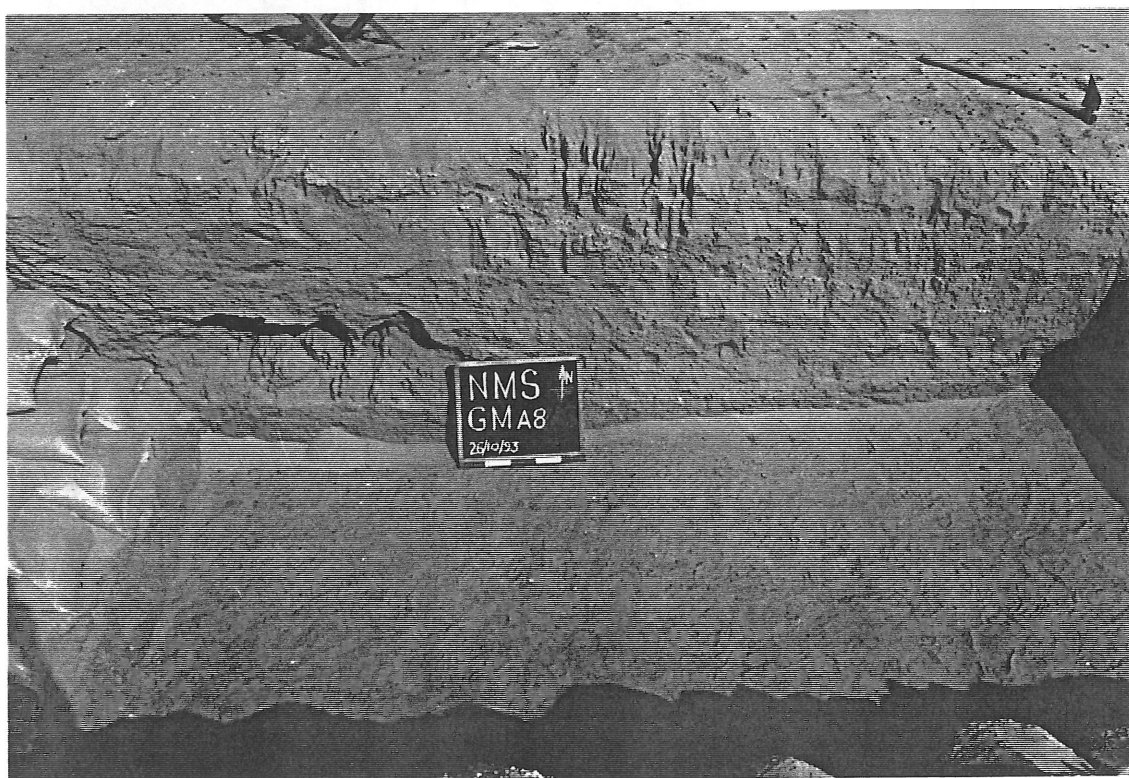
Fig.17



1. Anomaly GM90XS3

A8 Sondage A8WW

East face showing grey plaster pointing on first six courses which had been protected from erosion by the hard buttress fill. Note how fill stretches back from the wall over *tafl* boulders on desert floor



2. Anomaly GM90XS3-A8 Sondage A8WW

Prepared hard fill tapering out some 25 metres back from the wall (lower Eastern corner of section)

Fig.18

NATIONAL MUSEUMS OF SCOTLAND

Pseudo-section of profiles 90/203-206

Gisr el Mudir Anomaly GMA8WW/XS3

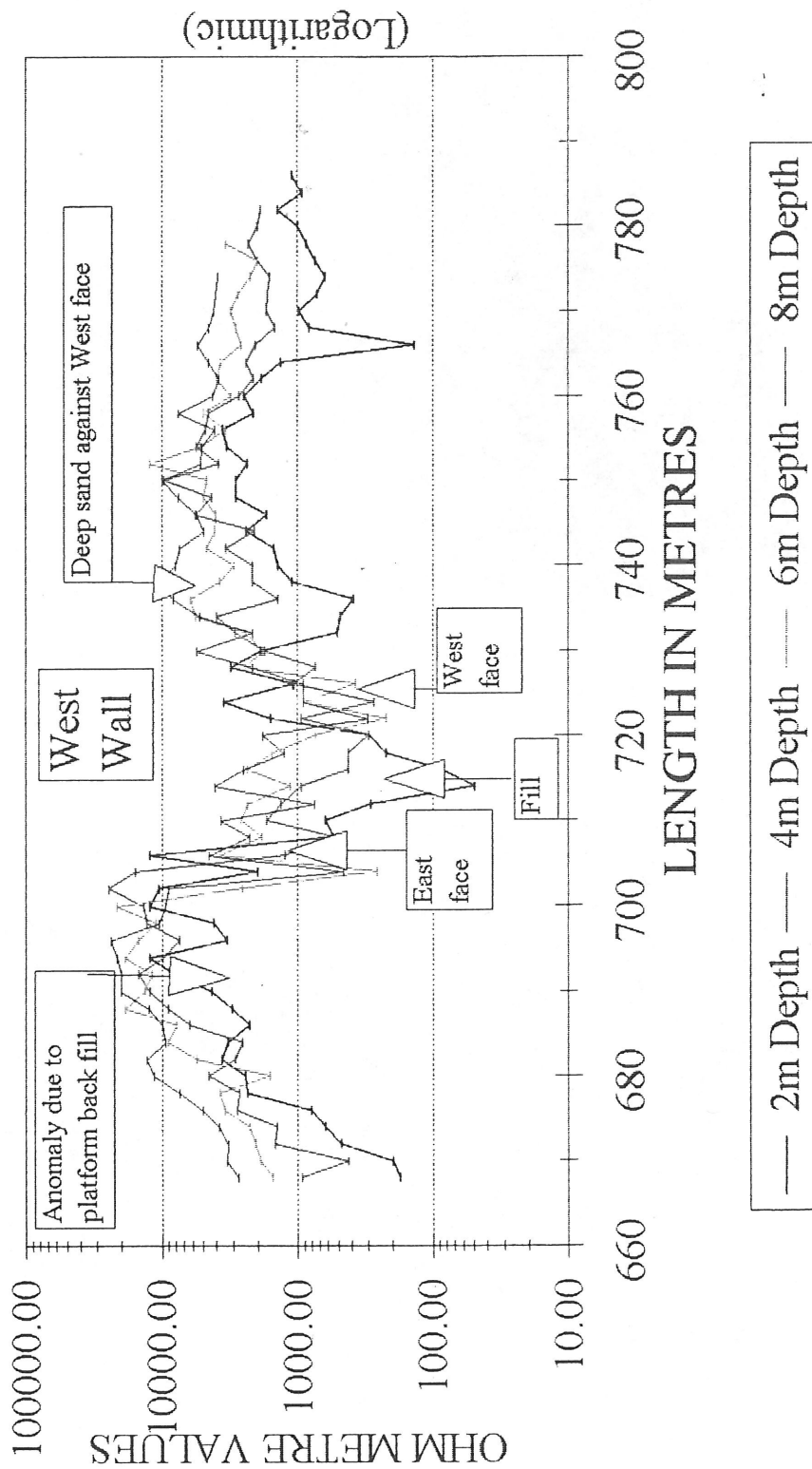
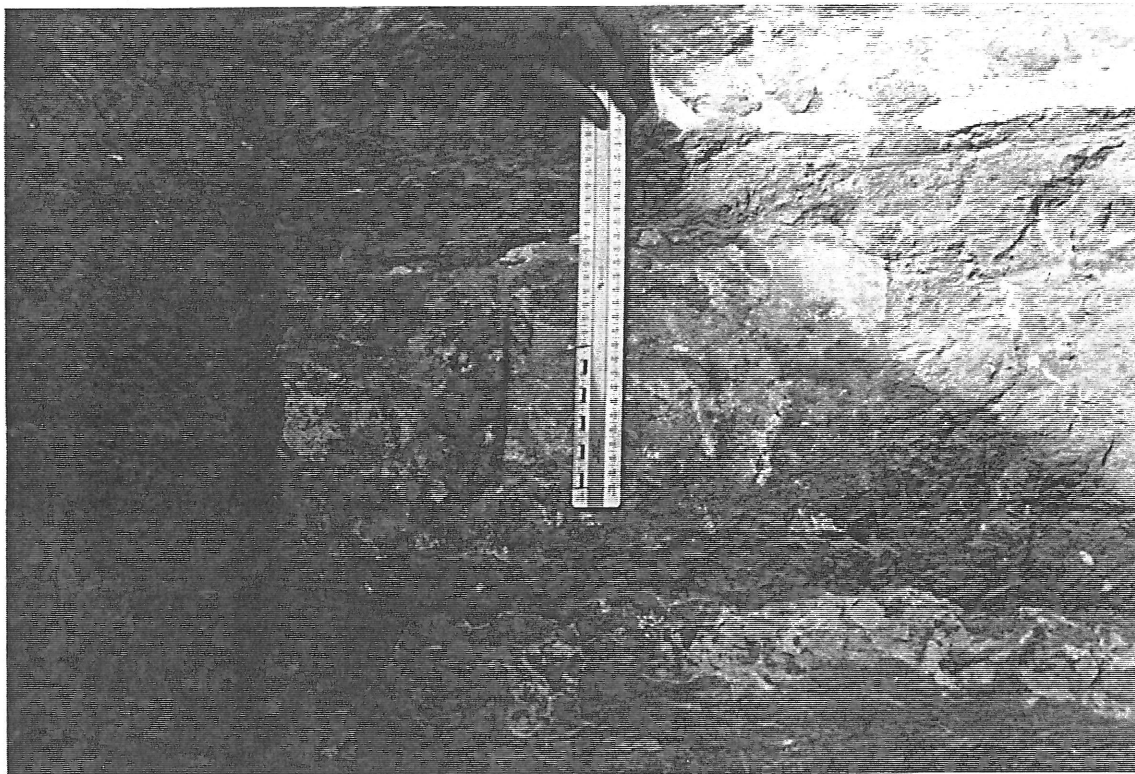
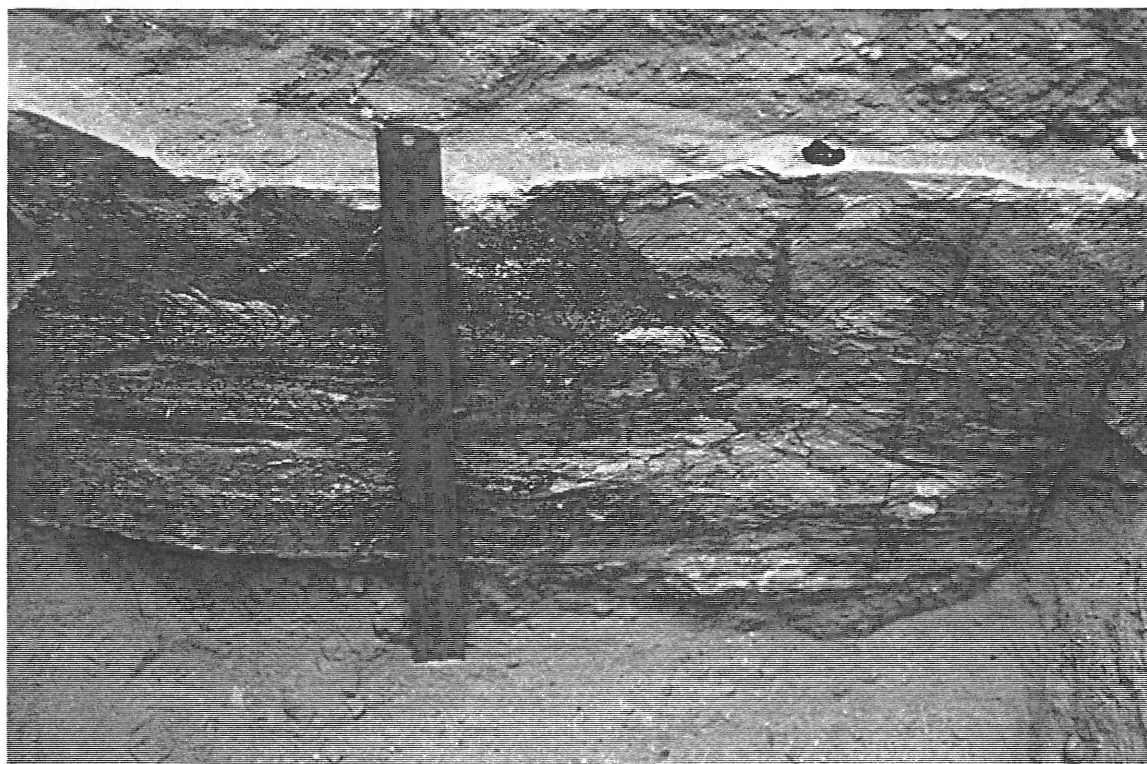


Fig.19



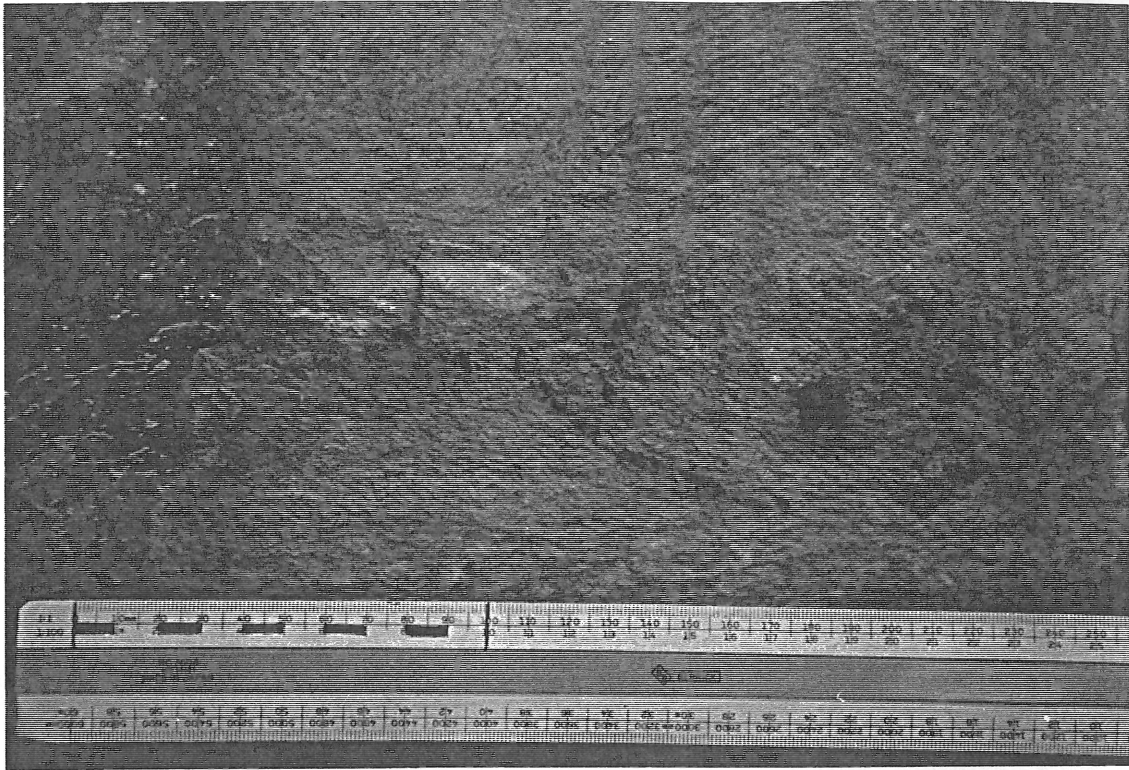
1. Anomaly GM90XS3-A8 Sondage A8WW

East face of wall Masons' wsr or wsr sceptre mark on 4th course from the base

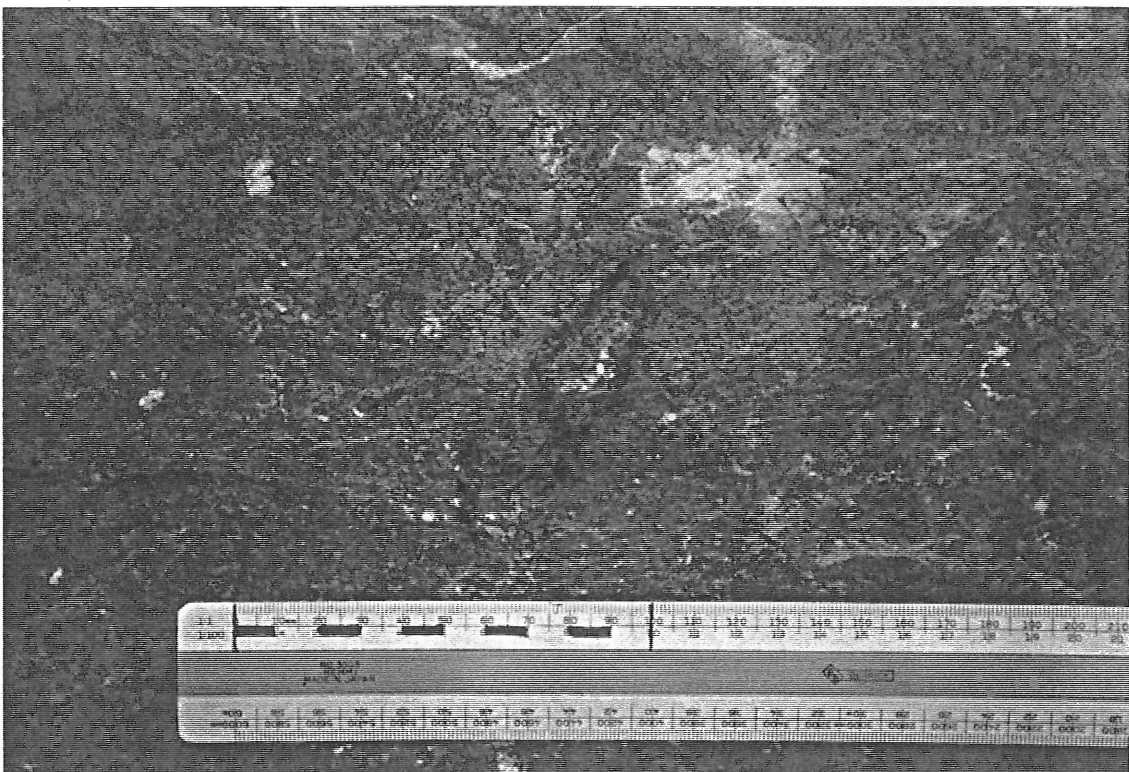


2. Anomaly GM90XS3-A8 Sondage A8WW

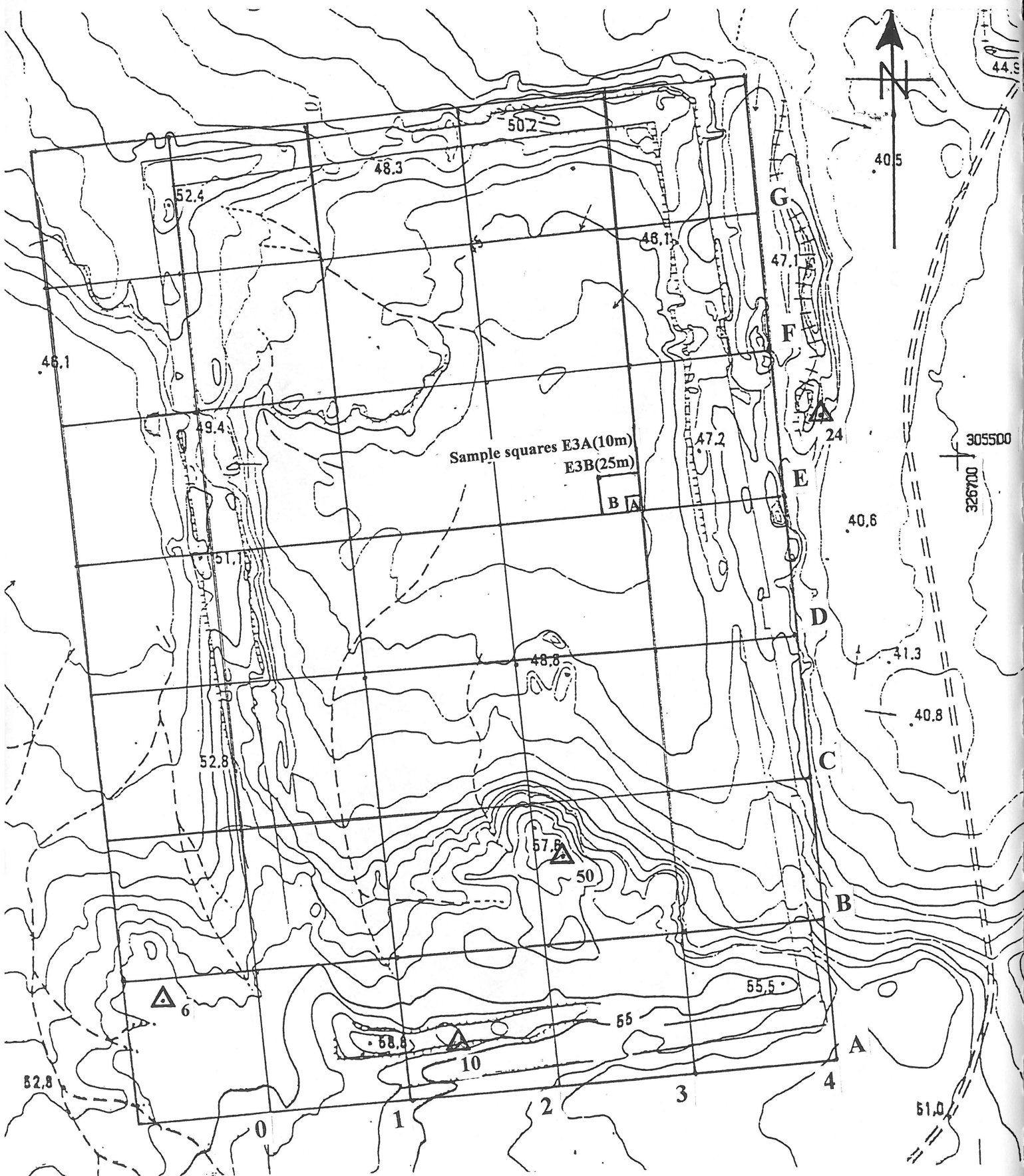
East face of wall Masons' njwl mark on the foundation course.
The course is laid on the desert floor without mortar or special cutting
which is probably the reason for the prepared fill buttress



1. Anomaly GM90XS3-A8 Sondage A8WW
East face of wall showing *graffito* on foundation course



2. Anomaly GM90XS3-A8 Sondage A8WW
East face of wall showing *graffito* on foundation course



NATIONAL MUSEUMS OF SCOTLAND
GISR EL MUDIR 1993
Surface Pottery Survey Grid
UTM Grid Scale 1: 3500

Fig.22

Gisr el Mudir 1993 Ceramic Surface Survey

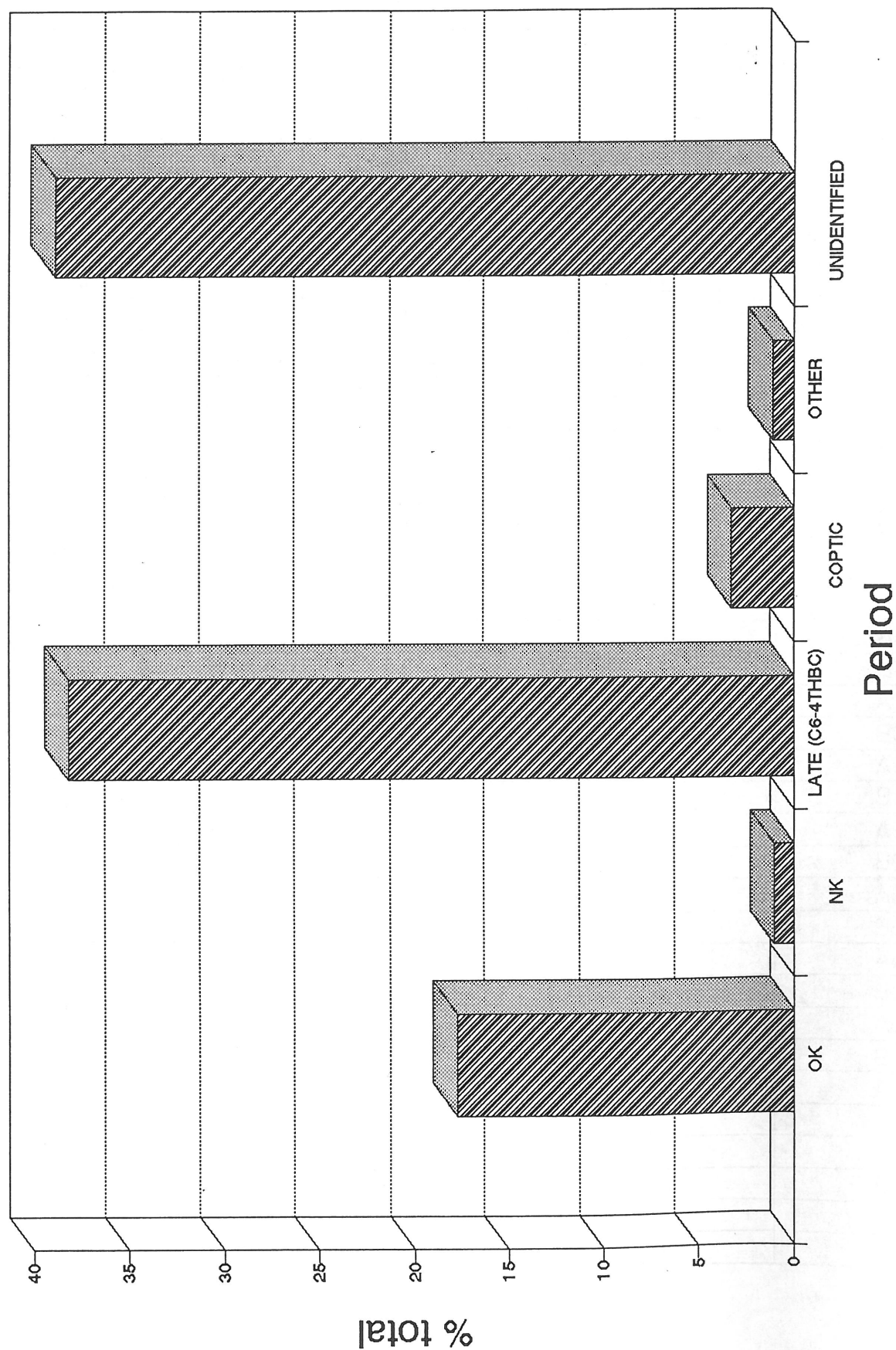


Fig.23

CERAMIC SURFACE SURVEY
GISR EL MUDIR 1993

SQUARE	OK	NK	LATE (C6-4THBC)	COPTIC	OTHER	UNIDENTIFIED	TOTAL
A0A							0
A0B	1			11		5	17
A1A			2				2
A1B	1		6				7
A2A		1				2	3
A2B			3	4		6	13
A3A						2	2
A3B	2					4	6
A4A			2			4	6
A4B	1		2			11	14
B0A			1	3		2	6
B0B			2			6	8
B1A						2	2
B1B	7					2	9
B2A						2	2
B2B			6			1	7
B3A							0
B3B							0
B4A	5					1	6
B4B	20		1			7	28
C0A							0
C0B			4			5	9
C1A						1	1
C1B							0
C2A						1	1
C2B	1					1	2
C3A						4	4
C3B				1		11	12
C4A	10					3	13
C4B	2					26	28
D0A						2	2
D0B						7	7
D1A					1		1
D1B						1	1
D2A						1	1
D2B	4		2		6		12
D3A						4	4
D3B	2		17	1		77	97

Fig.23a

NMS Preliminary Report

D4A					1	9	10
D4B	10				1	7	18
E0A	1			1			2
E0B							0
E1A						4	4
E1B						19	19
E2A			1		1	2	4
E2B	4		5			9	18
E3A			35			7	42
E3B	2	5	123	7		36	173
E4A	4					3	7
E4B	6		2			6	14
F0A						2	2
F0B	1						1
F1A							0
F1B							0
F2A						2	2
F2B						1	1
F3A			7			6	13
F3B			38			5	43
F4A	6					3	9
F4B	50		2			6	58
G0A	2					2	4
G0B				1			1
G1A							0
G1B			4	1		1	6
G2A			6			3	9
G2B	7	1	73			18	99
G3A	2		11	1		5	19
G3B			17	1	1	12	31
G4A							0
G4B	23	3	2			12	40

Grand Total	174	10	374	32	11	381	982
% of Total	18	1	38	3	1	39	

Fig.23b

Gisr el Mudir 1993
Ceramic Surface Survey

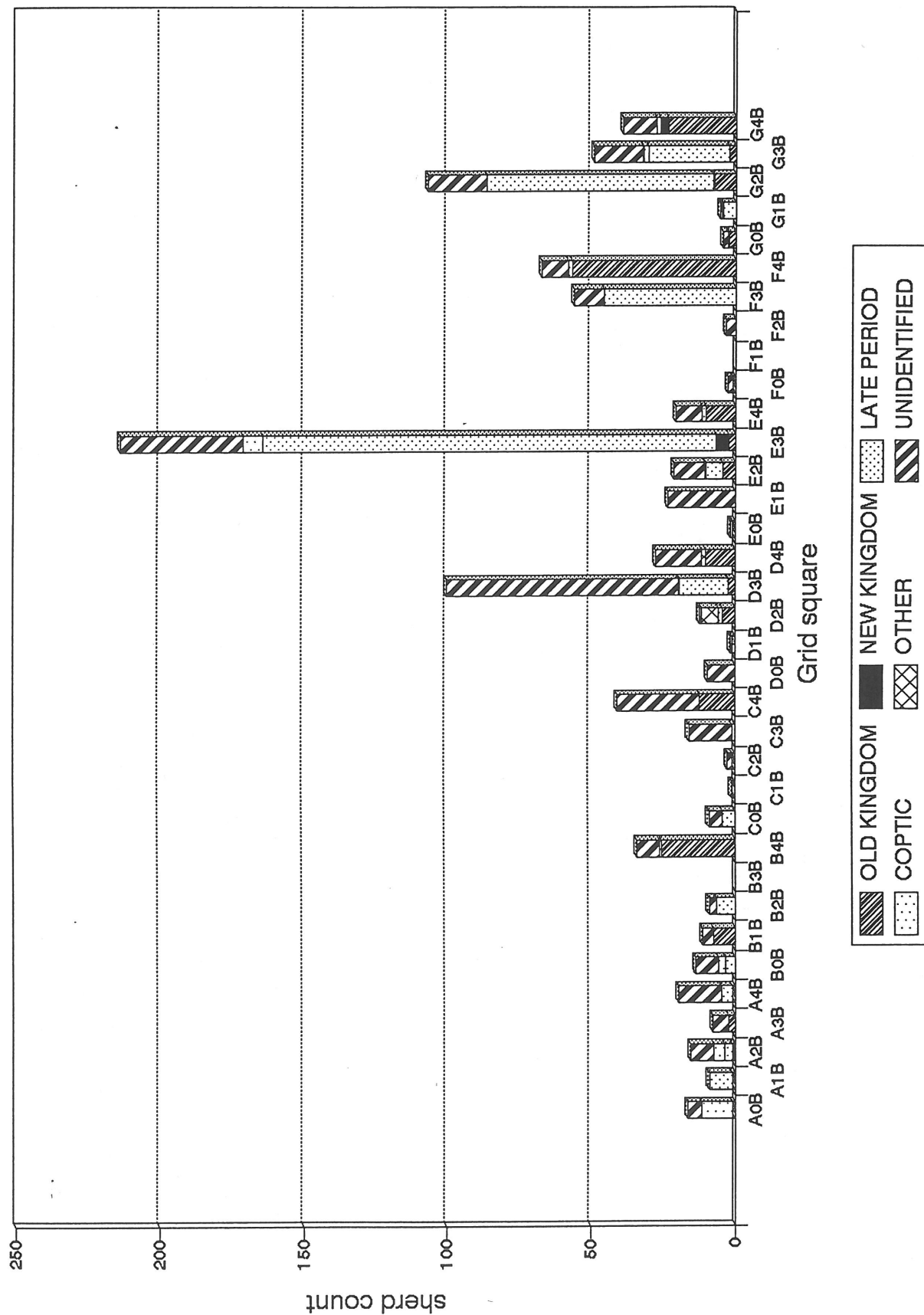


Fig.24

CERAMIC SURFACE SURVEY
GISR EL MUDIR 1993

SQUARE	OK	NK	LATE (C6-4THBC)	COPTIC	OTHER	UNIDENTIFIED	TOTAL
A0B	1			11		5	17
A1B	1		8				9
A2B		1	3	4		8	16
A3B	2					6	8
A4B	1		4			15	20
B0B			3	3		8	14
B1B	7					4	11
B2B			6			3	9
B3B							0
B4B	25		1			8	34
C0B			4			5	9
C1B						1	1
C2B	1					2	3
C3B				1		15	16
C4B	12					29	41
D0B						9	9
D1B					1	1	2
D2B	4		2		6	1	13
D3B	2		17	1		81	101
D4B	10				2	16	28
E0B	1			1			2
E1B						23	23
E2B	4		6		1	11	22
E3B	2	5	158	7		43	215
E4B	10		2			9	21
F0B	1					2	3
F1B							0
F2B						3	3
F3B			45			11	56
F4B	56		2			9	67
G0B	2			1		2	5
G1B			4	1		1	6
G2B	7	1	79			21	108
G3B	2		28	2	1	17	50
G4B	23	3	2			12	40

Grand Total	174	10	374	32	11	381	982
% of Total	18	1	38	3	1	39	

Fig.24a

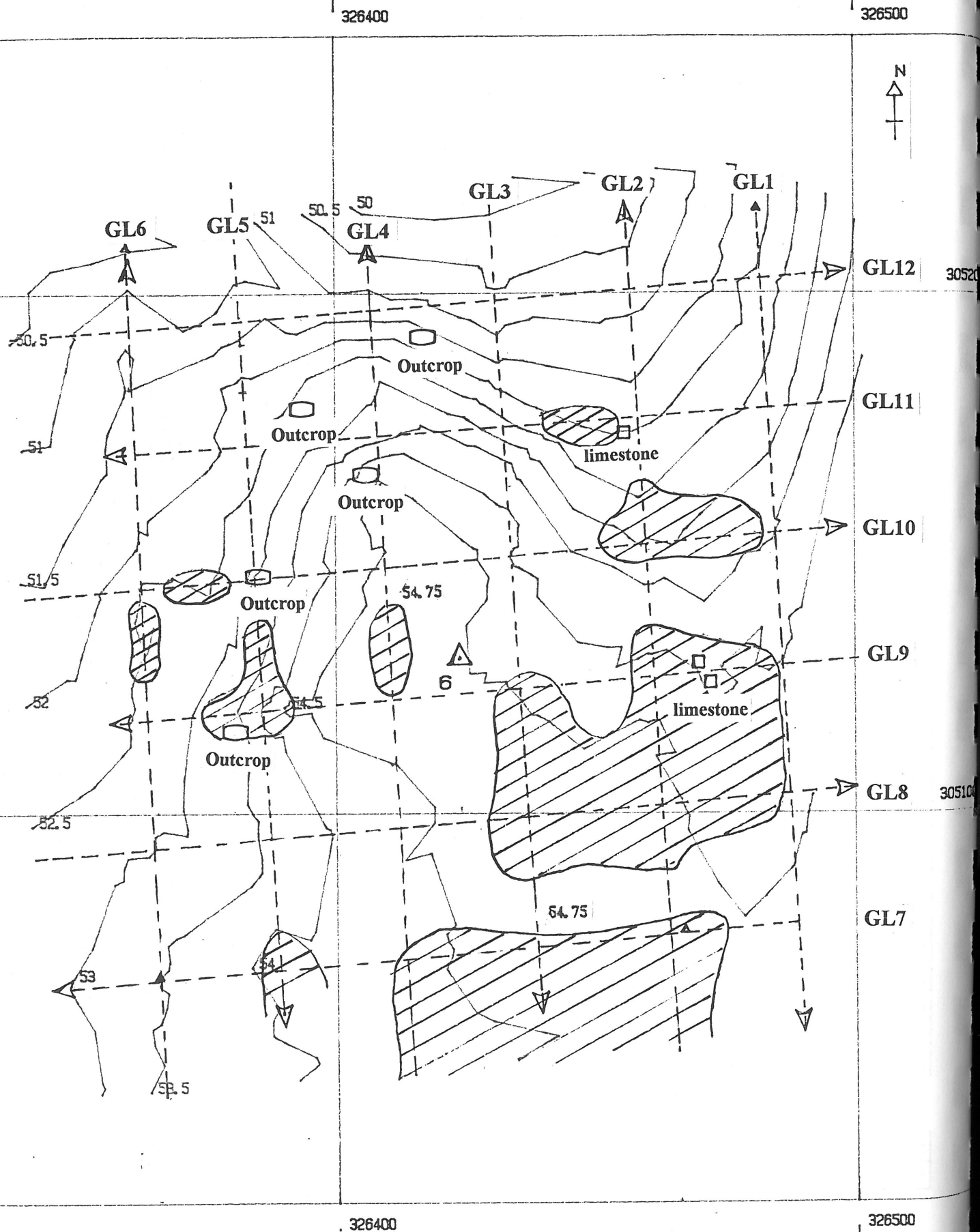


Fig.25

NATIONAL MUSEUMS OF SCOTLAND
GISR EL MUDIR 1993

Plan showing anomalies in area MT2

Resistivity lines

Anomaly areas

UTM Grid

-----GL9



Scale 1: 1000

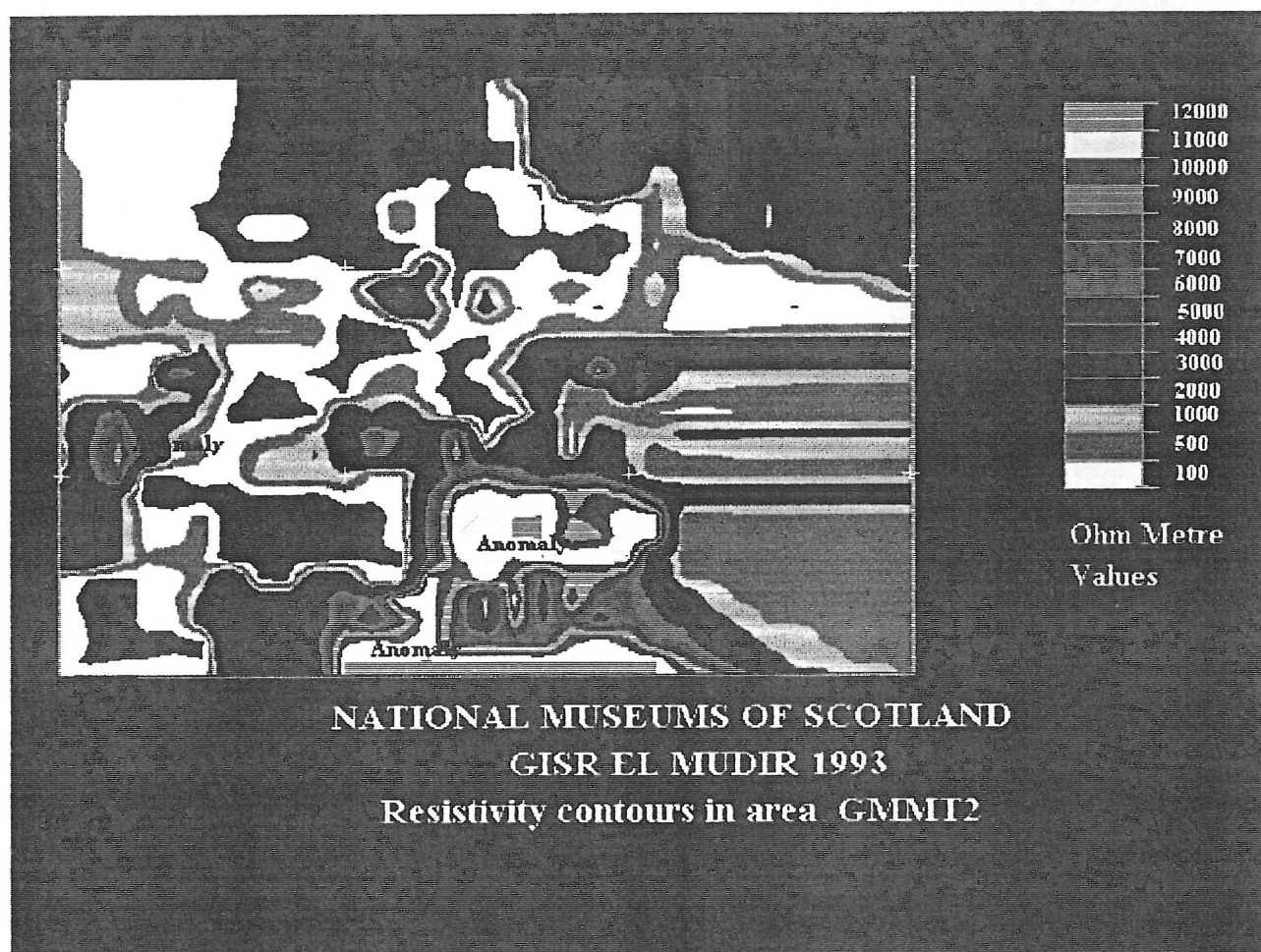
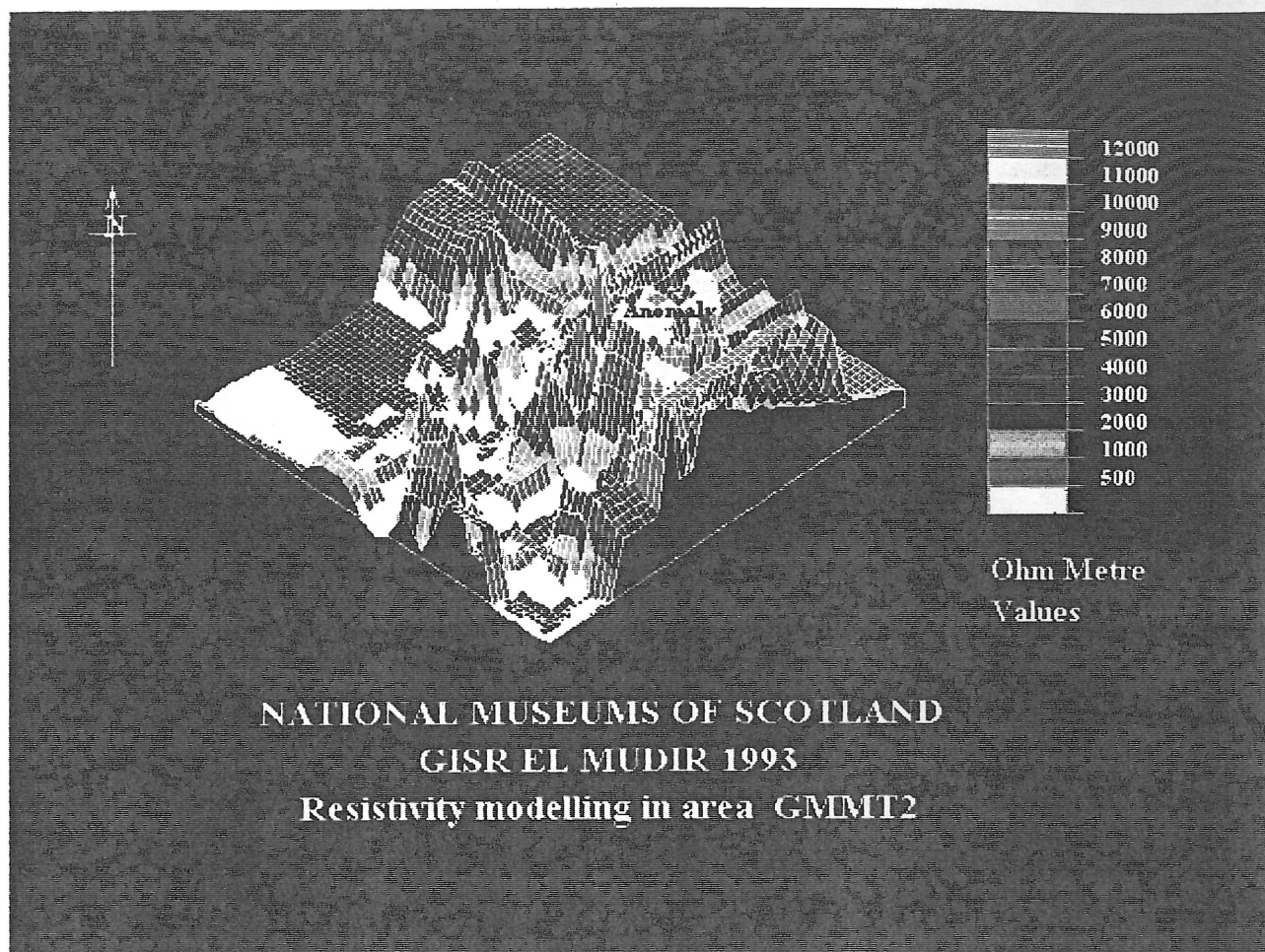


Fig.26