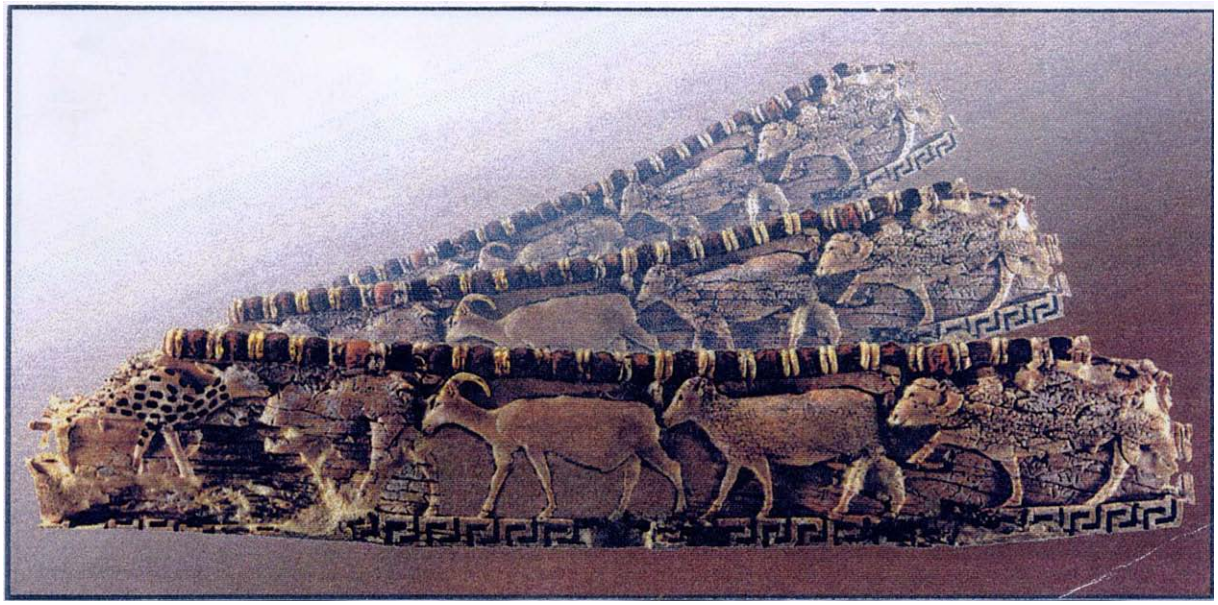
THE KERKENES DAĞ SURVEY



PRELIMINARY REPORT ON THE 1997 SEASON

Geoffrey and Françoise SUMMERS

NOT FOR PUBLICATION

THE KERKENES DAĞ SURVEY

Preliminary Report on the 1997 season

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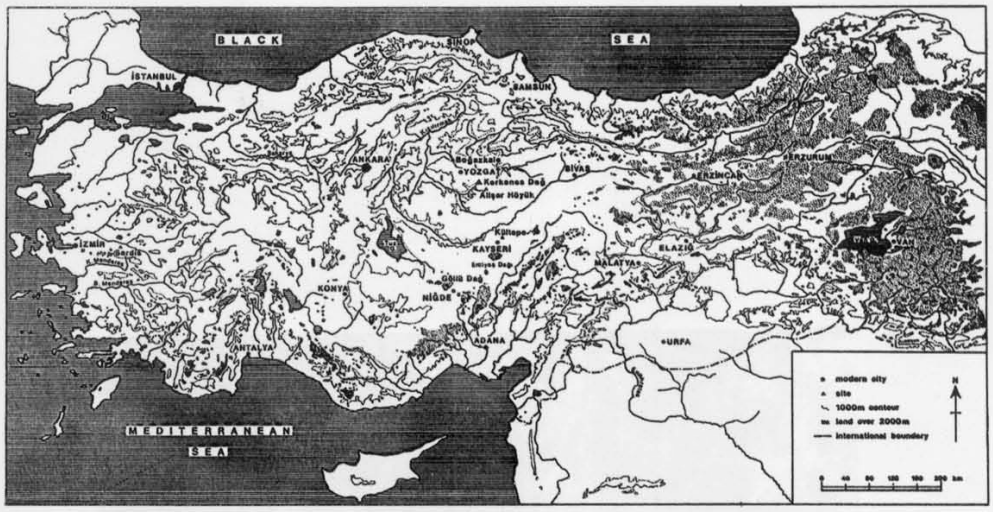
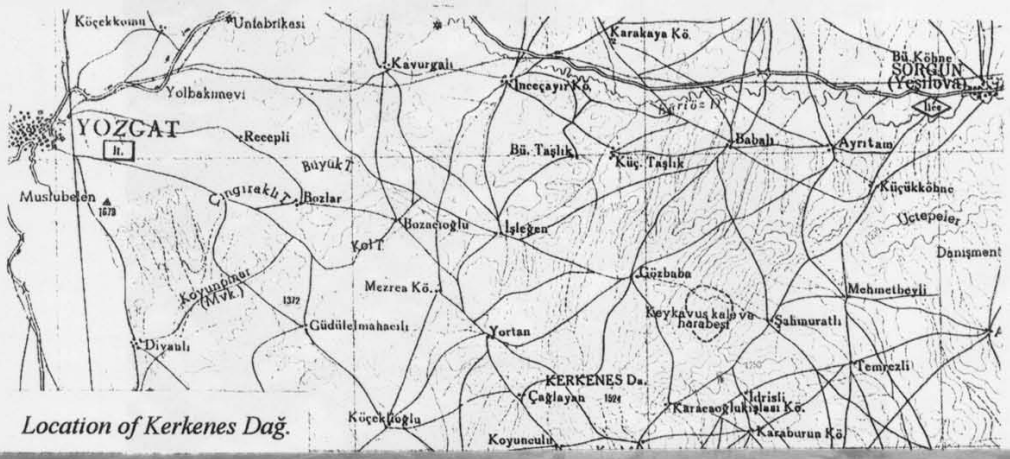
http://www.metu.edu.tr/home/wwwkerkfindex.html





Location of Kerkenes Dağ.

The Landsat Thematic Satellite Image provided by MTA combined with a Digital Terrain Model graphically potrays the relationship between the location of the city and the landscape. Images prepared by Onur Kose (Dept. of Geology, Hacettepe University).

ACKNOWLEDGEMENTS

The fifth and final field season of the first phase of the Kerkenes project took place during August and September 1997 under the auspices of the British Institute of Archaeology at Ankara (BIAA). Once more it is a pleasure to thank participants, sponsors and friends for all the enthusiastic support, donations, hard work and encouragement.

We wish to thank the General Director and staff of the General Directorate of Museums and Monuments and Mr Musa Ozcan, Director of the Yozgat Museum, for continuing help and encouragement. The Vali of Yozgat, Mr Naflz Kayali, the Director of the Yozgat office of the Ministry of Culture, Mr Veyis Sanal and the Kaymakam of Sorgun, Mr Ekrem Yaman, renewed their support. We are greatly indebted to our representative, Mr Ugur Terzioglu of the Samsun Museum, for his enthusiastic participation and assistance. The village of Sabmuratli and its Muhtar, Mr Osman Muratdasi, again extended its friendly hospitality and the expedition house offered the facilities and friendly atmosphere essential to the good progress of work. Special thanks are due to Dr. Sevket Bagci and to the house staff without whom running the expedition would have been an impossible task.

Grants for 1997 were awarded by the British Academy and the BIAA. The donation, from Yibitas Lafarge, of a powerful Intergraph computer and a grant for a research assistant will enable the progress of the post-survey processing of data at METU. An educational copy of Intergraph GIS software package was bought with an anonymous donation. Scans of photographs were made at the Dept. of Graphic Design, Bilkent University, with the kind cooperation of Prof Dr. Bulent Ozguç, at TAI Inc. and the BIAA; Mr Zeki Sagay of MNG Inc. oversaw the production of an orthophoto, the digital camera was donated by Nurol Inc. and an eight page colour brochure, primarily intended for PR and fund raising, was printed for the project by the Is Bank. Much valuable help in kind came from Core Resources Management, the Galata Hotel - Yozgat, Hilton Ankara, Intergraph, MESA Inc., METU, Metis-Balfour Beatty Joint Venture, Sheraton Ankara, Sokkia Seza, Yenigun 1nsaat and Yimpas. Dr. Ronald Gorny, Director of the Alisar Project, loaned equipment. Dr. Attila çiner and Onur Köse, from the Geology Department of Hacettepe University produced images combining the Digital Terrain Model with the Landsat Satellite Image provided by MTA.

We were pleased to welcome again Simone Korolnik, our conservator, whose meticulous work last autumn on the conservation of the ivory can now be admired in the new gallery of the Museum of Anatolian Civilisations in Ankara. Special thanks are due to the Museum Director, Murathan Temizsoy.

Scott Branting, Director of the GIS Office, Oriental Institute Chicago, undertook the GPS survey with equipment loaned by the 01. Survey of the city defences was completed by Nilüfer Baturayoslu, and the detailed study of gates by Omur Harmansah. Christine Perrier was largely responsible for co-ordinating the cadastral survey and her contribution as research and publication assistant continues to be essential. Graphics and electronic data management continue to progress thanks to the efforts of Levent Topaktas and Deniz Kutay. Graphic design and the World Wide Web page remains the responsibility of Jakub Michalski, a graphic design student at Bilkent University. Prof Dr. Mete Nakiboglu and Dr Mustafa Turker are supporting post-survey GIS analyses under the umbrella of the newly established Graduate Programme for Geodesics and Geographical Information Technologies (METU). Geological and geomorphological studies were carried out by Prof. Dr. Ayhan Erler, Kadir Dirik, Piril Onen (METU) and Christine Perrier. Nahide Aydin, who has participated in every season since the start of the project, has become an essential member of the team. Other team members played invaluable roles: Kamyar Abdi, Jennifer Alcock, Fiona Armitage. Stevan Beverley, Katherine Geers. Andrew Goldman, Ivgeniya Grigoriev, Zenia Hüserich, Pen Johnson, Torben Larsen, Jared Miller, Jennifer Ross and Stine Rossel. The team, truly international, was drawn from the Universities of Bilkent, Chapel Hill, Chicago, Copenhagen, London, METU, Michigan, Sheffield, Tel Aviv and UCLA.

Dr. Lewis Somers, GEOSCAN, designed geomagnetic sampling strategies and image processing from data collected by Ibrahim ciftci. Some team members took up the opportunity to develop skills in geophysical survey with commendable success.

A BIAA supplementary grant was awarded to Dr. Wendy Matthews for study of the samples that she took for micromorphological research during the 1996 season.

Of the many who freely gave advice and encouragement special thanks are due to Prof Crawford H. Greenewalt Jr., Dr. David French, Dr. Roger Matthews and Prof Henry T. Wright Jr.

AIMS

The aims of the 1997 season at Kerkenes were:

1. To complete the cadastral survey of the ancient city, probably to be identified with the Median city of Pteria (Summers, 1997) (Figs 1-9).
2. To complete plans and written description of the city defences (Figs 1, 10-12).
3. To complete plans and written descriptions of the zone of "public monuments" at the southern end of the city (Figs 13-14).
4. To complete conservation, drawing and photography of finds from the 1996 test trenches and from earlier seasons of survey (Figs 15-19).
5. To carry out limited geophysical survey as an aid to software development and to answer questions relating to function and architecture of specific complexes (Figs 13, 20-2 1).
6. To experiment with kite photography in order to obtain additional low level photographs for the rectified mosaic (Fig. 1).
7. To continue geological and geomorphological study.
8. Collection and study of Hellenistic to Byzantine pottery from the surface of the Kale and Kiremitlik.
9. To make substantial progress towards the preparation of a monograph and a number of specialised academic papers.

All the aims were totally or very largely achieved, despite an ambitious programme of research. The season was only marred by a bad accident with the BJAA Landrover that forced two of the team members to leave early for medical treatment. Although the vehicle was written off, injuries were comparatively minor and everyone involved has made a complete recovery. We would like to take this opportunity to thank the BJAA, its Ankara staff, and particularly its Director, Dr. Roger Matthews, for considerable help and great understanding concerning the accident, especially during the crucial few days when the extent and seriousness of the injuries sustained was awaiting expert medical diagnosis, first in Ankara and subsequently in the USA and Switzerland.

NEW INITIATIVES

1. Use of a Global Positioning System ('GPsS).

GPS was used to make a detailed topographic map of the Kale and surrounding slopes (Fig.
3). It was then possible to drape the rectified photographic images and the measured plan of the castle walls over this image (Fig. 4). The next stage will be three dimensional representation and creation of a virtual reality fly through, a procedure that involves conversion of the site grid to be compatible with the UTM grid used by the GPS. This conversion and overlaying of the different layers of data is being done through *Microstation* in the Middle East Technical University Institute for GIS (Geographical Information Systems). The GPS survey was carried out under the direction of Mr Scott Branting, Director of the GIS laboratory at the Oriental Institute, Chicago, with equipment and software that Mr Branting kindly arranged for the Project to borrow. Photographic rectification using AERIAL V and combination of data sets in *Microstation* is being carried out by Ms Deniz Kutay, with help from the Project computer systems consultant, Mr Levent Topaktas from Intergraph Inc.

2. *Very high sample density geomagnetic survey.*

Two 40 x 40m grids were surveyed at high sample density to assist with software development, elucidation of specific architectural and other cultural problems and future research design at Kerkenes (and elsewhere) being developed by Dr. Lewis Somers of GEOSCAN (Figs 20-2 1).

3.Collection and study of Hel/enistic to Byzantine sherds.

Collection and study of Hellenistic to Byzantine sherds from the Kale and the Kiremitlik undertaken by Mr Andrew Goldman, in connection with his wider doctoral study of late Roman and early Byzantine material in northern Anatolia. The Kerkenes material is being prepared for publication by Mr Goldman.

4. Kite Photography.

Experimental kite photography enabled to obtain further low level photography for ongoing completion of the rectified photographic mosaic (Fig. 1).

RESULTS

1. *Cadastral survey.*

Cadastral survey concentrated on those steeper and more difficult areas of the site that, for logistical reasons (steepness of slope, proximity of bed-rock to the surface and large bed-rock outcrops, erosion of cultural features), will not be subject to large area geophysical survey in future seasons, and on the zone of "Public Buildings" in order to resolve particular functional and architectural problems. The preliminary results are shown on Figs 5-9. The programme of interpretation of these results and the combination of the cadastral plans with geophysical data and rectified balloon photographs will continue through the winter and spring of 1997/98. Completion of the city map, showing communication routes, urban zoning, water resources and management is within sight. A longer term goal, spatial analysis leading towards an increased understanding of the urban dynamics through GIS is also underway.

A number of points have been confirmed or become clearer during the course of the season:

(i) all of the urban space was being utilised by the time of the catastrophic fire (? at the hands of Croesus *c. 547* BC) that brought the life of the city to an abrupt end;
(ii) the intensity of the destructive fire, seen in test trenches dug in 1996, extended over the whole of the city;
(iii) erosion has denuded much or all of the cultural material from the steeper slopes, with the exception of stone wall foundations.

The substantial preliminary report published in *A nato/ian Studies* for 1996 will require only minor modification, but considerable addition and expansion (which is, after all, the whole point of continuing the field work), but is essentially correct in all matters of importance, e.g. the absence of internal defensive walls, the date of the destruction, the architectural affinities (or lack there of), the nature of the city as a new imperial foundation, the division into urban blocks as a result of centralised division of urban space and its enclosure **(=** city planning).

2. *City Defences.*

Completion of the detailed plan of the city defences, with individual plans and descriptions of the city defences was fully achieved (Figs 10-12).

A major discovery was a new gate on the eastern side of the north-east section of the city wall, described in detail below. It is now thought probable that the "Water Gate" was not in fact a gate but a very heavily fortified section of the city defences at the weakest point in the circuit. If there was a gate here it can only have been a foot passage. The total number of city gates would thus appear to have been seven, a number that might well have had special significance. Specific architectural questions concerning the gates have been at least partially answered, particularly the way in which the sloping glacis that encloses the outer face of the defensive system at the gates has been resolved. In general, the unique form and skilful military design of each gate that incorporated the naturally defensible advantages of each individual position and its topography have been further elucidated. An outstanding problem is the width of the gate-passages, averaging about 8m, and how the superstructure of the gates was carried, or intended to be carried over them. Only partial clearance of a gate will eventually answer this question.

3. *Zone of "Public Monuments ".*

Planning and description of the "public zone" (Figs 13-14), comprising the "palace complex", the stone-lined Sülüklü Göl (leech pond), "imperial stables" or "store houses", the approach from the "Cappadocia Gate", the "military area", the "administrative block", the "polo field" and associated structures and the "stone circle" was completed.

The survey was carried out by a combination of techniques that included ground truthing balloon photographs, flagging and surveying walls visible on the surface, and further geomagnetic mapping. Specific goals were: (a) to ascertain whether the features that appeared on previous incomplete geomagnetic maps of the street leading from the "Cappadocia Gate" to the façade of the "Palace Complex" required a re-interpretation of this area and, (b), to see if there were any ancient structures in front of the putative monumental entrance to the "Palace Complex" which might have necessitated a re-interpretation.

A preliminary description and discussion is provided below (Appendix 1). This has greatly enhanced our knowledge and understanding of this huge and critical area of the city.

4. *Object Conservation, Drawing and Photography.*

Conservation of all material from every season was completed in spite of the early departure of our conservator, Ms Simone Korolnik, as a result of the traffic accident. We were also pleased to have been able to clean and restore a small number of Early Bronze Age decorated pottery vessels from the rescue excavations at Mercimek Tepe (Yozgat city) conducted by Sayin Musa Ozcan, Director of the Yozgat Museum.

All the material from Kerkenes itself was drawn and photographed, in colour, black and white and much of it, for the Kerkenes World Wide Web page, with a digital camera. Most of the pottery from the regional survey has also been drawn. Outstanding is an expert examination of the iron pieces excavated in the "columned hail" in 1996 (probably wheel parts), and a very small amount of object photography.

5. *Geophysical Research.*

Geomagnetic survey was carried out over two 40 x 40m grids (Fig. 20) at a sample density of 8 readings per meter at 0.25m intervals in parallel (not zigzag) so as to provide the best possible data set for the development of processing software and also future sampling strategies at Kerkenes. The significance of this work for the development of geophysical data processing goes beyond Kerkenes itself which is a natural laboratory for the development of these techniques. The images on Fig. 20 were processed in the field, Lewis Somers is currently reprocessing this data together with that from previous seasons, in his pre-release version of GEOPLOT 3. Much greater clarity is anticipated, together with the re-evaluation of features not yet readily apparent.

The two areas selected for this intensive survey were chosen because coarser sample density collection in 1996 had shown that there were well preserved sub-surface remains that yielded signals not obscured by geological features or by really massive destructive burning. The second of the two areas (Fig. 20b) was also selected to test the hypothesis that there was a columned hall here, with negative but not conclusive result.

A new plan of Area D, incorporating new geophysical data with that collected in previous seasons and checked against surface features was drawn (Fig. 21)

6. *Kite Photography.*

A small portion of the city is without low level balloon photographs suitable for rectification in the composite mosaic (Fig. 1). Experiments with a kite borne camera made good the deficit.

7. *Geomorpho/ogica/ and Geological Studies.*

Study of the geological formation and composition of the Kerkenes Dag was undertaken in the field. Thin section and compositional analyses of the granitic rock and geological issues concerning geomagnetic survey at Kerkenes is continuing in the Department of Geology at METU. Relationships between the geology, hydrology, regional settlement patterns and urban planning were examined with positive results. The nature of the Kerkenes soils in relation to geomorphological evolution of the landscape and to patterns of erosion following the destruction and abandonment of the city were elucidated.

8. *Later Periods.*

A report on the Kale and other later features, (Figs 3-4), will be submitted to *A nato/ian Studies.* A report on the Hellenistic to Byzantine pottery from the Kiremitlik and Kale is being prepared by A. Goldman (as an appendix to the above or as a paper in its own right).

9. *The Monograph.*

Substantial progress has been made in the production of a monograph. (Appendix 3)

10. *Micromorphology.*

Dr Wendy Matthews continued study of the samples that she took for micromorphological research in 1996. The results have enabled assessment of the value of these techniques in the development of future research design at Kerkenes. A preliminary report by Dr Matthews forms Appendix 2.

CONCLUSIONS

A new phase of research at Kerkenes will reveal an exceptionally detailed plan of the city, mainly through a combination of large area geophysical survey, limited test trenching and computer aided combination of cadastral survey and rectified balloon photographs. GIS analyses and image enhancement will utilise the latest technological advances to enhance our understanding of the city and enable dissemination of the results through both electronic and traditional forms of publication. Thus the project will continue to be flag ship for the incorporation modern and developing approaches to the archaeology of urban sites, empires and human impact on upland landscapes.

The results obtained so far have added a new dimension to our understanding of the Middle Iron Age in Central Anatolia and the wider Near East by providing striking evidence for the existence of a hitherto under-recognised imperial centre, probably Median. The ancient city displays characteristics that are unusual, perhaps unique, that sheds light on the ideals and mechanisms of imperial control which appears to be fresh and intrusive. Origins of the urban concepts remain elusive and should probably be sought beyond Anatolia. Cultural contact, interaction and exchange between East and West are being revealed through an increasing understanding of urban dynamics, including the development of defensive systems, urban planning, religious monuments and architectural forms, and through discovery of high status luxury objects of an otherwise unknown artistic tradition.

The results will continue provide evidence for the extent and influence of states and empires in the Middle Iron Age and fill a vacuum in Central Anatolia. They provide a basis on which the historical geography of the sixth century can be expanded and re-evaluated, and against which the rapid expansion of Achaemenid power can be better understood.

PROJECT PUBLICATIONS

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1995. "Archaeology in Turkey", *AJA* 99.

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1997. "The Identification of the Iron Age City on the Kerkenes Dag in Central Anatolia." *Journal sf Near Eastern Studies* 56.2: 81-94.

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1995. "Kerkenes Dag 1993", *XJL Arastzrma Sonuclari Toplantzsz. 30 Mayis .3 Haziran 1994 Ankara.* Ankara: 567-582.

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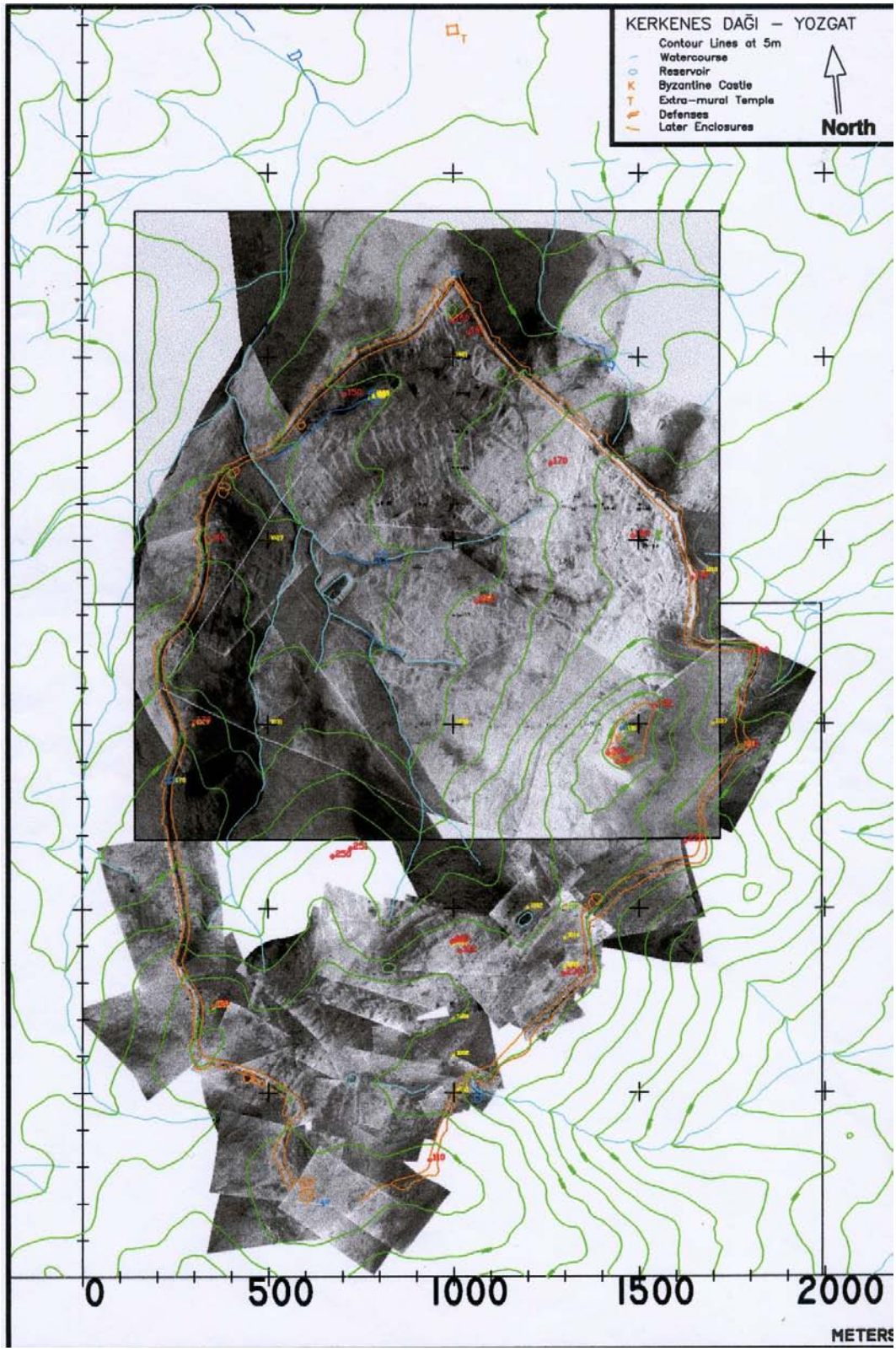

Figure 1. Mosaic of balloon photographs, rectified with AERIAL V, superimposed on the digital map. Missing parts are being added. Enlargements are used in *Microstation* to complete the city plan shown on Fig. 2.

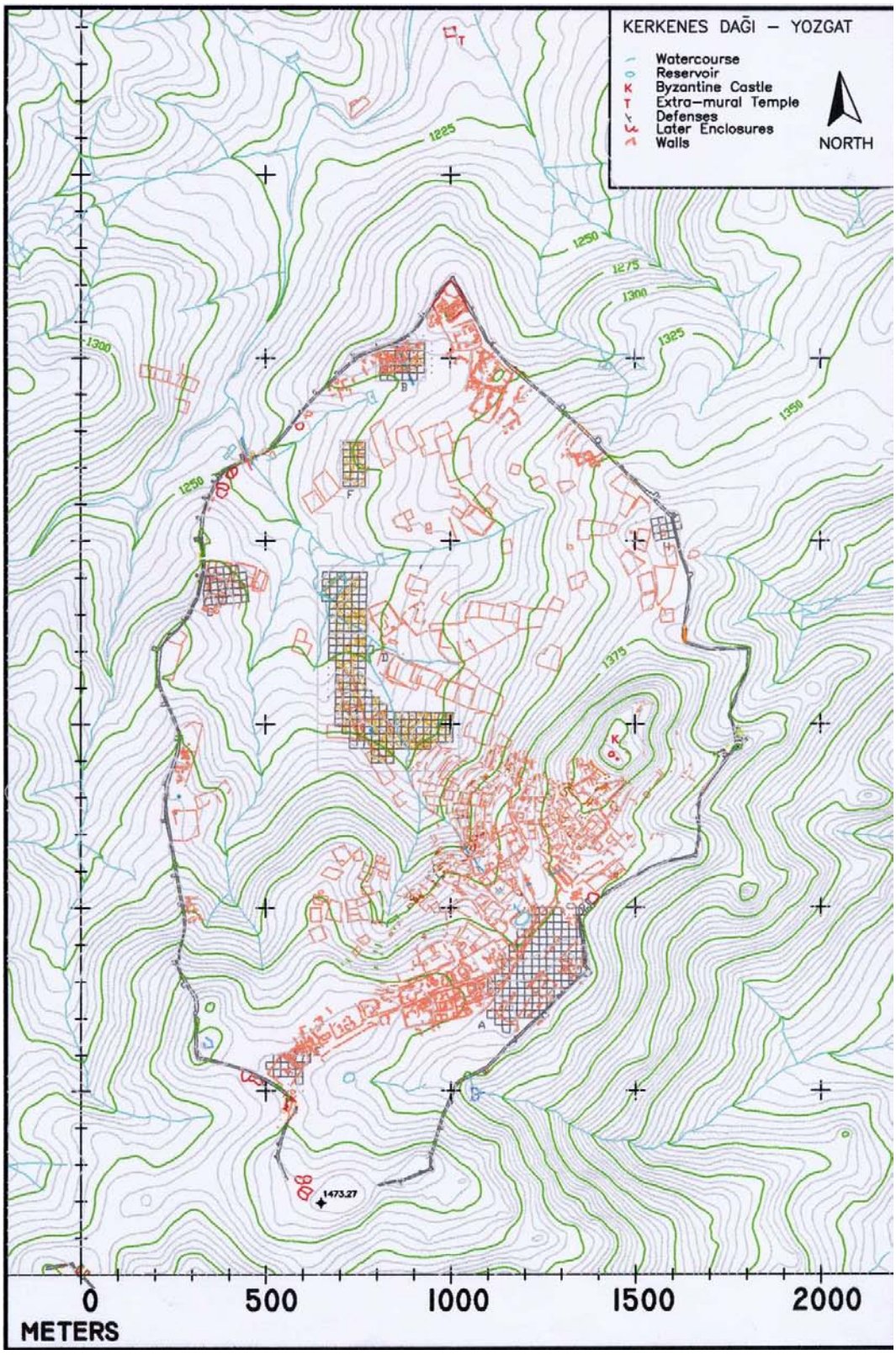

Figure 2. Plan of the city showing the progress of cadastral and geophysical survey at the end of the 1997 field season. This data is being combined with the urban plan being drawn from Fig. 1

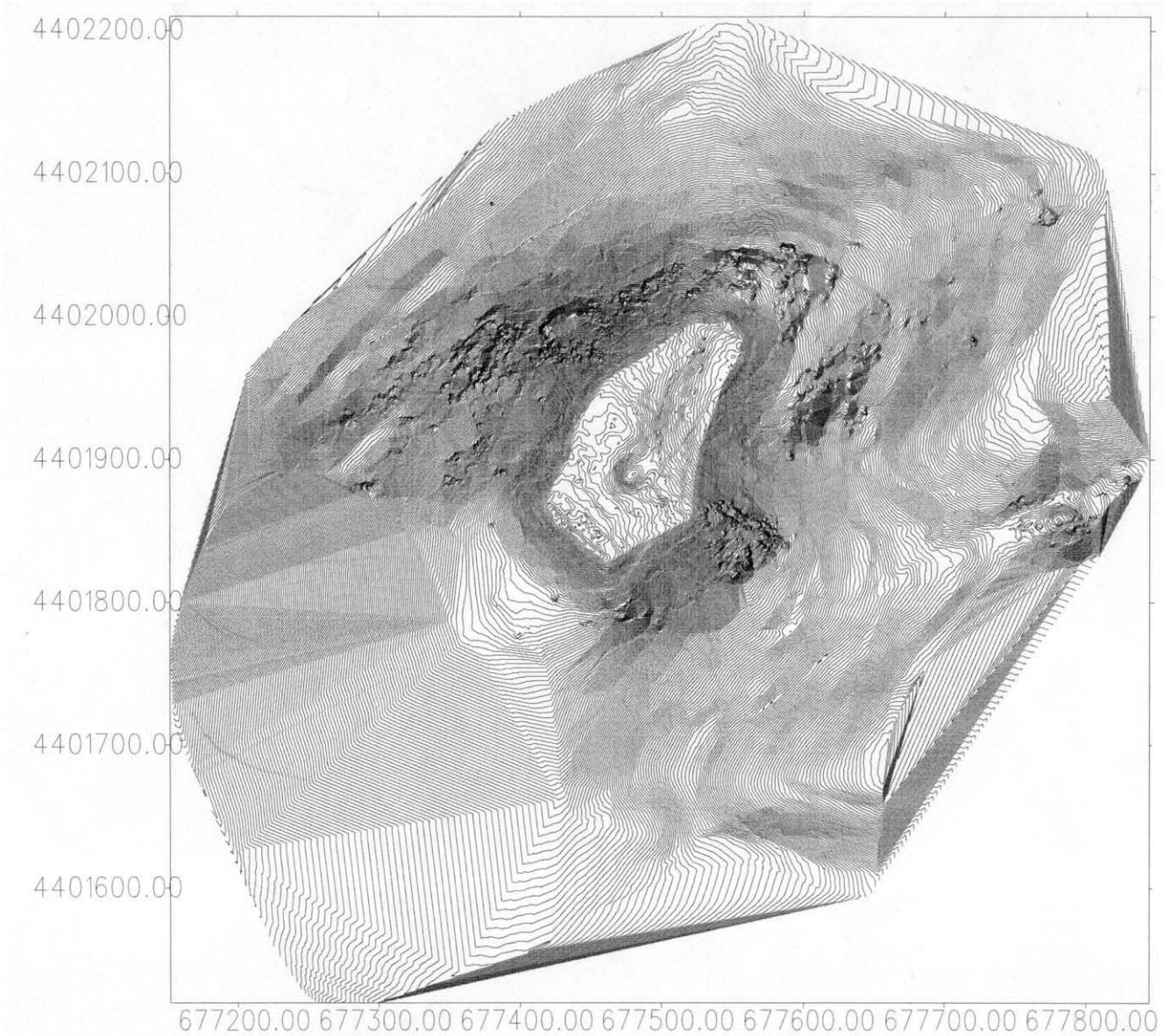

Figure 3. Topographic plan of the Kale and slopes made from the GPS survey. The image is generated from 17,000 survey readings collected in 10 days and can be displayed in a variety of ways.

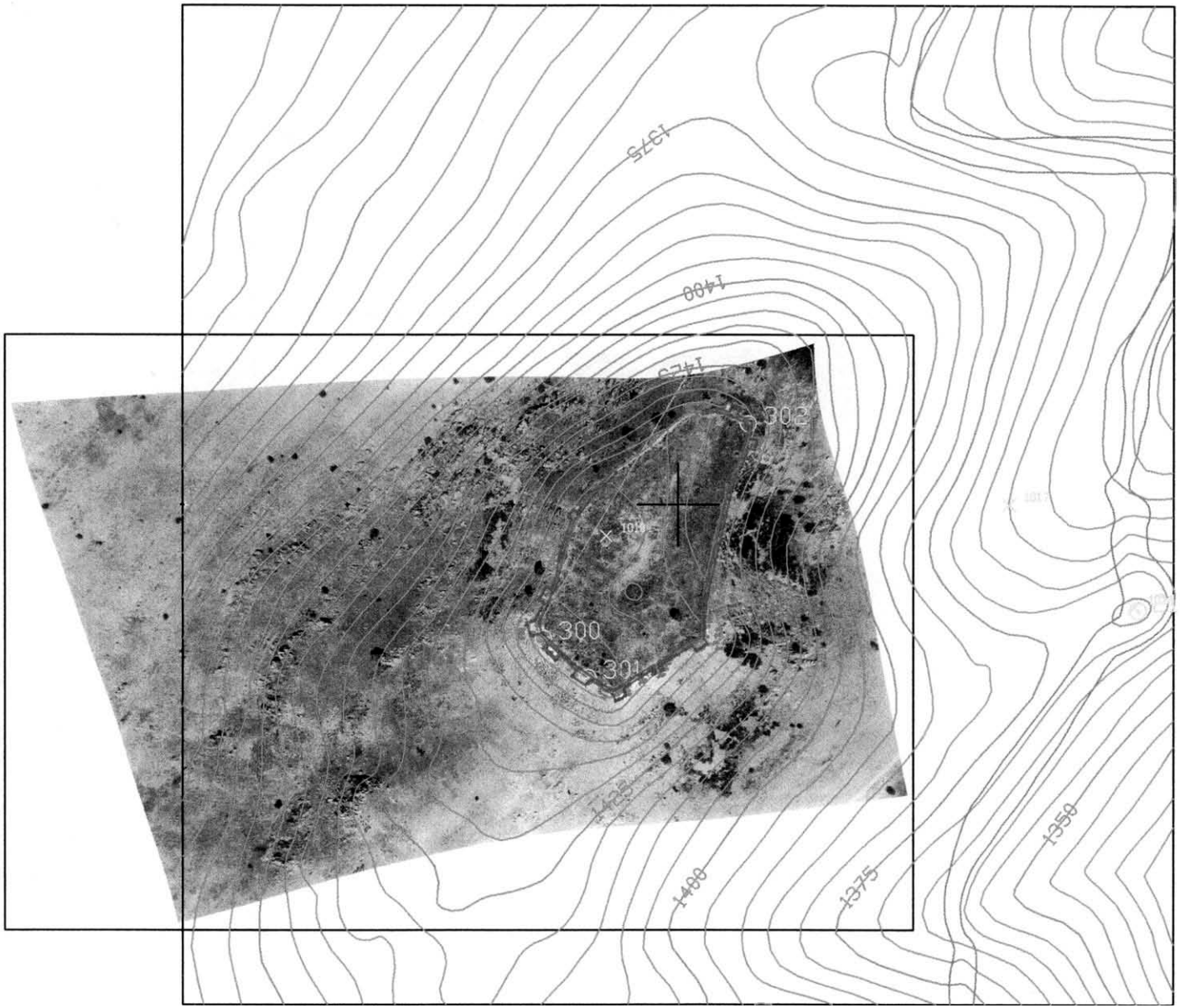

Figure 4. The Kale walls and contour plan draped over a rectified balloon photograph. Combination of the data used to generate this picture with that used for Fig. 3 will enable the construction of virtual reality simulations.

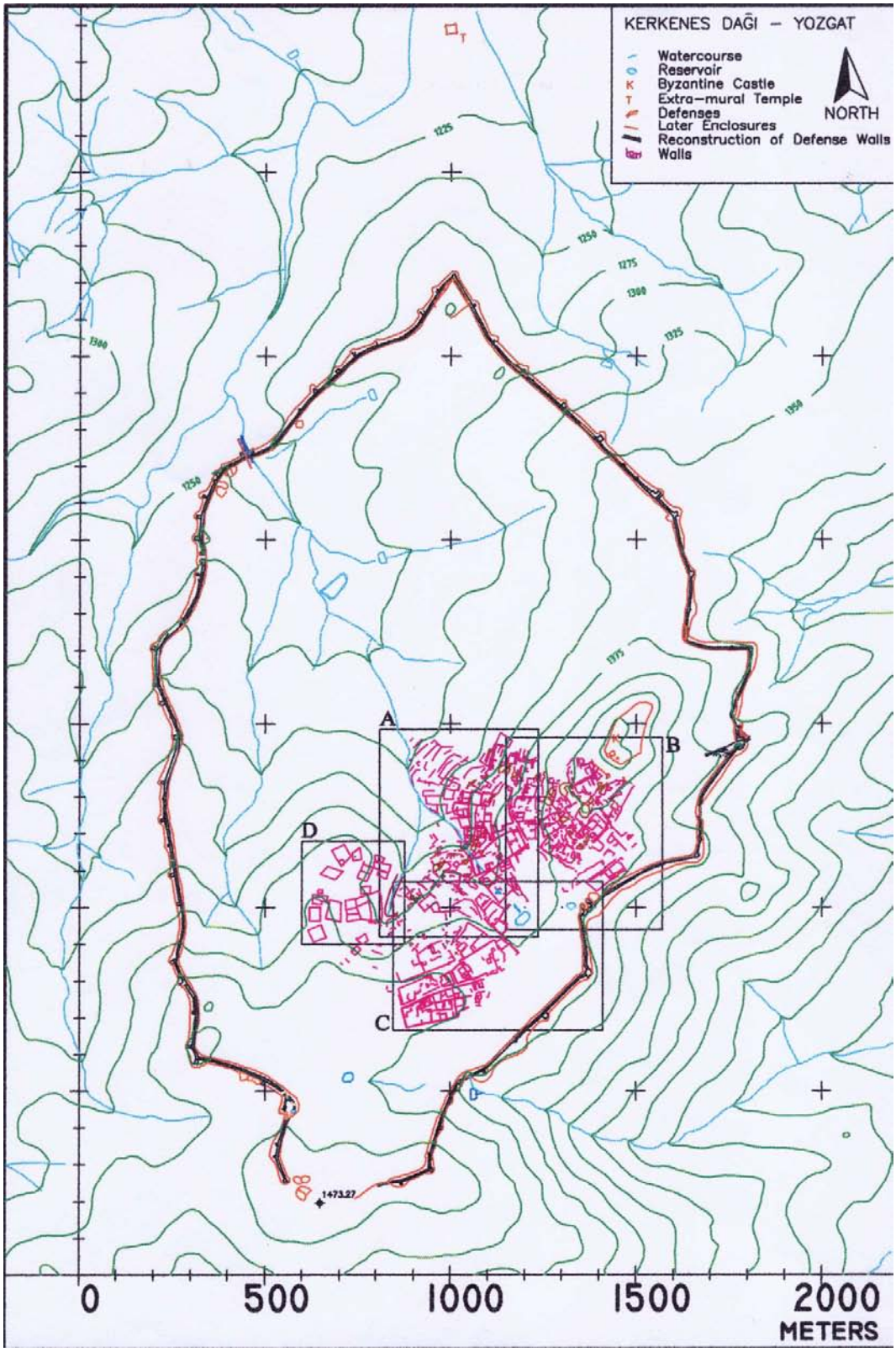

Figure 5. Key plan of the city showing the positions of Figs 6-9 and the area of detailed cadastral survey carded out in 1997.

Figure 6 (Fig. *5* Plan A). Surface features: Sülüklü GOl at bottom right, urban blocks, terraces, streets & passages on steep slopes below the Kale are NE of the stream, those on the slopes below the “Public Zone” are SW of the stream.

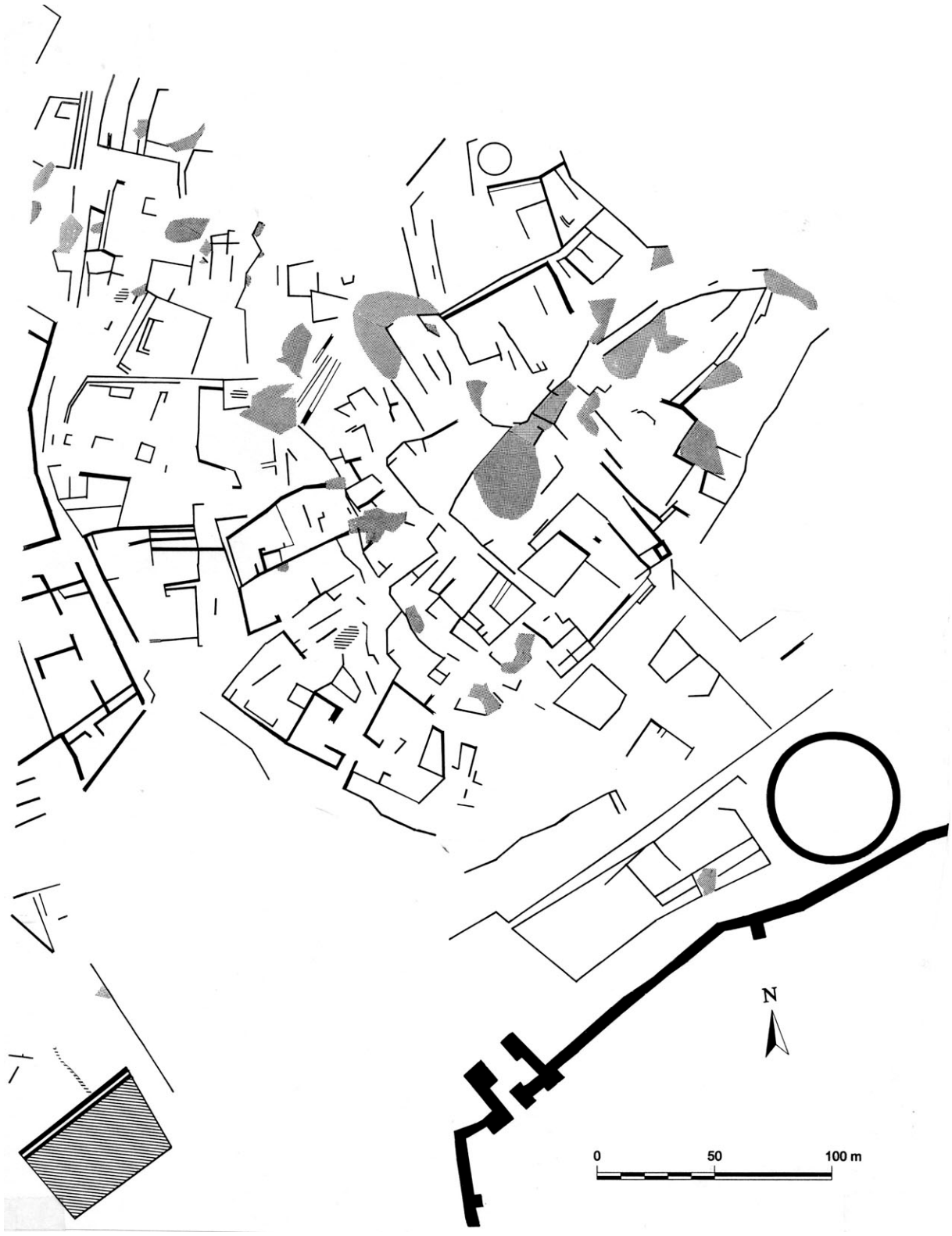

Figure 7 (Fig 5 Plan B). Surface features Suluklu GOI bottom left, “Cappadocia Gate” bottom centre, circular “animal pound” at right, urban blocks, terraces, streets and passages on steep slopes below the Kale foot

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Figure 8 (Fig. 5 Plan C). Surface features: Sülüklü GöI near centre, “Cappadocia Gate” at right, “Palace Complex” bottom left with, urban blocks, terraces and streets to N.

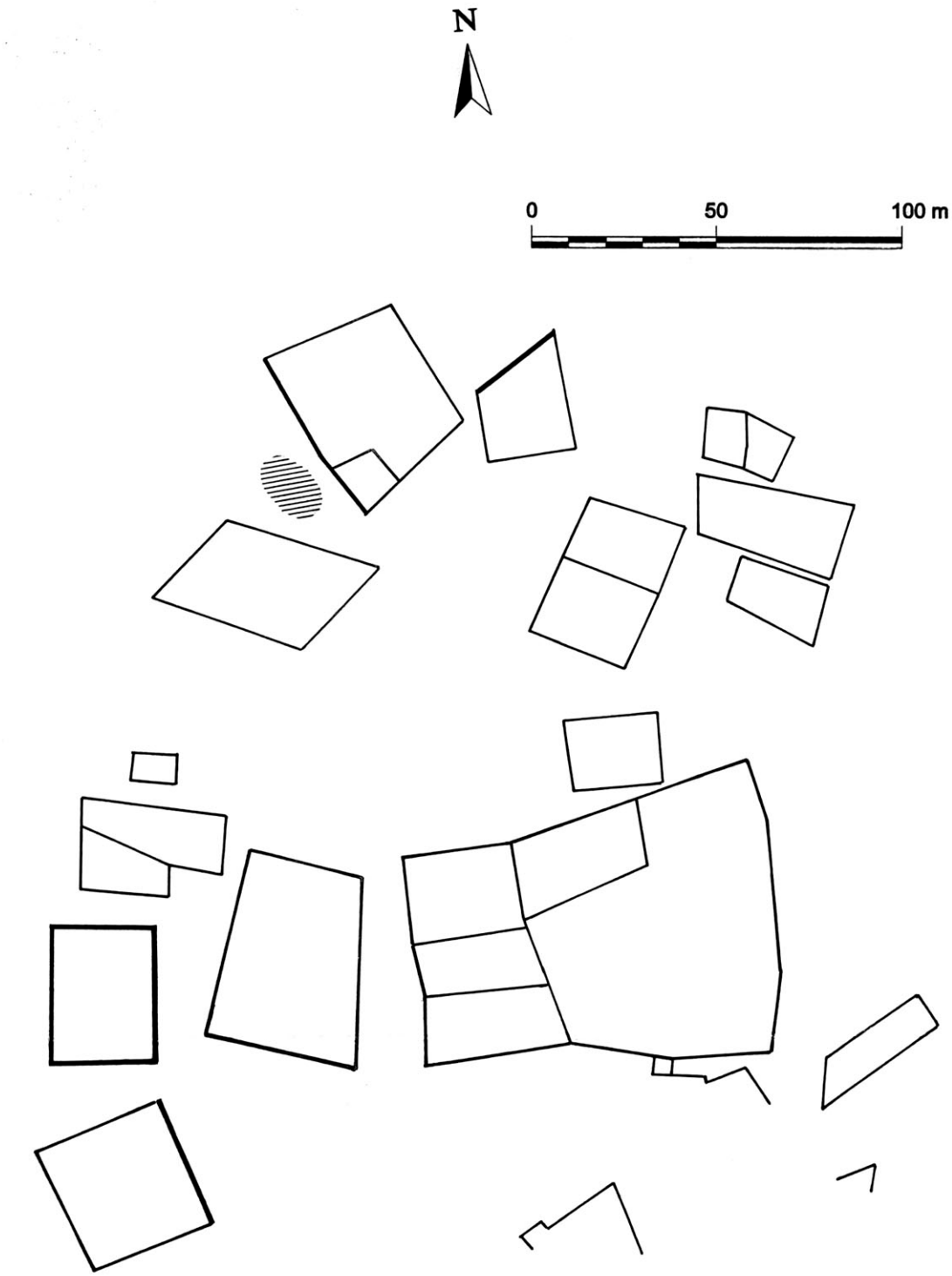


Figure 9 (Fig. *5* Plan D). Surface features: urban blocks and terraces on steep slopes NW of Fig. 8.

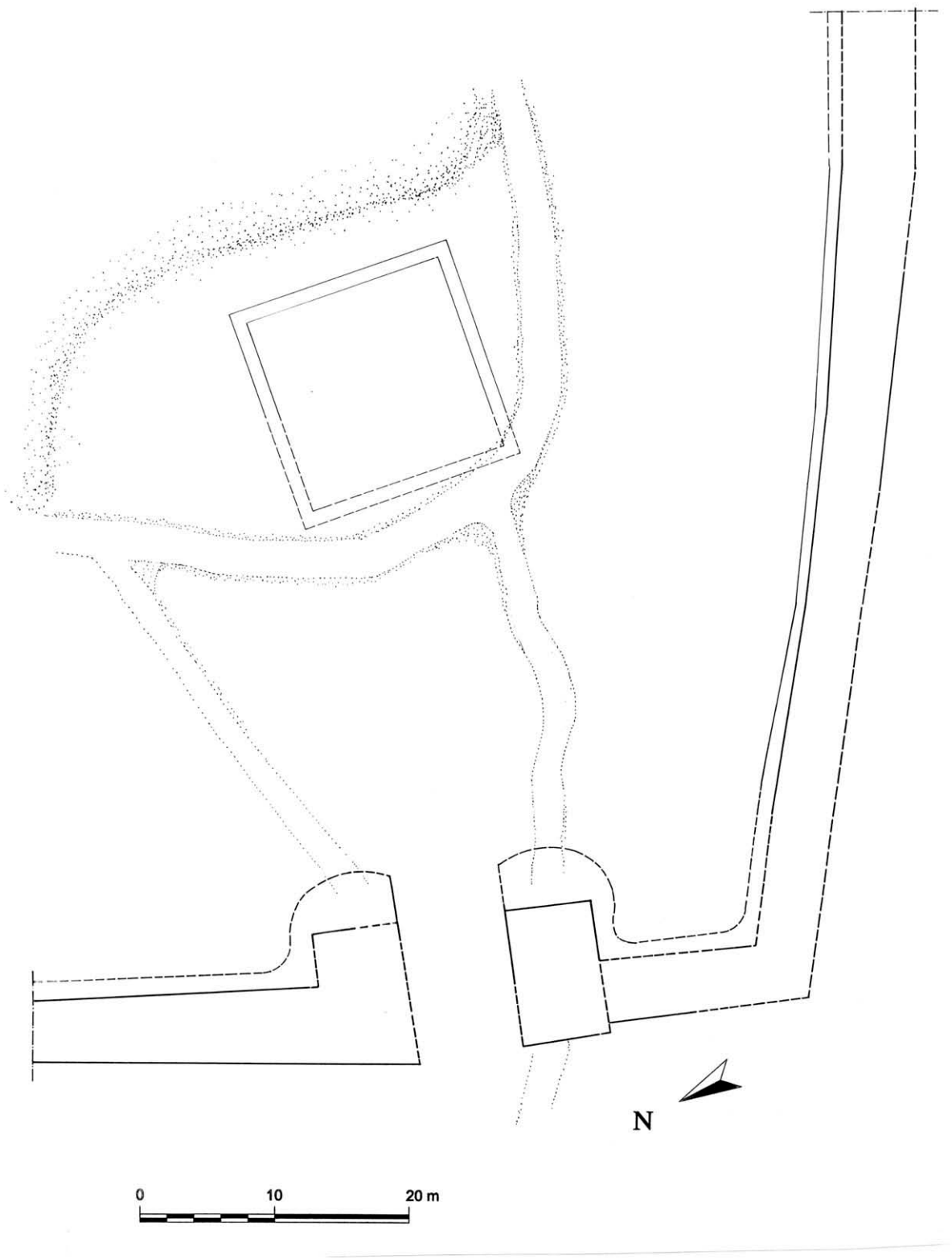


Figure 10. Plan of the newly discovered gate at the NE angle in the city wall, showing the extra mural structure and the lines of the modern tractor tracks that run over the towers. The gate passage, some 8m wide, is filled with stone fallen from the towers.

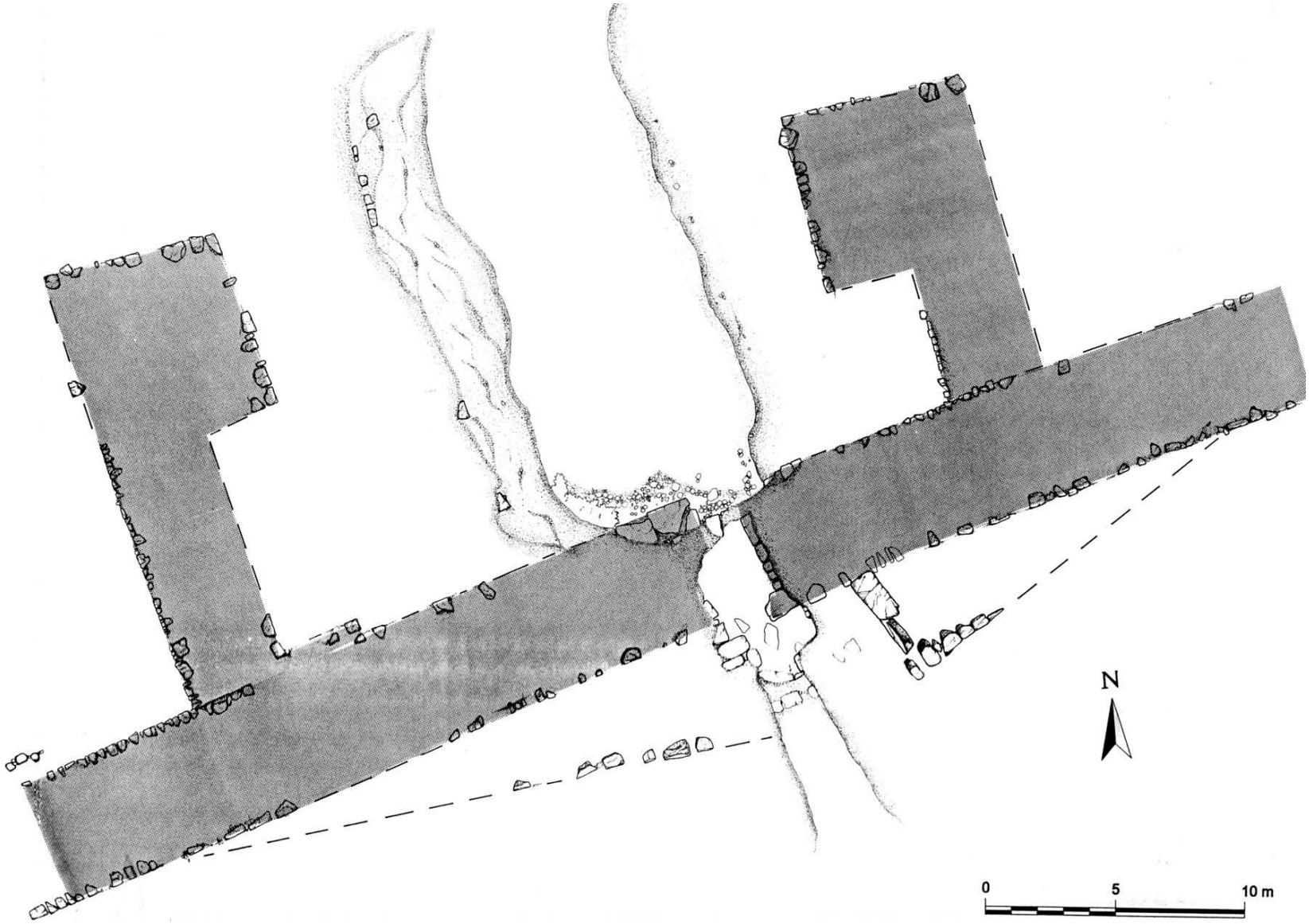


Figure 11. The Water Gate, showing the internal glacis and the external reservoir. The external glacis, poorly preserved or buried beneath rubble and difficult to reconstruct, has been omitted. Identification of this structure as a gate is open to question.

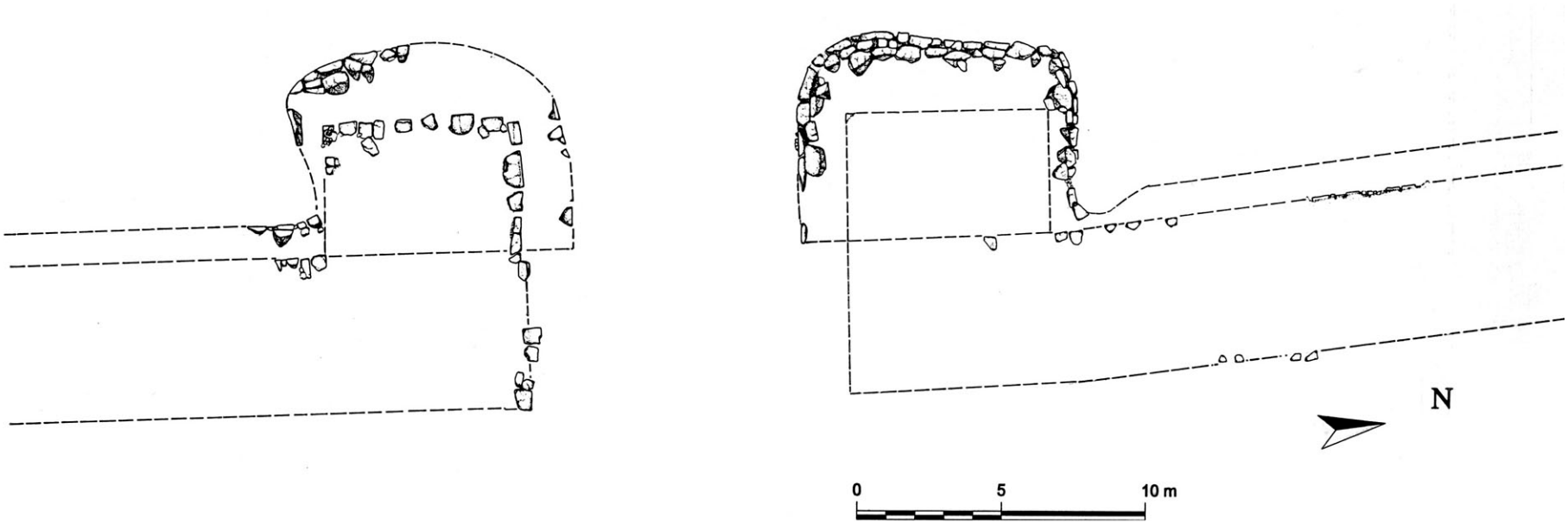


Figure 12. Plan of the West Gate showing the stone glacis around three sides of the tower, unlike the new gate on Fig. 10.

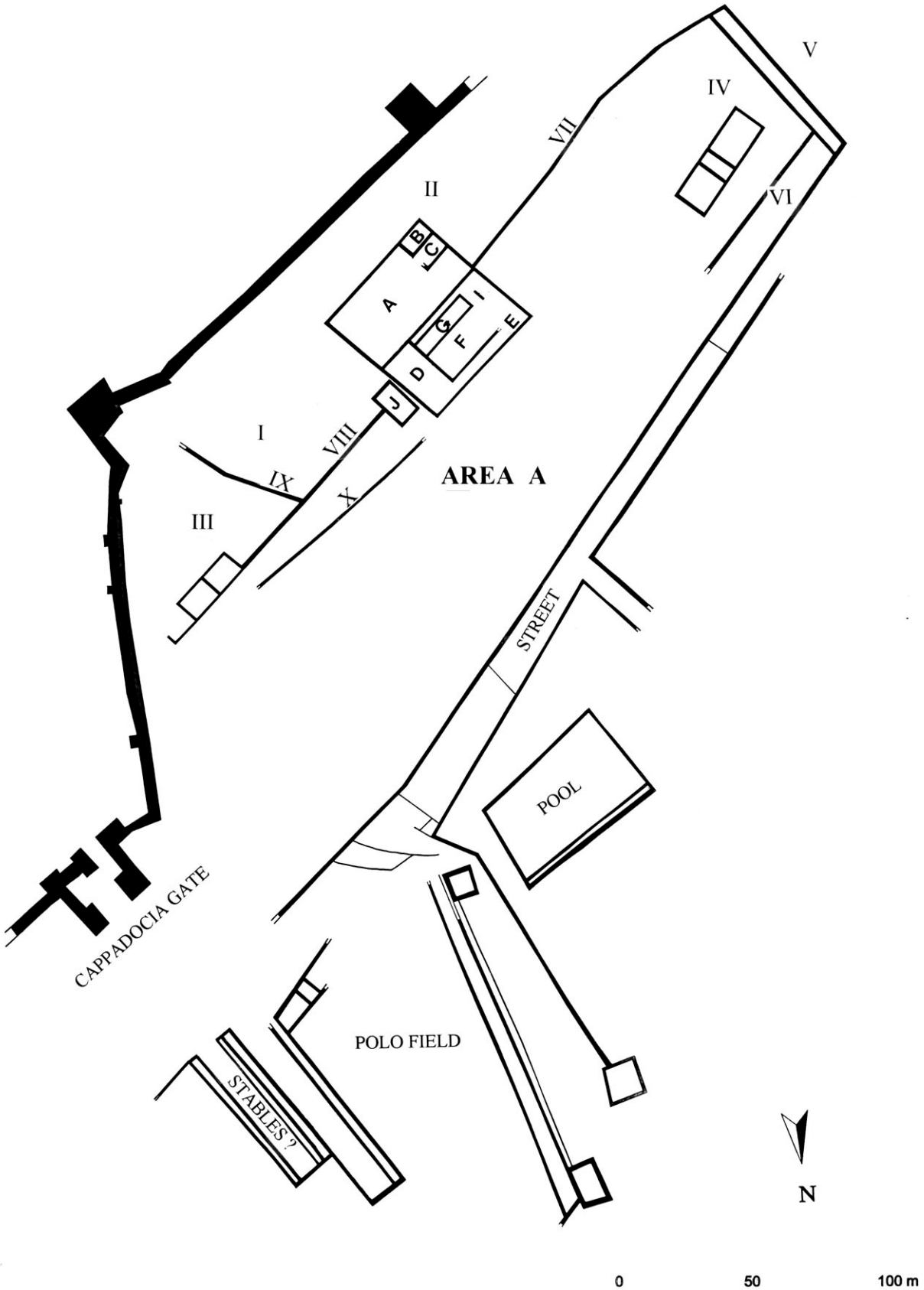


Figure 13. Plan of the "Public Zone" showing the "Cappadocia Gate" city wall and towers. The "Military Area", the Sülüklü GOl, the "Polo Field" and the "Imperial Stables" or "Store Houses".

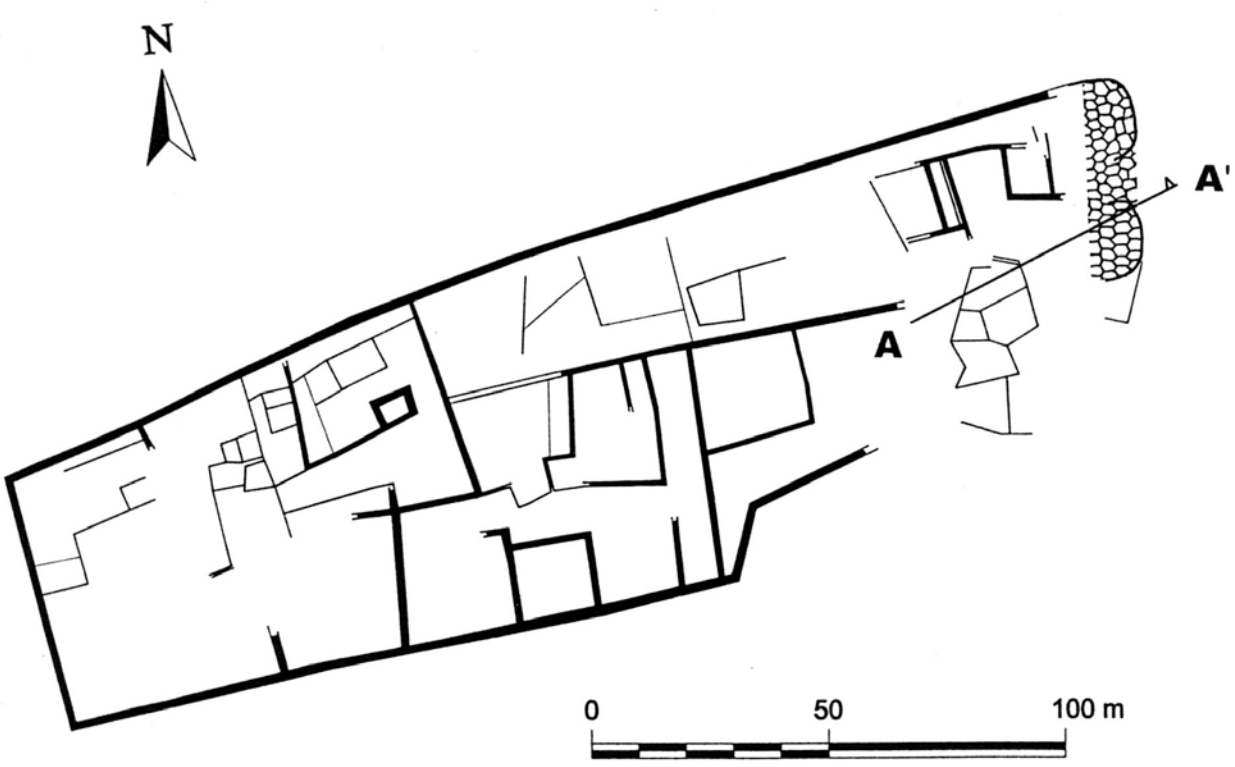


Figure 14a. Plan of the “Palace Complex” with the sloping stone façade and the probable entrance.

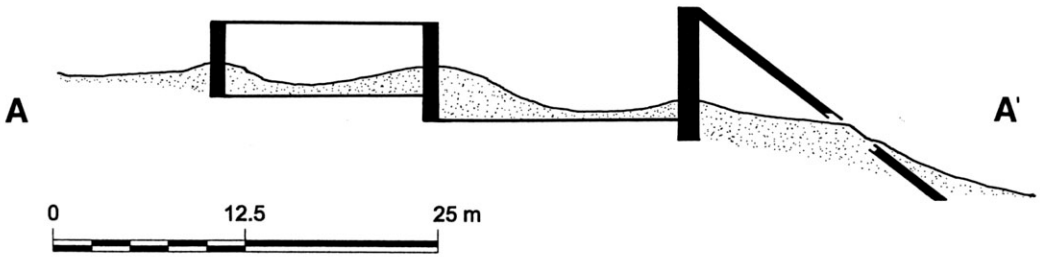


Figure 14b. Reconstructed architectural section through part of the “Palace Complex”.

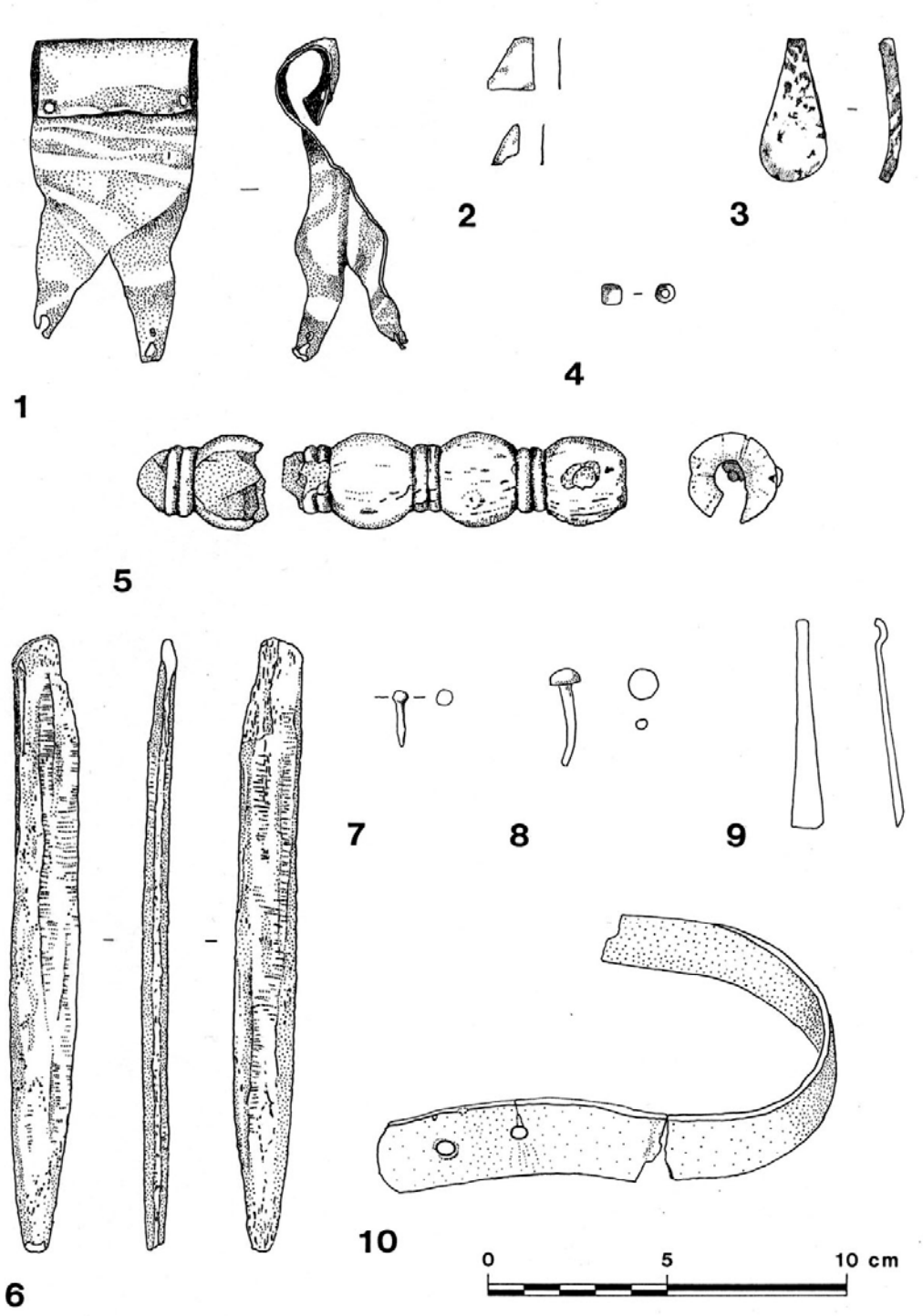


Figure *15.* Objects, drawn in 1997, from the 1996 test trenches. 1. Gold ornament, 2. Gold leaf fragments, 3. Frit object, 4. Frit bead, 5. Ivory handle with iron tack, 6. Polished bone object, 7-8 Copper alloy tacks, 9. Copper alloy tweezer, 10. Copper alloy strip with two drilled holes (incomplete).

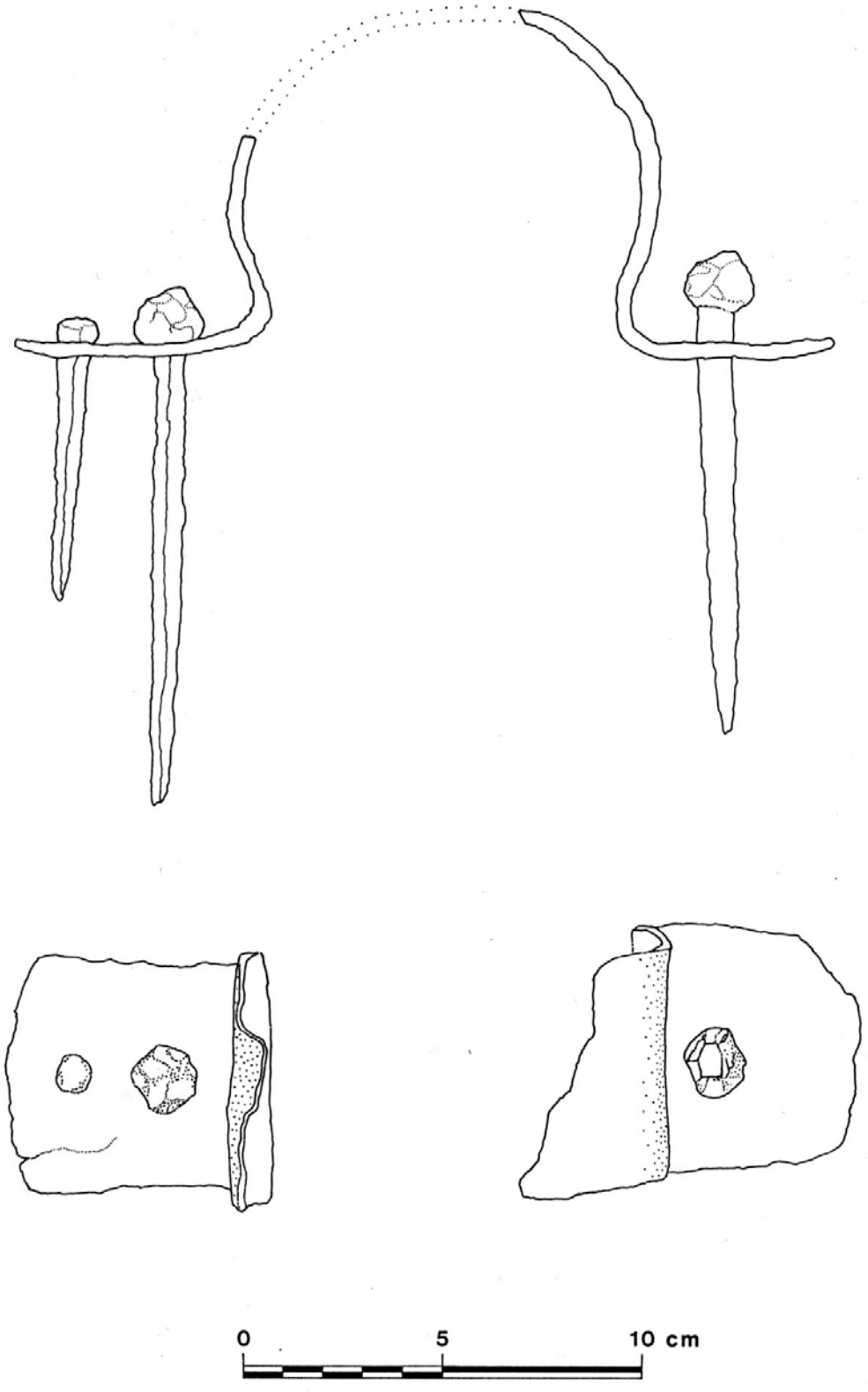


Figure 16. Large iron object, drawn in 1997, from the 1996 test trench in “Palace Complex”, perhaps from a vehicle.

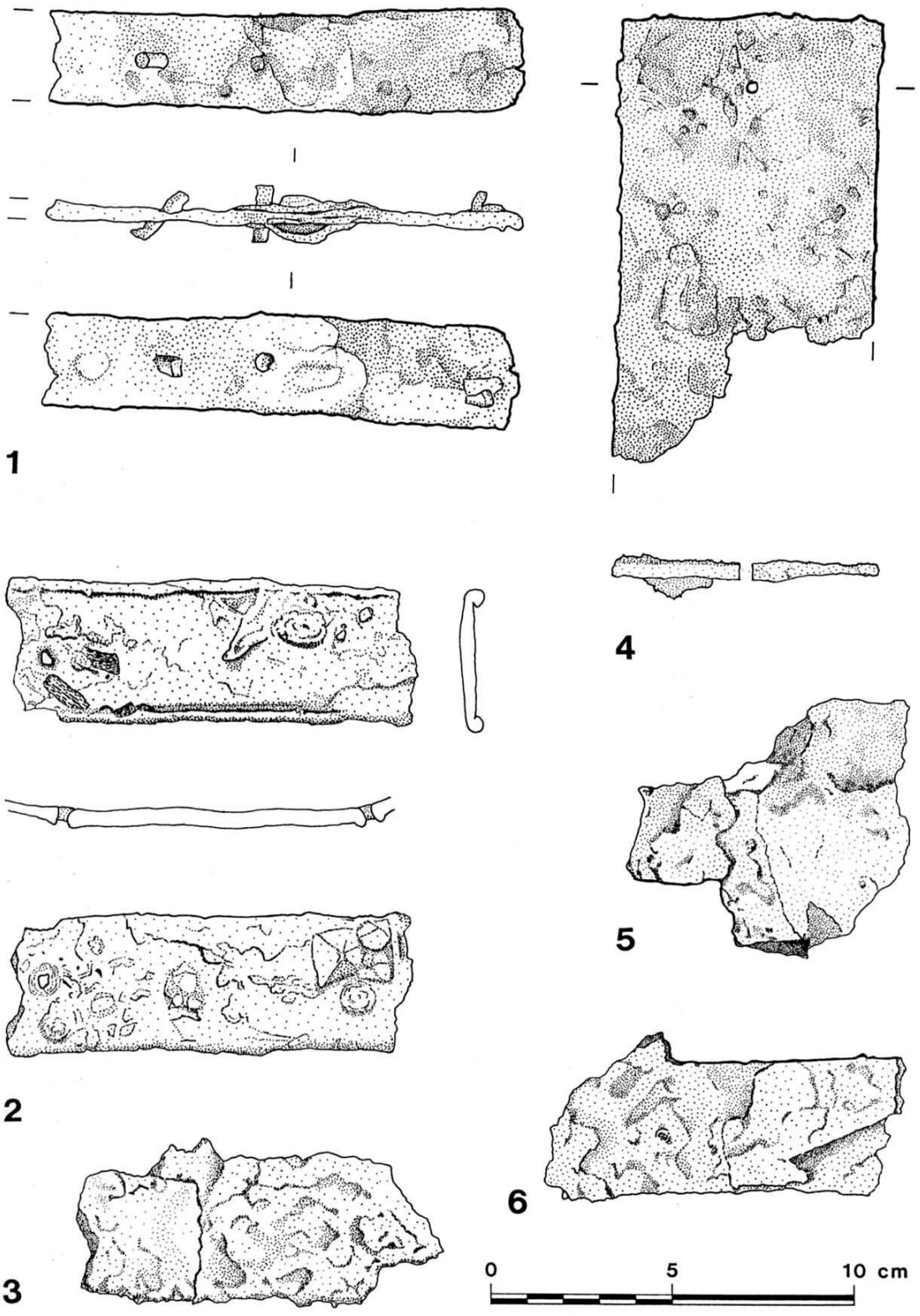


Figure 17. Iron objects, drawn in 1997, from the 1996 test trenches through the columned hall, including what may be part of an iron tyre (no.2), and perhaps pieces of wheel clamps (nos 4-6).

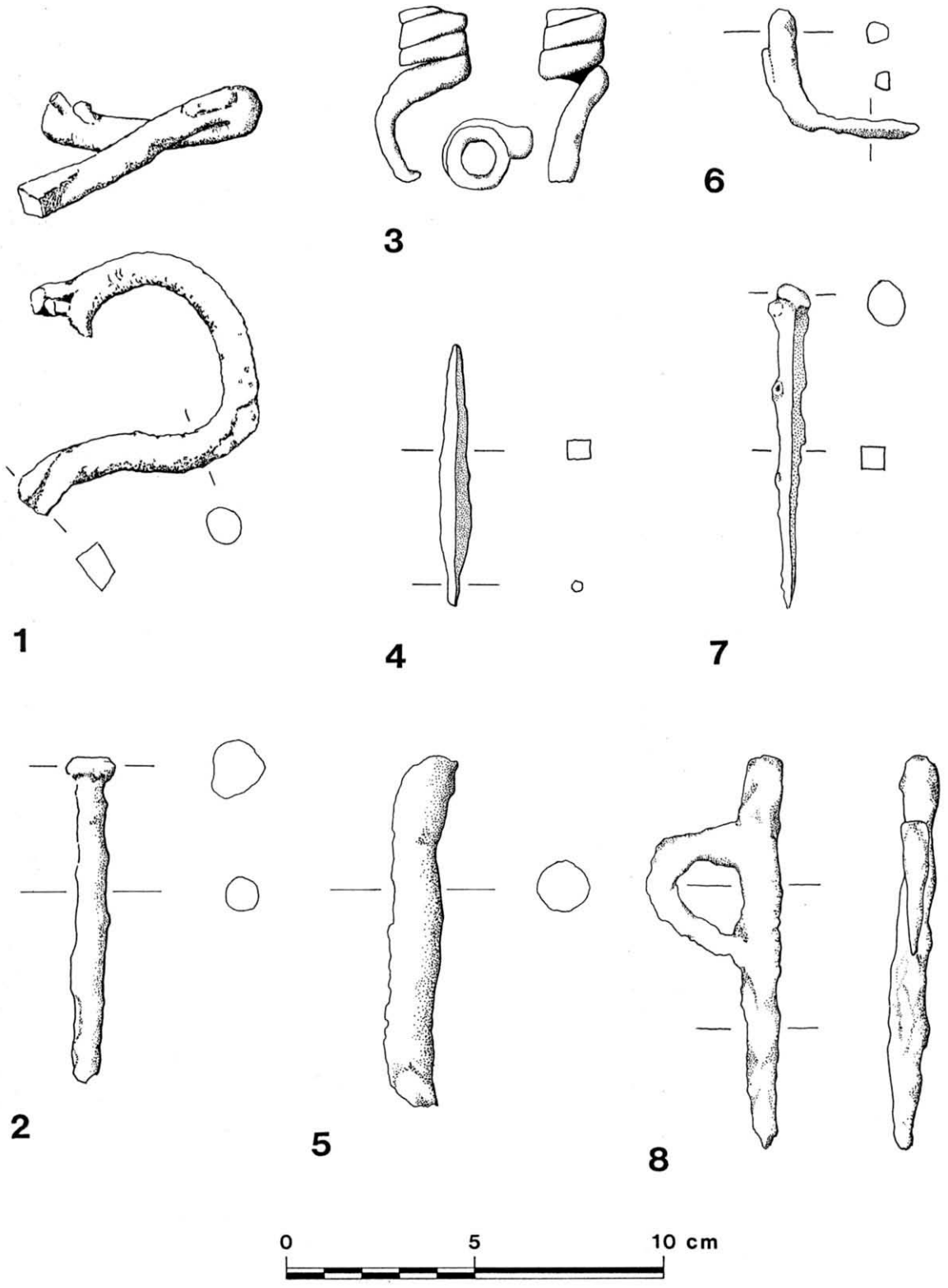


Figure 18. A variety of iron objects, drawn in 1997, from the 1996 test trenches.

Figure 1 9a. Red ware polychrome jug, originally with a cut away spout opposite a handle where the design is absent. Upper half coated with a white ground, painted design in red (hatched) and black (solid) paint, over-burnished. Scale 1:4.

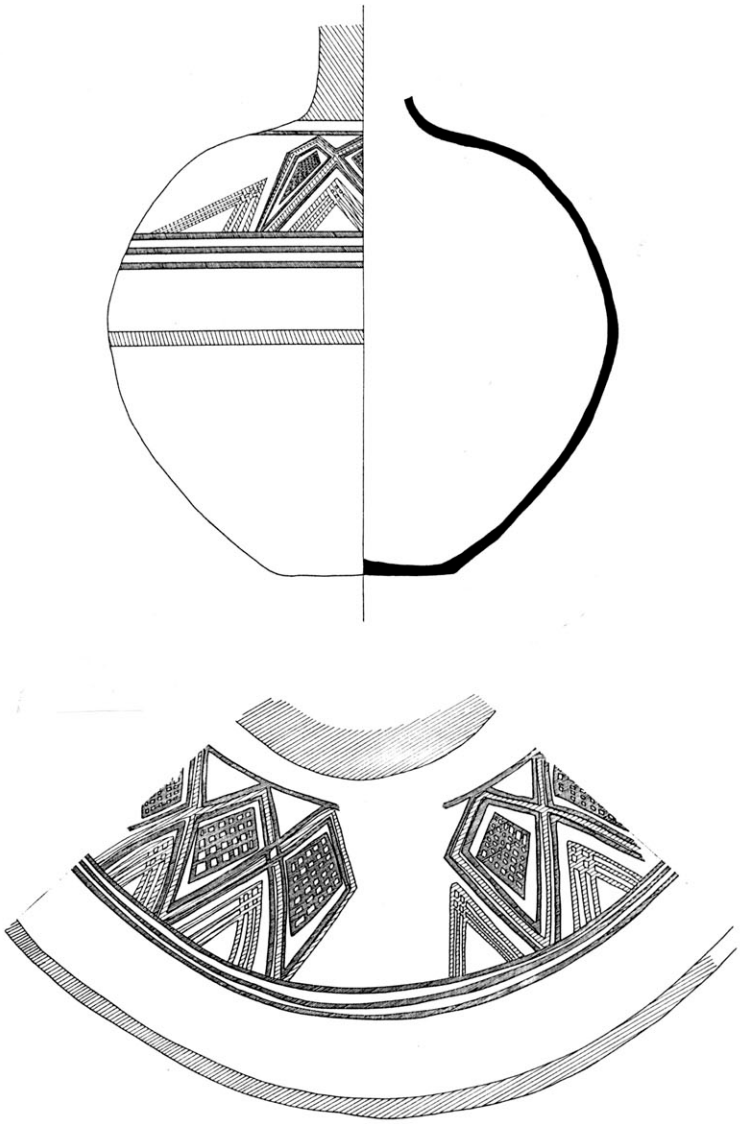
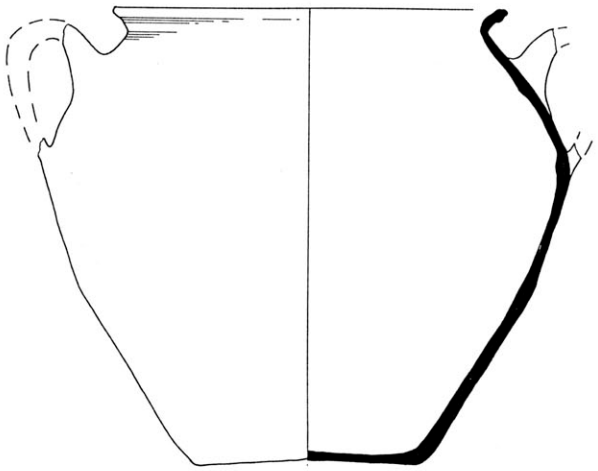


Figure 19b. Typical 2 handled grey ware cooking pot with everted rim and flat base. Hand-made, wheel finished, burnished. Scale 1:4.



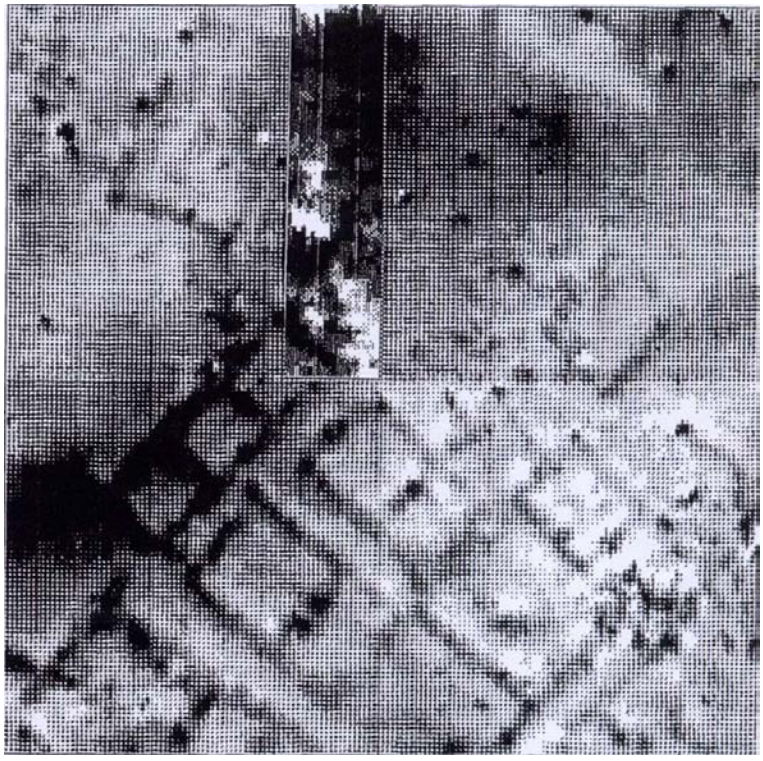


Figure 20a. Geomagnetic survey of a 40 x 40m grid: 8 readings per m. at 0.25m. intervals. Processing is preliminary. Note the two-roomed structures with burnt door posts. The image is drawn on the left of the N point on Fig. 21.

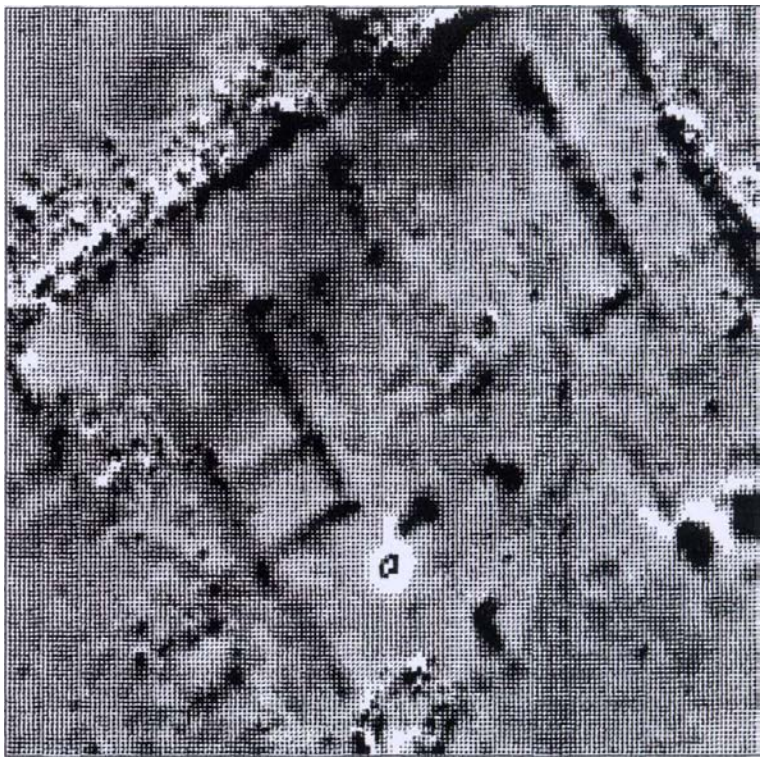


Figure 20b. As above. The white highlight is a metal survey pin, large black features at right could be fire installations. Top right corner of the urban block, lower centre of Fig. 21.

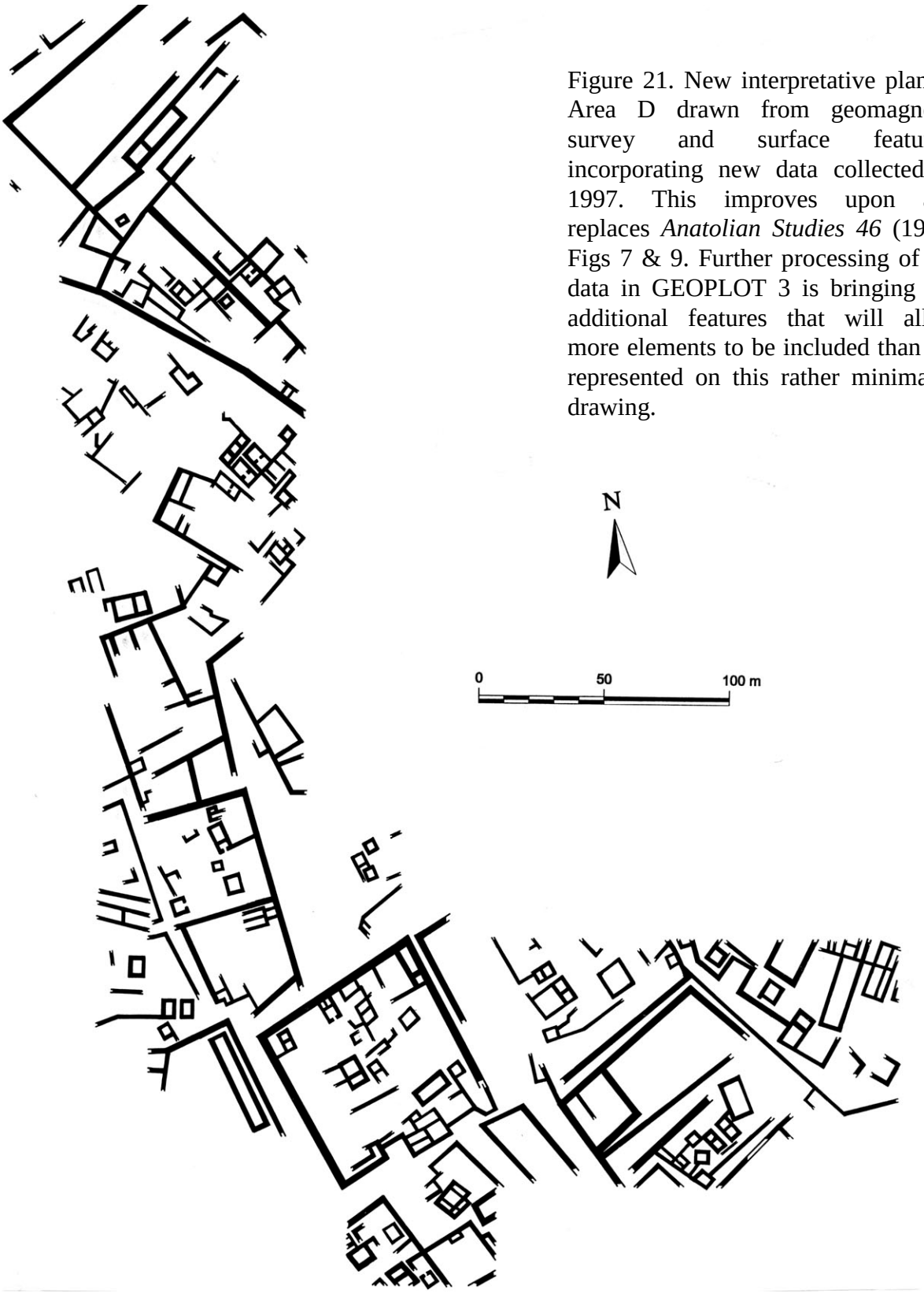


Figure 21. New interpretative plan of Area D drawn from geomagnetic survey and surface features, incorporating new data collected in 1997. This improves upon and replaces *Anatolian Studies 46* (1996) Figs 7 & 9. Further processing of the data in GEOPLOT 3 is bringing out additional features that will allow more elements to be included than are represented on this rather minimalist drawing.

APPENDIX 1

REPORTS ON SELECTED ASPECTS OF THE 1997 SURVEY

Geoffrey Summers

1. THE NORTH-EAST OR SINOP GATE

During the survey of the city defences in 1997 a new gate was discovered at the eastern end of the north-east section of city wall, immediately north-west of the sharp eastern turn (Fig. 10). The gate was previously unrecognised because, like other gates at Kerkenes, the large face stones of the passage walls had fallen into and blocked the passage itself Later and modern reuse of the gate has entailed the clearance of paths and tractor tracks over the towers and city wall either side of the passage, and the dumping of more stone into the passage itself

The gate is at the north-eastern end of the major street that runs from the southern, "Cappadocia Gate". The size and strength of the North-East Gate are an indication of its importance. The route out from the gate leads directly northwards and traces of a road may be extant in along the hillside before vanishing into the Sahmurath Koy vineyards. Beyond the gate is a square or rectangular enclosure that appears to be contemporaneous with the city. There may also have been a spring immediately outside the gate, now obliterated by the modern village road.

The plan of the gate is simple. An Sm wide passage is flanked by two rectangular towers projecting out from the face of the city wall. The southern tower also projects about lm inside the line of the inner face of the city wall. Neither tower is an exact rectangle, both measure around 6.40 by 10.OOm. The northern tower and stretch of city wall stand much higher than the southern, reflecting the underlying outcrops of bed-rock over and around which the gate was constructed. The sections of the city wall either side of the gate do not quite line up, which was compensated for by the interior projection of the southern tower. The outer face of the city wall and the towers are, as everywhere, enveloped by a stone rampart faced with uncut granite slabs. The line of the gate passage continues through the glacis, an architectural device which was not used, for instance, on the west gate where the glacis clearly continues around three sides of both towers. If the passage was 8m wide for the whole length it would seem unlikely that the city wall could have been carried over it, thus it can be postulated that part of the passage was restricted. There is no evidence for the position or number of doors.

2. THE WATER GATE

The Water Gate planned in detail (Fig. 11). There is now considerable doubt that the extraordinary elaboration of the defences at this weak point do in fact represent a gate. If a passage did exist it would have been on the east side of the stream where there is not sufficient space to permit more than foot traffic to pass through. The stream, which flowed through a corbelled stone structure within the city wall, debouched into a large stone walled reservoir immediately beyond the wall. The form of the towers that flank the reservoir appear to be peculiar to this section of the defences. The external stone glacis, not shown on Fig. 11, appears not to have extended between the towers and was compensated for by the construction of a glacis inside. Schmidt though that there was a gate here and in 1928 dug a test trench against the south-east corner of the internal glacis in the hope of uncovering a sculptured lion.

3. THE WEST GATE

Detailed planning of the West Gate (Fig. 12) revealed that the stone glacis extended around three sides of the gate towers but not, apparently, along the sides of the gate passage. This represents a different architectural solution to the problem of joining a sloping façade to vertical elements of the gate structure to that seen in the North-East gate (Fig. 10). Presumably the passage was somehow narrowed in order to carry the superstructure over the top, and there were presumably jambs for gates, but the mass of rubble that has collapsed into the passage has obscured these architectural details.

4. OTHER GATES

Plans of the other *5* gates have been drawn up for publication. The "Cappadocia Gate" is shown on Figs 7 and 8, a stone plan of the East Gate is too large for convenient inclusion here. The "Göz Baba Gate", South-West Gate and North Gate are so obscured by rubble and later modification by tumuli and shepherds constructions that it has only been possible to draw block plans which have not been included here for want of space.

5. THE PUBLIC ZONE

The high southern zone of the city, along the ridge between the "GOz Baba Gate" and the terraces on the north-western slopes below the Kale (Figs 5-9) display an integrated concept of urban design and city planning on a scale commensurate with the ambitious foundation, layout and construction of the city. The descriptions that follow are based on a combination of ground survey and observation, interpretation of balloon photographs and geomagnetic mapping of sub-surface features. There has necessarily been a considerable degree of interpretation in deciding what to include and exclude from the plans and in deciding how much can be reconstructed with a reasonable degree of confidence. Field records contain more information and a greater differentiation between levels of confidence than limitations of space and graphics allow here. Both recording in the field and, to a greater extent, drawing of the current plans, have been consciously and unconsciously influenced by our understanding of what the extant remains represent, and by the need to present results that are coherent and intelligible. Research is still in progress:
geomagnetic maps will add considerable clarity and detail, test trenches will provide evidence for function and additional architectural information. Thus the results presented here are interim and will require much expansion and some modification as the project moves into its next phase. On the other hand, it is thought that they will not require substantial revision and that the broad interpretation is essentially correct, however slight the evidence on which it is based.

The Sülüklü Got

Description

The Süluklu Gol, Leech Pond, is an artificial stone-lined reservoir also known as the At GOl, Horse Pond (Summers *eta!*. 1996, 216 & n. 23). It lies within a larger walled compound into which geophysical survey and ground observation have not yet revealed an entrance. The pool itself is rectilinear, measuring *c.* 32 by 56m Probing with a hand auger in 1993 established that it contains about 1 .OOm of silt, making the total original depth some 3m with a total capacity of *c.5376m*^{3}. Today it is fed by a spring to the south-west, much altered in recent times and consequently now normally dry by the end of August. The location of the original spring is

uncertain and may well have been within the pool itself which has a naturally sandy bottom. Doubtless recent modification has lowered the water table and it can safely be assumed that with proper management there was sufficient water available to keep the pool full throughout a normal summer. It is also likely that other sources of water, including run-off from surrounding complexes to the east, south and west, helped to maintain the water level and some features seen on the geophysical map running obtusely across the street to the south channelled rain water into it.

The pool would seem to have been created by enlarging and squaring off a natural feature and construction of a dam with a central sluice on the northern side and the north-eastern and north-western corners. The dam comprises two parallel walls, presumably with water impervious clay between them, and a large bank that both supported the walls and reduced seepage. The other three sides have vertical walls and there is a sloping face of uncut granite around all four sides, constructed in the same manner as the glacis around the city defences and the façade of the "Palace Complex". There is no evidence of steps or ramps down into the pool, but such might have existed.

Interpretation

The position of the enclosure and the pool is such that it would seem to have formed a focal feature for the public complexes to the east, south and north. If this is indeed the case it implies a concept of planning and use of urban space on an imperial scale. Since the original height of the enclosure walls has not yet been established, it is not possible to assess how visible or secluded the pool would have been. Construction was evidently lavish since the much larger BUyuk Göl, in the centre of the lower part of the city, and other artificial reservoirs elsewhere in the urban confines, were not stone lined. Clearly, the Sülüklü Gol was something more than a utilitarian reservoir. Beyond that simple observation it would be imprudent to venture.

The "Palace Complex"

Location

The complex occupies a gently sloping area on the high ridge towards the southern end of the city, some 280m west of the southern or "Cappadocia Gate" and is more or less orientated east—west. The approach to what appears on the geomagnetic map to have been a spacious open area in front of the monumental façade seems to have been via a broad street leading from the street node inside the "Cappadocia Gate". On approaching the palace complex the street divides to run along each of the long sides, that on the north eventually broadening out into a plaza-like public space before veering off south-westwards to the "GOz Baba Gate".

The south-eastern end of the complex thus afforded a view over the stone-lined pool and the public buildings beyond. From elevated points within the complex the northern Cappadocian plain could have been observed with, on clear days, Mount Erciyas in the far distance.

Somewhere close to the complex façade was the perennial spring that fed, and still feeds, the stone-lined pool. This source of water has been affected by recent attempts to tap further and deeper into the source and today the spring is dry by late summer.

The obvious advantages of the position (good communications, splendid views, fresh water) can be countered with a conspicuous disadvantage, exposure to inclement and sometimes fearful weather.

Description

The plan and reconstructed profile (Fig. 14) are based on observation and recording of extant features on the ground and balloon photographs, combined with a. geomagnetic map of a single 20 x 20m grid and subsequent (1996) limited exposure in Test Trench 17. Understanding the surface remains is problematic for several reasons, including modification by the construction

of later tumuli and shepherd's shelters, the ruinous state of the stone walls and, as revealed by theTest Trench, that much of the architecture is not visible on the surface. A further significant problem is that some structures within the complex might have risen two or more stories and perhaps had basements. The plan presented here contains those elements which could be measured with a high degree of confidence; solid lines represent clear walls where in places both faces could be seen, open lines represent extensions of walls indicated by surface features, single lines represent apparent wall lines without visible faces. The profile is a diagram that represents an attempt to understand, interpret and impose minimal reconstruction on the visible remains at the north-eastern end of the complex, and is more subjective than the plan. The overall character of the complex has thus been recovered, further elucidation of structures will require a combination of further geophysical mapping and test excavation.

The complex is enclosed by a substantial wall, some 2.Om wide, along the northern, western and southern sides. Total length of the complex is c. 250.Om, width at the west end 56.Om and maximum width 80.Om. The south-east corner is enigmatic, in part because of later use by shepherds and tumulus construction. The east end is monumental, comprising a sloping façade of neatly fitted uncut granite slabs retaining rubble fill, in the same technique as that used for the city defences. The façade slopes upwards at an angle of around 4Os45o, being preserved to a height of c. 1. 5m. If the back (west) wall of the façade was 1 .O-2.Om wide, the original sloping face would have attained a height of some 7.5m. Bed-rock outcrops at the base of the northern portion which, together with the sloping façade and marked differences in height, presumably reflect large outcrops of bed-rock that were incorporated into a monumental architectural scheme. Reconstruction of the façade presents many problems. At the north-west corner the sloping face continues round to join the north wall, presumably becoming gradually steeper until it reaches the vertical. There is a similar arrangement at the south-east corner where the sloping face presumably butts up against the substantial angled wall of which only the lower courses are preserved. In the centre of the façade the sloping faces can be seen to turn inwards either side of a space some 9m wide. The facing disappears into a confused mass of loose stone which most probably fills an entrance passage and that could conceal a monumental staircase or ramp. Alternatively, and perhaps less probably, the sloping façade is continuous between the two buttresses. If there is indeed a monumental entrance through the façade it may originally have led directly to an upper floor room above the extant walls seen on the ground.

If the entrance to the complex was not in the centre of the monumental façade it must have been in the eastern end of the southern wall where today there are large and conspicuous gaps either side of the high rubble ruins: there is little in favour of an entrance in either of these gaps and it is more likely that the apparent spaces are the result of later clearance of stone for tumulus and other construction.

Inside the south-eastern corner lies a group of rooms the preserved walls of which are at a substantially higher level than the surrounding area. Only the northernmost wall can be clearly ascertained amongst the confusion of rubble and the wall lines, as reconstructed from the linear heaps of stone, appear to form very irregular rooms. The preserved height of the stone walls probably indicates at least two stories. The irregularity has probably been exaggerated by the way in which the walls have collapsed into the rooms and by later modification by shepherds and perhaps tumulus construction; nevertheless, the irregularity does appear to be real and may well reflect the incorporation of out-cropping bed-rock into the structures.

The remainder of the interior of the complex is divided up into more or less rectangular units. The main north—south walls that demarcate these interior divisions also mark rises in elevation from east to west, presumably dictated by rises in the underlying terrain. The larger spaces are subdivided into smaller units some of which are square or rectilinear. In the north-western sectors wall lines of actual buildings are indicated by ridges of rubble. Individual monumental buildings are not discernible amongst the surface remains.

Jdentfication and Interpretation

The monumental nature of the complex, especially the façade at the eastern end, the size and the location, distinguish this complex from others within the city. The absence of entrances through the well preserved enclosure walls into the central and western sectors of the complex could be taken as evidence in favour of a unified function and a progression from public at the front (east) end to more restricted elements at the west end. Further, the complex appears to form part of a larger planned area of public buildings. This combination of factors makes it likely that the complex was palatial. It can be assumed that the city would have contained a palatial complex of some sort and no better candidate has been recognised. Positive proof of the identification is, however, lacking, making further geophysical survey, clearance of the monumental façade and perhaps further test excavation a priority in future research design.

The term palatial is a functional one that in the Ancient Near East implies, at the minimum, the residence of a ruler or governor (in this case presumably a Median Satrap), his family and staff (e.g. retainers, servants, bodyguard, slaves), a public audience chamber and administrative units.

The plan suggests some overall concept of the use of space within the complex, but also displays surprising irregularity and informality. From the Test Trench it is clear that there was more than one phase of construction, giving rise to the possibility that the original conception may have been altered over time by the addition of new structures. The complex is without known parallel.

The "Military Area"

This is a large, mostly level and roughly triangular area immediately inside the city wall on the west side of the "Cappadocia Gate" and south of the road leading to the "Palace Complex", with a commanding view over the Cappadocia Plain. The plan presented here is a revised version of that in Summers et a!. 1996, 211 Fig. 3. Differences and refinements are obvious, representing an increased ability to recognise walls and improved processing and interpretation of geophysical data. The overall nature of the area has, however, been apparent since the first (1993) field season and was one of the main reasons for selecting this part of the site for the initial geophysical survey.

Access was probably directly from the "Cappadocia Gate" at the east end of the area and at the south-east corner. Evidence is obscured by outcrops of bed-rock and the construction of later tumuli, shelters and pens that make it impossible to see the exact relationship between the city gate and the complex. No entrances can be determined in the long, c. 367.Om northern wall. A natural depression, formed by a fissure in the bed-rock, runs along the inside edge of the city wall. This depression is devoid of visible ancient structures although it does contain a number of relatively recent (?Ottoman) two-roomed shelters and attendant animal pens constructed in the relative shelter between the city wall and the rock outcrop.

The highest part of the complex, Structure I, was enclosed by sinuous and poorly preserved walls, VIII and IX, that made the best use of the rock outcrops and retained terraces. Atop the outcrop was a structure of obvious importance, too little of which remains for a coherent plan to be recovered.

Complex II, some 3m lower than Structure I, comprises several distinct units, A-I, with an annex on the east, unit J. The complex is divided into two equal portions by a central east—west wall, the southern half containing units A-C, the northern composed of units D-I. Unit A is a spacious open area that contains a shallow reservoir quarried out of the rock. This shallow pool today holds water until late spring, but there is no obvious source apart from run-off The pool was unfinished, evidenced by its irregularity and shallowness. The south-west corner of the complex contains a pair of adjacent rectangular rooms that, if not sub-divided, would have required roof beams capable of spanning 1 lm. The northern half of the complex displays some symmetry. It is tempting to reconstruct two open units, D and I, flanking a central block, units F,

G and perhaps H. A narrow corridor or passage, E, connected areas D and I. None of the walls of this complex appear to stand more than a couple of courses above bedrock. Units F—H are full of stone rubble apparently from the pool and probably intended to form a level base for a raised floor. No indication of collapsed superstructure is apparent, nor are there indications of burning. The whole complex thus appears to have been unfinished.

The line of the central partition in Structure II is extended westwards to the south end of Structure V by Wall VII, and eastwards from Unit J to Structure III by Wall VIII. The north wall of Structure II is extended east by Wall X. Structure III comprises, so far as can be seen, a terrace of three square rooms each measuring approximately 8.5 by 12.Om. The area to the north of Structures IL, III, VII and X is flat and fairly level with bed-rock visible in many places. It seems to have been devoid of buildings apart from Structure IV.

Structure IV is tripartite and measures 41.0 by 14.Om.. The four outer walls are of stone and clearly visible on the surface, but the pair of internal cross walls, 5.Om apart, can only be seen on the geomagnetic map where they appear to be much fainter and of very different character to other walls. Immediately outside at either end of the eastern partition wall the magnetic map shows a pair of opposing high spots which are difficult to interpret.

Structure V forms the western boundary of the Area, beyond which the ground falls steeply away to the west. It comprises a unit some 72.Om long and 8.Om wide. There are some surface indications that cross walls divided it into sub-units or rooms, but the evidence is ambiguous. The space between the extant wall tops is filled with rubble and there is a certain amount of stone collapse to either side. Some of the stone in the interior may be levelling for floors that have not survived or were never laid. There is no evidence for burnt wall or roof amongst the stone rubble. The north end has been denuded by stone robbing for tumulus construction.

Structure VI is enigmatic, represented by a poorly preserved stretch of wall between Structure V and the north wall of the Area. It is possible that the wall extended further to the east or that it turned southwards to enclose Structure IV, but nothing can be distinguished amongst the spread of stones and exposed bed-rock. Structure VI is of a different character to Structure V. being much less prominent because it is not so well preserved and lacks the collapsed stone.

Jdentsfi cation and Interpretation

The Area is unlike any other within the city and was surely a public complex. Interpretation of the function is circumstantial and, because of the poor preservation, not likely to be significantly supplemented by further research. The arguments for a military function are set out below. Other possibilities exist, palatial, cultic, administrative, but these seem less probable.

The urban space occupied by these structures would have been highly desirable given its proximity to the “Cappadocia” Gate, its position within the “Public Zone”, the commanding view southwards and access to the main streets within the city and the (incomplete) street around the inner face of the city wall. It can thus be assumed that the space was assigned a special function at the time of the city’s foundation and that construction began soon thereafter. There is evidence that some or all of the complexes were unfinished. Since the city defences were unfinished, in that the intended mud-brick wall was never built, it could be argued that there was a functional, and thus military, link between the area under discussion and the city wall.

Much of the area is level and empty, and could have provided space for the assembly of people, animals, equipment and goods. Plans of individual structures are without known parallel and thus of little help in determining function.

The Streets

Immediately inside the “Cappadocia Gate” was an open space, later occupied by a small Byzantine complex, in front of a T junction. From the junction one street led northwards, above

the Terrace Structures and around the edge of slopes below the Kale before dividing to each of the two easternmost gates in the north-eastern section of city wall. The other street ran from the East (Ecbatana) Gate westwards between the stone circle on the south and the imposing structure on the slopes above and to the north, passed the Terrace Structures, "Polo Field" and Sülüklü Göl on one side and the "Military Area" on the other, before reaching the open space in front of the "Palace" façade where it split and continued either side of the "Palace Complex". Between the "Cappadocia Gate" and the "Palace" façade the south side of the street was lined by the long and continuous wall that formed the north boundary of the "Military Area". There appears to be sufficient fallen stone from this wall to suggest that it rose high enough above the street to deny observation. On the other side there were also walled enclosures along the street side which could also have stood to a considerable height. The street, though some 8.5m wide, would have been sheltered from wind and, depending on the height of the walls, from sun.

Jnterpre tation

If the concept of a wide street sheltered by high walls on both sides is correct, the façade of the "palace" would have been hidden from view until near the street end. The element of surprise would have enhanced the impact of monumental façade. Perhaps, too, some of the features that appear to cross the Street on the magnetic map represent the existence of gates that would have restricted access. One curious feature of the city is the absence of inner defences or a defended acropolis, but perhaps the long streets bounded by high and blank walls, possibly blocked by gates, provided a different defensive solution whereby attackers who had penetrated the outer defences would find themselves confused and liable to be trapped.

The Stone Circle

Between the "Cappadocia Gate" and the "East Gate" is a large circle, 50.Om in diameter enclosed by a wall some 3. 50m thick composed of large slabs of granite set on edge. The circle slopes downwards to the south, respecting both the inner face of the city wall and the southern edge of the Street. The heights of the Kale offer protection from the prevailing wind, as does the slope of the circle itself Resistivity survey conducted in 1993 failed to reveal any internal features. A Byzantine burial ground, known as the "Cemetery of the Martyrs", runs over the north-eastern part of circle wall and reused much of the stone.

Interpretation

The monumentality, construction method, respect for the line of the city wall and, especially, the line of the street, and the absence of underlying features make it certain that the circle was an integral part of the Iron Age city plan. The Byzantine graves preclude a more recent date. The position, on a sheltered slope between two gates and across the street from a large complex that was perhaps administrative, is suggestive. One possible interpretation is a pound for pack animals. The size and the exceptional thickness of the wall could suggest that it was designed for camels. The slope would not have been suitable for riding, breaking in or training animals. The circle may also have been intended for military use and just possibly for military camels (Herod.1.80).

The "Polo Field"

The "Polo Field" (Fig.13) is a broad flat area, maximum dimensions 75.0 by 138.Om, more or less opposite the "Cappadocia Gate", below and west of the Terrace Structures and east of the Sülüklü Gol. The east side is bounded by a steep bank that presumably masks a terrace wall, a wall of large blocks forms the northern end. A range of structures is visible in the bank at the south-east corner, their western extent being obscure; at a greater elevation than the field and

the western structure, it could have been more than one storey. Access to the field appears to have been from the south-western end. The western edge is formed by a long narrow Structure with rectangular structures appended to the outer, western, side at either end. The west extension of Test Trench 19 was dug across the long narrow structure. Excavation clarified some architectural points but failed to reveal any evidence of internal structures, floors or artefacts. On the west edge there is a substantial terrace wall founded on loose rubble fill, retained in turn by a further terrace wall, not exposed, lower down the steep bank. Immediately east of the upper terrace wall, and retained by it, is the western wall of the building. The eastern wall of the building has only an outer face to a rubble fill that extends westwards beneath the inner (east) face of the west wall. It is thus apparent that the two walls of the building and the rubble fill of the core are of the same construction. The floors were not extant. It is likely that the floors of the building were raised, or intended to be raised, well above the level of the "polo field" which today becomes boggy in spring as water flows down the terraces from the foot of the "Kale". Sub-divisions have not been located but could be revealed by geophysical survey or wider exposure. In the Field bed-rock is visible in many places and the present level aspect of the field is doubtless artificial.

It is possible that this complex was, like the city wall and "military area" unfinished. The test excavations have not completely elucidated this problem, but did not reveal any traces of destruction debris or burning, either within the building or down the slope below.

Interpretation

The function is unknown but was clearly public and related to other activities within the "Public Zone". The large, flat, open area, apparently devoid of structures, is suggestive of exercises, parades, animal riding, games and other public spectacles, hence our nick-name: the "Polo Field". Other possibilities include a market and a place for the loading and unloading of caravans. None of these suggestions need be mutually exclusive. The long narrow structure, c. 7.5 by 138.Om, along the west edge would have reduced the force of the prevailing wind and provided shelter, although the area of roofed space would have been restricted and seems to have been too narrow for tethering horses. It may have stood two or more stories high.

The Terraces

To the east of and above the "Polo Field", and west of the main north—south street, are a series of long narrow structures on artificial terraces. Two distinct units are visible on the surface and were examined by Test Trench 19 in 1996.

Interpretation

These structures fall into a class of buildings that are often interpreted as stables. The existence of stone paving together with drains might support such an identification here, hence the preliminary suggestion that they were "imperial stables". In favour of this identification is the theoretical probability that stables do exist within the city. Other interpretations are, however, possible. The dimensions of the long narrow elements are on the narrow side for horses and the position is very exposed for quartering horses during the winter months. Further, the wide central space, perhaps open at the south end, could only have been roofed with the use of substantial columns or posts. It is thus more probable that these structures were store houses, perhaps designed to provide shelter for the loading and unloading of pack animals and even wagons. Geomagnetic survey of these structure planned for 1998 might throw additional light on this problem.

APPENDIX 1

PRELIMINARY REPORT ON THE MICROMORPHOLOGY OF DEPOSITIONAL SEQUENCES AT THE FIRST MILLENNIUM BC URBAN SETTLEMENT AT KERKENES DAĐ, CENTRAL ANATOLIA.

Dr Wendy Matthews

Research Associate, McDonald Institute for Archaeological Research, Cambridge

Introduction

A range of depositional sequences in key context types have been sampled from the urban settlement at Kerkenes Dağ, c. 550 BC for microscopic analysis in large resin impregnated thin sections. The aim is to assess the potential of the technique for examining the nature of depositional sequences and identifying traces of use of space in conjunction with geophysical survey and test trench excavation strategies at Kerkenes Da. Seven contexts have been sampled including in-situ fuel in a large oven and adjacent floor (STT4); floors in a typical two-roomed building (TT16); a large columned hall (TT15), and a stone paved area (STT5).

Analyses of depositional sequences at Kerkenes are providing important data on the nature of depositional sequences within settlements in more temperate climates in Anatolia, for comparison to sequences further south at «atal Hˆy¸k, Aªkl″ Höyük and Kilise Tepe (Matthews et al. 1996). The settlement at Kerkenes lies within Zohary's Xero-Euxinian steppe forest of Querco-Artemisietea anatolica geobotanical zone, in a region with sandy clay soils on top of granite, which contrast to the calcareous soils in the Konya basin and Göksu valley (Zohary 1973). The Iron Age levels at Kerkenes are being compared to Iron Age levels at Kilise Tepe, and to earlier sequences at all three of the other settlement currently being studied.

Method

Each depositional sequence was cleaned, photographed and drawn. Intact block samples were cut out of the section faces using a Swiss Army knife and wrapped tightly in tissue and tape. It should be noted that the block samples were difficult to cut out from the section faces at Kerkenes Da due to the hardness of the sandy clay sediments when dry. The slots cut around each block had to be moistened with a gentle jet of water, and sediments pared away c. 5-10mm at a time. Each block took up to 2 hours to cut out, in contrast to the usual maximum time of half an hour. Furthermore, the conflagration which destroyed much of the settlement in the Sixth Century BC had baked a range of deposits, particularly in the columned hall, and meant that some samples were solid and had to be sawn out of the section face. After oven drying at 40°C, the blocks were impregnated with a crystic polyester resin under vacuum, and cut, ground and polished into large thin sections, 13.5 x 6.5cm, in the Geoarchaeology Laboratory, University of Cambridge (Murphy 1986).

The thin sections have been analysed as hand held specimens and at both low and high magnifications from x5-400. They have been described using internationally standardised terminology and procedures (Bullock et al. 1985; Courty et al. 1989). The relevance and interpretation of each micromorphological attribute to study of site formation processes and uses of space is discussed in Courty et al. 1989; Matthews 1995.

Previous applications of micromorphology to studies of occupation sequences and use of space within archaeological sites include analysis of deposits within Palaeolithic and Neolithic

caves, and a range settlements in the Near East and elsewhere in the world in conjunction with experimental and ethnoarchaeological research (Courty et al. 1989; Matthews and Postgate 1994; Macphail and Goldberg 1995; Matthews et al. 1997).

Results

Depositional components

Mineral sediments

A wide range of particle sizes are present in the thin section samples from Kerkenes, including clay (<2im), silt (<50stm), sand (50sim-2mm) and rock fragments up to 32mm in diameter. The mineralogy of these sediments has been analysed in collaboration with Dr Piril Oren, Department of Geology, Middle East Technical University. The mineral and rock fragments principally comprise quartz and plagioclase and orthoclase feldspars derived from the local granite bedrock. The individual crystals range from microcrystalline structures to large crystals which cooled and formed during increasingly long periods of time. The minerals and rocks present in the settlement deposits are more weathered than those in the parent bedrock, due to ongoing pedogenetic processes in the soils, in particular of oxidisation and kaolinisation. Other minerals include: mafic amphiboles, pyroxines, hornblende, ?epidote, sphene, apatite, and sparse volcanic rock fragments. The latter could either be derived from natural outcrops, or from grindstones used within settlement. Silt, sand and rock particles sizes constitute up to 60% of deposits, particularly in packing or levelling deposits below floors, and would have provided a firmer substrate.

The organisation of the groundmass (clays) in the settlement deposits at Kerkenes varies considerably according to context and deposit type:

Groundmass type	Description	Occurrence
reticulate striated	oriented in lines which cross at right angles	characteristic of plasters and co-occurs with grano-striated -
grano-striated	oriented around sand and rock articles	characteristic of plasters and co-occurs with reticulate striated
mosaic speckled	random flecks of oriented clays	characteristic of occupation deposits
undifferentiated	no birefringence or oriented clays, dark in cross-polarised light	co-occurs with mosaic speckled in occupation deposits. Predominant in roofing sample
?crystallitic	birefringent (bright in cross-polarised light -	earth floor in ?unroofed are in 2 roomed building

Further library research is being conducted in order to investigate the significance of these variations with regard to the origin, deposition and post-depositional alterations of deposits.

Inorganic materials of organic origin

The fragments of bone in these samples are sparse and small, <2mm, and include both burnt and unburnt fragments. Bone occurs in deposits adjacent to the oven in STT4 and in the columned hall in IT 15.

Organic remains

The principal organic remains in the samples analysed are charred plant remains, which constitute <2-50% of deposits. Charred remains are particularly abundant in lenses on floors adjacent to the large oven in STT4. The charred plant remains include a range of coniferous and deciduous woods, including Quercus type; reeds, grasses, seeds and cereal grains. The preservation of these charred plant remains varies from ‘mashed’ (due perhaps either to shrink!

swell action of clays, or trampling), to well preserved remains in uncompacted deposits. Siliceous plant remains, often referred to as phytoliths, are not abundant, and only occur as 2% of deposits in in-situ oven fuel, and as traces in roofing material. Melted plant silica from reeds, with identifiable phytoliths embedded in a vesicular melted silica matrix, occur in occupation deposits on top of the floor of the columned hail and in overlying collapse. Silica melts in temperatures greater than c. 8000C.

Pseudomorphic voids of vegetal remains which have since decayed characteristically occur in floor plasters, but in low concentrations c. 2%, and in greater concentrations in mudbrick and particularly roofing fragments, at 5-10%. These voids probably represent the remains of vegetal stabilisers which would have provided tensile strength and flexibility (Norton 1986).

Possible fragments of dung occur in some deposits, represented by 2-5% finely fragmented plant remains in in-situ oven fuel (96.03 [2]), and ?digested plant remains included in floor plaster materials in the two roomed building (96.05 [2]).

Artefactual remains and anthropogenic aggregates

Few fragments of artefactual remains have been identified in these samples. Only one fragment of pottery is present in the thin sections, in deposits above the stone paving in STT5. Fragments of basaltic rock may have been abraded from grindstone surfaces during use, but may also be of natural origin from volcanic outcrops in the environs. The proximity of such outcrops is being investigated by the Department of Geology, METU.

Sub-rounded aggregates of unburnt floor plaster may originate from floor sweepings, and occur in accumulated deposits next to the oven in STT4, and in the unroofed stone paved area in STT5. Burnt aggregates occur in in-situ oven fuel, collapsed structural debris, and in the ?unroofed area of the two-roomed building.

The sparsity of anthropogenic debris, including charred plant remains, in all building materials (plaster, mud bricks and roofing) corresponds with the nature of the new and rapid construction of the settlement at Kerkenes. Virgin soil has been exposed below some buildings, and current chronological evidence suggests the settlement may have only been occupied for c. 40 years. Building materials on longer lived tell or hOyuk mound sites tend to include higher percentages of anthropogenic debris in at least some instances, from the use of source materials in and close to the halo of refuse around a settlement, or materials excavated from abandoned areas of a site.

Post depositional alterations

No reprecipitated salts have been identified in any of the thin sections analysed from Kerkenes, in contrast to settlements in more semi-arid and calcareous environments. Deposits at Kerkenes have been subject to greater physical disturbance and reworking of the original microstructure particularly in the two-roomed building in TT 15, where aggregates of plaster floor have been vertically displaced by more than 4cm.

The agents of this reworking include extensive root action attested by presence of modern roots, and a network of channels and chambers. The alternate shrink! swell of the clays during wetting, drying, and winter freeze thaw action, probably also accounts for some of the physical reworking. The microstructure of baked deposits by contrast is better preserved, as in the burnt plaster floor in two roomed building (96.05 [2]) and the baked floor and collapsed mudbrick in the columned hall (96.04 [1 and 3]). Organic staining from the decay of organic remains occurs in deposits in the two roomed building.

Types of floors

Different types of floors have been identified on the basis of their micromorphological characteristics. These types of floors moreover, vary according to context.

Floor plasters at Kerkenes are characterised by:

- embedded related distribution of coarse and fine sediments
- reticulate and grano-striated groundmass
- pseudomorphic voids of vegetal remains which have since decayed, and probably
- represent remains of vegetal stabiiisers which would have provided some tensile strength
- and flexibility
- *c*. 40% mineral inclusions (predominantly quartz and plagioclase)

The possible unprepared earthen floor in the ?unroofed area in the two roomed building by contrast

- does not have a grano-striated groundmass
- has no pseudomorphic voids of vegetal remains
- has a higher concentration of mineral inclusions (60%)

and resembles packing/levelling.

Underlying packing/levelling deposits in the large room with the oven have:

- high concentrations, c. 60%, of sand and rock fragments
- absence of strong striations in groundmass

Impact on floors

Some floors, particularly in the columned hail have sub-horizontal cracks below the surface, which at other sites are interpreted as characteristic of trampling (Ge et al. 1993; Davidson 1992).

Burning during a conflagration has oxidised the plaster floor surface in the roofed room of the two-roomed building, which is yellowish orange brown in colour. The plaster fabric below the surface was burnt in more reducing conditions, and is dark brown in colour. Bioturbation has vertically displaced plaster floor fragments up to 44mm in the two roomed building.

Origin and deposition of occupation deposits

Some of the attributes which distinguish occupation deposits from floors include:

Occupation deposits	**Plaster floors**
parallel undulating orientation and distribution of component inclusions, related to periodic accumulation and compaction	unoriented orientation and distribution of coarse inclusions from deposition as a single unit
less dense microstructure with complex packing voids	massive microstructure, occasionally with sub-horizontal cracks
bridged or inter grain aggregate coarse/fine related distributions	embedded related distributions from pugging and packing of floor during application
mosaic speckled groundmass from irregular unaligned distribution of clays, perhaps due to effects of trampling and less moisture during deposition	reticulate and grano-striated groundmass, perhaps associated with pugging of moist clays during mixing and application
higher concentrations of anthropogenic debris, especially charred plant remains and burnt aggregates	few anthropogenic inclusions

Interpretation of uses of space in different contexts

A list of the principal mieromorphological attributes of each depositional unit [n] and interpretation of each sequence is presented in Table 2.

96.01 STT4 Schmidt french. Room with large oven

This room has a moderately well prepared plaster floor. Overlying lenses of accumulated oven rake-out are rich in diverse charred plant remains, including coniferous and deciduous woods, and seeds. Other food related debris includes a ?grindstone fragment, and sparse burnt bone. These lenses of oven rake-out alternate with lenses of sediment rich deposits. The overlying layer of building collapse includes a ?roof fragment with a charred reed still adhering to the surface.

96.03 STT4 Schmidt french. Large oven.

The large oven in the room described above, had been subject to extensive bioturbation, evident also in the animal burrows visible in the field. Surprisingly well preserved charred plant remains survive in disturbed burrow fill. The surviving remnants of in-situ fuel include charred wood, 2% phytoliths, <2% melted silica, and *2-5%* ?dung represented by finely fragmented plant remains. This fuel has been mixed with collapsed superstructure aggregates, which resemble the fabric of the adjacent floor plaster, 96.01 [2].

96.05 TTJ6 Two-roomed building. Room.

The plaster floor in this room was also moderately well prepared. The surface of this plaster has been oxidised during the conflagration which destroyed this building. Some plaster floor aggregates have been vertically displaced by bioturbation. No occupation deposits are distinguishable from the overlying infill. This may due either to the fact that the room was well maintained and swept, perhaps, leaving no microscopic residues, or to extensive bioturbation which has dislodged floor plaster fragments.

96.07 TT1 6 Two-roomed building. ? Unroofed area.

The floor in this area appears to have been an earthen unprepared floor [2]. It is distinguishable from the overlying infill deposits at a microscopic scale, by the nature of the groundmass which is mosaic speckled, lacking oriented striations. The spongy/vughy microstructure of the infill deposits further suggests extensive bioturbation. These deposits include 2% charred remains and burnt aggregates, perhaps from a fire-installation somewhere in the vicinity, or brought in from the street.

96.04 TTI6 Columned hall.

The plaster floor in this hall was baked hard by the intensity of the heat from the conflagration which destroyed the building. The surface has subhorizontal cracks which are often characteristic of trampling (Ge et al 1993, Davidson 1992), but may also have been affected by the burning. A thin lens of occupation deposits includes melted reed (perhaps also from the root) and sparse slivers of bone. These deposits are irregularly dispersed, and mixed with 50% aggregates of collapsed and baked mud brick.

96.02 STT5 Schmidt french. Stone paved area.

This deposit has little internal lensing, in contrast to deposits in the room with the oven in STT4. Deposits are unoriented and include *2-5%* charred remains, a pottery fragment <5mm, calcareous rock fragment, and subrounded aggregates with charred remains adhering to the surface, perhaps from floor sweepings. The high concentrations of cereal grain retrieved during excavation were less visible in the field section and the thin section, perhaps suggesting localised deposition/survival.

96.06 Roofing fragment

This roofing fragment has macroscopic impressions of reeds on one surface. The microstructure has the highest concentration of pseudomorphic voids from decayed vegetal remains in this sample set, at 10%. This high figure suggests plant remains were vital to construction of roof to add greater tensile strength, flexibility and resistance to shrink/swell during temperature differentiations, and would have enabled reduction of the weight of deposits on the roof

Conclusions

Although the deposits at Kerkenes were difficult to sample, and have been subject to a range of post-depositional disturbances, micromorphology is enabling us to analyse a wide range of mineral, organic and artefactual components, and their preserved depositional and contextual relationships. Clear variation in deposit types, and indications of different uses of space are emerging. These variations will be better understood in the light of co-ordinated controlled volume wet-sieving and flotation which will enable examination of the concentrations and degrees of fragmentation of bioarchaeological and artefactual remains in larger sample sizes for further statistical analyses. The nature of the deposits at Kerkenes is new to the researcher, and can be further elucidated by additional library research, and comparison and discussion of samples with other micromorphologists at the International Soil Micromorphology Workshops which take place annually. This set of samples is providing important comparative information on the impact of human activities on depositional sequence in more temperate climates and regions with sandy clay soils on granite.

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Sample	Location	Packing/levelling	Floors	Impact on floors	Occupation deposits	Collapse	Post-depositional alterations	Interpretation
96.01	STT4 S Section Room with large oven	[1] Unoriented sandy clay loam. 60% deposit: granite rock fragments > 25 mm. Embedded in mosaic, local parallel + grano-striated brown groundmass.	[2] Unoriented sandy clay-sandy clay loam. 40% fabric: quartz and feldspar minerals. Embedded in grano- and reticulate striated yellow-orange brown groundmass. Subangular blocky microstructure. <2% pseudomorphic voids from decayed vegetal stabilisers.	Diffuse, irregular undulating boundary, <0.5mm thick.	[3] Undulating lenses of sandy silt loam with a dark brown mosaic speckled groundmass, + up to 50% charred plants including seeds + wood (coniferous* + ?oak) <2.7 mm in size; <2% burnt bone, + a ?grindstone frag <4mm, 5% subrounded aggregates (?sweepings)	[4] Includes orange brown sandy clay loam aggregate (?roof fragment) with charred reed adhering to undulating surface	Bioturbation: channels and chambers from root and insect activity 20% (floor [1]) - 50% (occupation [2]), modern roots still visible, <2%. Some charred plant remains in occupation deposits [2] are cracked and not well preserved.	Packing/levelling [1] includes 60% granite frags which would have provided a firm substrate for the moderately well prepared plaster floor [2]. Occupation deposits [3] comprise lenses of oven rake-out and floor sweepings. Collapse [4] inclu des ?roof frag.
96.03	STT4 Large oven			knife edge, irregular boundary (in areas where there has not been any bioturbation)	[2] Undulating sandy silt loam. Complex packing void microstructure. Mosaic speckled + undifferentiated groundmass, bridged + intergrain agg.10% charred remains (wood), 2% phytoliths, <2% melted silica, 2-5% ?dung, 20-40% burnt + unburnt aggs, 5-10% rock	[3] Unoriented sandy clay loam with reticulate + slightly grano-striated groundmass + embedded related distribution. 2% voids from vegetal stabilisers.	Extensive bioturbation, including large burrow 11.5 x 4 cm, between burnt aggregates. Large frag of bone and well preserved charred plant remains (incl. wood) in disturbed deposits in burrow.	In-situ fuel mixed with burnt and unburnt aggregates. Fuel included coniferous and deciduous wood, 'grasses', and ?dung. Fabric of collapsed oven superstructure [3] is similar to plaster floor fabric [96.01 Unit [2].
96.05	TT16 E Section Two-roomed building. Room		[2] Unoriented sandy clay loam (c. 40% quartz and feldspar). Embedded, grano- and reticulate striated groundmass. 2% voids and charred remains from vegetal stabilisers. ?2% charred dung.	Burning in conflagration has oxidised plaster floor surface y-orange brown, + reduced lower plaster v dark brown.	none detectable separately from collapsed debris, perhaps due to extensive bioturbation.	[3] Unoriented sandy clay loam. 50% quartz and feldspar minerals. <2% basalt grain. Embedded mosaic speckled brown groundmass. ?Spongy/vughy microstructure.	5% chambers within hard plaster floor, but 30-40% floor surface has been dislodged by bioturbation, and moved vertically >44mm. Modern roots > 15 mm. 2% dark brown staining. 25 % channels and chambers in [3].	
96.07	TT16 2 roomed building ?Unroofed area		[1] Unoriented sandy clay loam with 60% quartz and feldspar minerals and rock frags. Embedded, reticulate striated and ?crystallitic y-orange groundmass. <2% charred plants (wood). 5% crack microstructure	very diffuse boundary	none detectable separately from collapsed debris, perhaps due to extensive bioturbation.	[2] Unoriented sandy silt loam. Embedded, mosaic speckled brown groundmass, with microcontrasted particles. Some cracks and vughs in microstructure. <2% charred plants, 2% burnt aggregates and 10% unburnt aggregates.	10-15% channels and chambers. At least 20% bioturbation in floor zone, >60% in overlying deposits.	?Unprepared/poorly prepared earth floor (with no vegetal stabilisers nor a grano-striated groundmass, but a higher % of sand + rock frags). Occupation could not be distinguished from collapse /infill due to extent of bioturbation. Sparse ?FI rake-out.

Sample	Location	Packing/levelling	Floors	Impact on floors	Occupation deposits	Collapse	Post-depositional alterations	Interpretation
96.04	TT15 Columned Hall building		[1] Unoriented sandy clay. 40% quartz and feldspar minerals and rock frags. Embedded reticulate and grano-striated dark y-or brown groundmass. Subangular blocky microstructure.	Sub-horizontal cracks below plaster floor surface, characteristic of trampling (Gé et al + Davidson*)	[2] Unoriented sandy silt loam 2-7.5mm thick. Faint reticulate striated dark or. brown groundmass. Embedded, bridged + intergrain aggregate. Complex packing void + crack microstructure. 50% building aggs. (2% melted). 2-5% melted reeds, 2% bone frags	[3] Collapsed baked mud-brick. Unoriented loamy sand-sandy clay loam (quartz + feldspar). Undifferentiated v dk brown groundmass. 5-10% voids from vegetal stabilisers. <2% charred plants. Large aggregate of vesicular melted silica 55 mm, w. reed cells	Less bioturbation in floor and collapsed deposits in this sequence, due to indurate nature of fabrics baked by heat. Some of the cracks may be due to heat. 50% fabric bioturbated in occupation [2], due to irregular distribution of components	Baked plaster floor with sub-horizontal cracks from ?trampling/heat. Thin lens of occupation deposits includes melted reed and fine bone frags, later mixed with up to 50% aggregates from collapsed building materials.
96.02	STT5 Unroofed paved area				Heterogeneous deposits, including 2-5% charred plant remains < 15 mm, aggregates with charred material adhering to surfaces (from ?discarded sweepings), pottery frag, 2% amorphous crystallitic aggregates, <2% calcareous rock fragment, + <2% cracked bone			
96.06				?whole reed stem impressions		Unoriented sandy clay loam-sandy clay. 50% quartz and feldspar: <1mm + <15mm). Embedded, dark red ?undifferentiated groundmass. Massive microstructure. 10% voids from vegetal stabilisers, <2% siliceous plant remains/modern roots.	Silt clay-silt loam coating 140um thick on edge of roofing in curving impression, ?translocation/dust/mud adhering to (now absent) ?reed	Roofing material with intact ?reed impressions. This material and that of other plasters and mudbricks does not include reworked occupation debris, perhaps attesting to new and rapid foundation of architecture in this settlement. Highest % stabilisers.

APPENDIX 3

THE KERKENES DAG MONOGRAPH

PROGRESS REPORT, October *5* 1997

Geoffrey Summers

This progress report outlines the chapters and sections of the book as currently envisaged. The book is expected to total around 300 pages, to have dual English and Turkish text in adjacent columns and to contain a large number of full colour images. The precise model is the *Brochure* on the project produced by the Is Bank, although it is expected that the quality of both the printing and the colour separation can be improved on. The general model is Peter Neve's *Hattusa Stadt der Gotter und Temple,* von Zarben 1993

The book will probably be produced in Turkey. Some initial approaches have already been made to potential sponsors or donors for production costs, we will soon have a sample mock up of a couple of chapters around which further approaches and negotiations can proceed.

Intended readership is: 1. professional, academic, archaeologists, anthropologists, ancient historians and art historians with interests in the general archaeology of Anatolia and the Near East, the Iron Age and Hellenistic periods of Anatolia; Iran, the Black Sea and the Aegean. 2. archaeologists with interests in the application of new technologies, especially remote sensing, GIS analysis and image enhancement, 3. undergraduate and graduate students, 3. An educated lay public with interests in ancient Anatolia and its neighbours.

The aim of the book is to present an overview of the Kerkenes Project and the major results from the first 4 field seasons, 1993-1997. A wide selection of the evidence will be included to support the conclusions reached and to demonstrate the research design and methodological approaches that have been adopted. It is not intended be a complete report on every aspect of the project because the research is continuing. Nor will it contain detailed catalogues of finds, partly because exhaustive descriptions and catalogues are the preserve of specialists and are thus better suited to specialist reports in academic journals and partly because shush detail would be premature. The volume will nevertheless be a substantial and extremely informative contribution that no scholar or layman in the field will be able to ignore. The format is also intended to appeal to a wider readership than would normally take an interest in this area in the expectation that the wider dissemination of knowledge will enhance future support for the project in Turkey and beyond.

CHAPTERS

1 Introduction to the aims and scope of the Project.
Text, **GDS** and MEFS
Illustrations: map (colour version to be prepared), balloon photograph of site (done); other images to be selected, depending on space.

2. **Environment**
Geology and geomorphology, *being prepared by Christine Perrier and Prof Ayhan Er/er.*
Vegetation and land use, *GDS text in preparation.*
Illustrations: geological map (drawn, needs enhancement), DTM from Landsat (done), geological thin sections (being prepared), colour slides of vegetation and grazing (done). Satellite images (done; could do more if time permits, e.g. soil and vegetation maps).

3. History of exploration
Text GDS (done).
Illustrations: Marconigram from Schmidt (done), Von der Osten and Blackburn map with Schmidt trenches (done), illustration of 1928 expedition (done).

4. Historical background
GDS (short version of *JNES* paper on the identification, almost complete, needs editing and references to new map).
Illustrations: map of Media, Lydia etc. (to be prepared in colour), view of site in winter or showing dominant position of the site (done, need final selection).

5. Methodologies
Text *GDS and MEFS (partly done).*
Geophysics *GDS, MEFS, L. Somers (largely done,).*
GIS *Levent Topaktas Deniz Kutay (sin progress,).*
Test trenches, *aims of (GDS).*
Finds conservation *£ Korolnik (largely done, need pruning and editing,).*
Illustrations: balloon photography in progress, total station and or GPS, geophysical survey sample, data collection in progress, aerial photo rectification (most done, some to complete).

6. Description of city *(GDS et a/. The main body of the volume divided into sections,)*
Defences, Hydrology, Communications, Public Zone, Urban blocks, zoning and dynamics, NW block and excavation results, Karabas.
Conclusions (much of the description for all of the above is done, some needs further work, conclusions to be written).
Illustrations: Geophysical maps, plans drawn from same, rectified aerial images, balloon photographs, plans of public zone, urban areas, plan of defences, plans of gates, (all done, some will be enhanced).
Trench plans etc. (not finished).
Reconstructions, diagrams of urban zoning etc., block plans of gates and reconstruction (to be done or completed, gate plans and descriptions to be finalised with Omur Harmansah, Dec. 1997, other drawings to be finalised).

7. Finds from test trenches
Ivory (ills done, text being prepared by E. McIntosh).
Metal work (in consultation with K. Stevenson for the vehicle parts).
Pottery (selection of typical forms).
Illustrations (all drawn and photographed, need mounting and selection, pottery [strictly limited amount] mostly needs inking).

8. Tumuli
Text GDS (done).
Balloon photographs, general photographs (done).
Needs editing and collation.

9. Later Aspects
Kale and Kiremitlik, GDS *et al.*
Done *needs editing and collation.*

10. Regional Survey
Chalcolithic, Hittite (Kusakh/ Zippalanda), Göz Baba, Reservoirs.
GDS *parts done, some to be edited from existing reports, needs additions.*
Illustrations (done, need selection).

11. Village
(Optional)
Photographs (done)

12. Acknowledgements

As work progresses on the image enhancement and GIS analysis over the winter of 1997/8 new and better images will be produced and further insights will be gained. This process, as far as the publication is concerned, will be completed by the end of March 1998. Three months, April-June, will be spent on final selection of images for publication, collation, editing and so forth. Some chapters are now almost complete and will be used over the winter to raise sponsorship and to discuss various production procedures and costs with potential printers. It is expected that the volume will be ready for submission to a printer by the end of June 1998, before the start of the first season of the next phase of field work at Kerkenes. Experience has shown that production of such a volume in Turkey requires constant and considerable quality control which is very time consuming. While it is hoped that publication would be before the end of 1998, it is possible that the time needed to raise sponsorship and to oversee production and printing will take longer.